

THE EFFECTS OF POINT-OF-VIEW VIDEO MODELING ON SYMBOLIC PLAY  
ACTIONS AND PLAY-ASSOCIATED LANGUAGE UTTERANCES IN  
PRESCHOOLERS WITH AUTISM

by

Lauren Kravetz Bonnet  
A Dissertation  
Submitted to the  
Graduate Faculty  
of  
George Mason University  
in Partial Fulfillment of  
The Requirements for the Degree  
of  
Doctor of Philosophy  
Education

Committee:

\_\_\_\_\_ Chair

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

Program Director

\_\_\_\_\_

Dean, College of Education  
and Human Development

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

Summer Semester 2012  
George Mason University  
Fairfax, VA

The Effects of Point-of-View Video Modeling On Symbolic Play Actions and Play-  
Associated Language Utterances in Preschoolers with Autism

A dissertation submitted in partial fulfillment of the requirements for the degree of  
Doctor of Philosophy at George Mason University

By

Lauren Kravetz Bonnet  
Master of Arts  
George Washington University, 2006  
Bachelor of Science  
Ithaca College, 2003

Director: Pamela Hudson Baker, Associate Professor  
Graduate School of Education

Summer Semester 2012  
George Mason University  
Fairfax, VA

Copyright 2012 Lauren Kravetz Bonnet  
All Rights Reserved

## **DEDICATION**

This is dedicated to the love of my life, Ben, who agreed to join me on this adventure.

## ACKNOWLEDGEMENTS

First, I wish to recognize my family for their endless support, encouragement, and love. Ben, you are my everything. I am the luckiest person in the world to be adventuring through life with you by my side. My parents raised me in a loving household, challenged me intellectually, modeled a supportive and loving marriage, helped me persevere through thick and thin, and sent me to camp all those summers. I would never be the woman I am today without them. Mama, you are my guidepost for everything I do in life. You shared your love for teaching with me and I have idolized the way you run a classroom since I was young. Someday I hope to be half the teacher you are. Dad, you taught me to be a leader whether it was on the pitcher's mound or advocating for what is fair and just. You taught by example what it means to work hard and never give up on your dreams. Thank you for always being my biggest cheerleader. Adam, you always challenge me to do the impossible and dream larger than life. You are the reason I push harder, work longer, and strive to achieve higher in everything I do. And for that I am more proud of who I am and what I can do than anything else. Also, I am forever grateful that you brought me to Camp Gorham. Camp has fueled my desire to include all children in opportunities to learn outside school walls, build lifelong friendships, develop leadership skills, celebrate individuality, and most of all have fun. Last but not least, Brewster, whose loyalty, antics, and unconditional love fills our home with laughter and warmth: You bring a smile to my face every day.

I would like to express my most sincere gratitude to my dissertation chair, Dr. Pam Baker, for taking me under her wing for the last four years. From the start she has advised and guided me through school and life. She leads by example and her extraordinary ability to navigate interpersonal relationships seems effortless. Dr. Baker has challenged me to strive for my best and never accept anything else. Thanks for choosing me as your mentee. You have influenced me in more ways than I can ever express.

Thank you to my dissertation committee whom I affectionately call the BDCE (Best Dissertation Committee Ever) because they are just that! Thank you, Dr. Pam Baker, Dr. Anya Evmenova, and Dr. Vicky Spencer. Anya, your optimism and tremendous knowledge about research inspired me to continue to pursue a career as a researcher. I'm continuously amazed by all that you do and how well you do it, with a smile! Vicky, your encouragement and expertise have been so valuable. I'm forever grateful to you for the support you gave me when life threw me a curveball. Thanks for caring about me as both a student and a person.

I am very appreciative for the generous financial assistance that funded my Ph.D. program. Thank you to Dr. Pam Baker, Dr. Rick Brigham, and Dr. Peggy King-Sears for

selecting me as a recipient for funding through their Personnel Preparation grant in the area of Special Education Leadership.

I would like to give a heartfelt thank you to Dr. Alvin Crawley and Dr. Julie Crawford for their cooperation and support so I could work on both my research and professional career. I would like to acknowledge the cooperating school division and building principals for granting me access to their school and the opportunity to work with such wonderful students. Thank you to Elaina Eliopoulos, Rosie Gaston, Dani Green, Cintia Johnson, Felicia Russo, and Kenwyn Schaffner for your time, interest, and cooperation. I would also like to say a special thank you to Elaine Porter for her dedicated participation in my research.

Thank you to my friends whose unwavering love and support have helped me through this journey. Julia, you have been there for me through everything. I'm so lucky to have you as my best friend!

Last, but most certainly not least, a huge thank you to my students and their families. You have inspired me to make a difference in the way the world views learning and success. You are the reason I have chosen this career.

The contents of this dissertation were developed under a grant from the U.S. Department of Education, #H325D080036. However, those contents do not necessarily represent the policy of the US Department of Education, and you should not assume endorsement by the Federal Government.

## TABLE OF CONTENTS

	Page
List of Tables .....	x
List of Figures .....	xi
Abstract .....	xii
1. Introduction.....	1
Statement of the Problem.....	1
Background of the Problem .....	8
Delimitations .....	11
Research Questions .....	12
Definitions of Terms .....	14
2. Literature Review.....	17
Video Modeling .....	17
Instructor-Created Videos .....	19
Students With Autism Using Video Modeling .....	21
Point-of-View Video Modeling .....	24
Play .....	29
Symbolic Play .....	34
Cooperative Play .....	38
Motor Imitation in Play.....	39
Language Utterances.....	41
Play-Associated Language Utterances and Autism .....	42
Summary .....	45
3. Methodology .....	46
Research Design.....	46
Multiple Baseline Design.....	48
Single Subject Research Design Standards.....	48
Participants.....	50
Selection of Participants With Autism.....	51
Selection of Play Partner Participants.....	53
Selection of Professional Participants.....	53
Protection of Human Participants and Informed Consent .....	54
Participants with Autism.....	55
Summary of Participants with Autism.....	68
Play Partner Participants .....	69
Professional Participants .....	70
Setting and Selection of Site .....	70

Independent Variable .....	73
Materials .....	74
Validation of Independent Variable.....	76
Dependent Variables .....	78
Scripted Symbolic Play Actions .....	78
Spontaneous Symbolic Play Actions .....	80
Scripted Play-Associated Language Utterances .....	81
Spontaneous Play-Associated Language Utterances .....	82
Supplemental Measures .....	82
Procedures.....	83
Play Partner Participant Training.....	84
Random Assignment of Participants.....	86
Baseline.....	90
Point-of-View Video Modeling Intervention.....	91
Maintenance.....	93
Generalization .....	94
Reliability and Scoring .....	96
Independent Observer's Training .....	96
Interobserver Agreement for Dependent Measures .....	97
Interobserver Agreement for Supplemental Measure .....	99
Procedural Reliability .....	100
Social Validity .....	102
Data Analysis .....	104
Visual Analysis .....	104
Percent of Non-Overlapping Data .....	105
Randomization Tests.....	106
Summary .....	107
4. Results.....	109
Scripted Symbolic Play Actions .....	110
Marcos.....	111
Sarah .....	112
Diego.....	113
Leo .....	115
Randomization Test Results for Scripted Symbolic Play Actions.....	116
Spontaneous Symbolic Play Actions .....	116
Marcos.....	118
Sarah .....	120
Diego.....	121
Leo .....	122
Randomization Test Results for Scripted Symbolic Play Actions.....	124
Scripted Play-Associated Language Utterances .....	124
Marcos.....	126
Sarah .....	128
Diego.....	129



Leo .....	130
Randomization Test Results for Scripted Play-Associated Language Utterance .....	132
Spontaneous Play-Associated Language Utterances .....	132
Marcos.....	134
Sarah .....	135
Diego.....	137
Leo .....	138
Randomization Test Results for Spontaneous Play-Associated Language Utterances .....	139
Ancillary Findings: Inappropriate Play Behaviors .....	140
Marcos.....	142
Sarah .....	144
Diego.....	145
Leo .....	146
Randomization Test Results for Ancillary Findings.....	148
Social Validity .....	148
Student Participant Social Validity Questionnaire .....	150
Professional Participant Social Validity Questionnaire .....	151
5. Conclusion and Recommendations.....	155
Summary of Findings.....	155
Conclusions and Implications .....	157
Scripted and Spontaneous Symbolic Play Actions .....	157
Scripted and Spontaneous Play-Associated Language Utterances .....	162
Ancillary Findings: Inappropriate Play Behaviors .....	167
Other Noteworthy Contributions .....	169
Limitations .....	170
Limitations to Setting.....	170
Limitations to Participant Characteristics .....	171
Limitations to Point-of-View Video Modeling.....	172
Recommendations.....	172
Recommendations for Setting.....	172
Recommendations for Participant Characteristics .....	174
Recommendations for Point-of-View Video Model.....	175
Suggestions for Practitioners .....	176
Summary .....	180
Appendices	
A. Candidacy Checklist: Participants with Autism .....	182
B. Candidacy Checklist: Play Partner Participant .....	184
C. Candidacy Checklist: Professional Participant .....	185
D. HSRB Informed Consent Forms .....	186
E. Participant Material Used for Baseline, Intervention, and Maintenance .....	193
F. Participant Materials for Generalization .....	196
G. Point-of-View Video Model Script and Researcher's Script.....	198

H. Scripted Symbolic Play Actions Data Collection Sheet .....	199
I. Scripted Play-Associated Language Utterances Data Collection Sheet .....	201
J. Spontaneous Symbolic Play Actions Data Collection Sheet .....	203
K. Spontaneous Play-Associated Language Utterances Data Collection Sheet .....	205
L. Inappropriate Play Actions Data Collection Sheet .....	207
M. Randomly Selected Dyad Matches by Session .....	209
N. Procedural Reliability Checklist: Baseline, Generalization, and Maintenance ...	212
O. Procedural Reliability Checklist: Treatment.....	214
P. Professionals Social Validity Questionnaire.....	216
Q. Student Participant Social Validity Questionnaire .....	217
References.....	219

## LIST OF TABLES

Table	Page
1. Types and Sequences of Pretend Play .....	36
2. Summary of Characteristics of Participants with Autism.....	68
3. Description of Play Partner Participants .....	69
4. Brown's Fourteen Grammatical Morphemes.....	74
5. Methodology Summary .....	108

## LIST OF FIGURES

Figure	Page
1. Logic Model.....	7
2. Randomly Selected Tiers and Start Dates of Intervention.....	87
3. Scripted Symbolic Play Actions .....	117
4. Spontaneous Symbolic Play Actions .....	125
5. Scripted Play-Associated Language Utterances .....	133
6. Spontaneous Play-Associated Language Utterance.....	140
7. Inappropriate Play Behaviors.....	149

## **ABSTRACT**

### **THE EFFECTS OF POINT-OF-VIEW VIDEO MODELING ON SYMBOLIC PLAY ACTIONS AND PLAY-ASSOCIATED LANGUAGE UTTERANCES IN PRESCHOOL CHILDREN WITH AUTISM**

Lauren Kravetz Bonnet, Ph.D.

George Mason University, 2012

Dissertation Director: Dr. Pamela Hudson Baker

This single-subject research study was designed to examine the effects of point-of-view video modeling (POVM) on the symbolic play actions and play-associated language of four preschool students with autism. A multiple baseline design across participants was conducted in order to evaluate the effectiveness of using POVM as an intervention for students with autism.

The participants were between the ages of 3 and 4 years old and enrolled in a special education preschool program in a public school district in a Mid-Atlantic state. Students were paired with typically developing preschool peers from general education classes at the same school as the participants with autism. Prior to the implementation of the video model, baseline data were collected from students during play with a randomly selected play partner participant and the same materials later shown in the video model. Regulated randomization procedures for multiple baseline design were used to randomize

students to each tier of intervention and randomly assign the treatment starting point from a designated interval of acceptable start points. Dependent measures included (a) scripted symbolic play actions, (b) scripted play-associated language utterances, (c) spontaneous symbolic play actions, and (d) spontaneous play-associated language utterances.

During intervention, the participants with autism were shown a video clip demonstrating symbolic play actions and play-associated language utterances from their perspective immediately prior to engaging in a 7-minute play session with a play partner participant. The variety of symbolic play actions and play-associated language utterances were recorded and measured during all phases. Additionally, partial interval recording was used to record frequency of inappropriate play behaviors. Maintenance data were collected after the immediate removal of the POVM and one week after the conclusion of the intervention phase. Generalization data were collected for a novel but similar play set to that in the video model. A checklist for procedural reliability was completed for 68% of sessions across all phases and participants and calculated to be 100%. Interobserver agreement was calculated for 31.58% of sessions across all phases and participants and was averaged at 90.81%. Social validity measures were collected from the teacher, instructional assistants, and therapists that work with each participant. Additionally, information about student perceptions was collected from each participant using a visual choice menu. A visual analysis was conducted for the data collected across the four dependent variables and one ancillary finding for each participant. The visual analysis involved interpretation of the level, trend, variability, overlap, immediacy, and

consistency of data points. Percent of Non-overlapping Data (PND) and randomization tests were also used for analysis.

Overall findings from the study indicate that (a) three out of four preschool participants with autism increased the variety of scripted symbolic play actions after watching the POVM, (b) three out of four preschool participants with autism increased the variety of spontaneous symbolic play actions after watching the POVM, (c) one out of four preschool participants with autism increased the variety of scripted play-associated language utterances, (d) two out of four preschool participants with autism increased the variety of spontaneous play-associated language utterances, and (e) three out of four preschool participants with autism decreased the frequency of inappropriate play behaviors.

In reference to maintenance of behaviors, (a) all four participants maintained the variety of scripted symbolic play actions, (b) all four participants maintained the variety of spontaneous symbolic play actions, (c) one out of four participants maintained the variety of scripted play-associated language utterances, (d) two out of four participants maintained the variety of spontaneous play-associated language utterances, and (e) three out of four participants maintained a reduction in the frequency of inappropriate play behaviors.

Regarding generalization of behaviors for the dependent variables, (a) two out of four of the participants demonstrated a variety of scripted symbolic play actions from the intervention play set when playing with another car-based play set, (b) all four participants demonstrated a variety of spontaneous symbolic play actions during

generalization with a different car-based play set, (c) one out of four participants produced a variety of scripted play-associated language utterances from the intervention during play with a different car-based play set, (d) two out of four participants produced a variety of spontaneous play-associated language utterances when playing with the generalization play set, and (e) three out of four participants were able to maintain a reduced frequency of inappropriate play behaviors during generalization probes.

The results of the regulated randomization test indicated a statistical difference between the students' variety of scripted play actions ( $p = 0.0078$ ) and frequency of inappropriate play behaviors ( $p = 0.0104$ ). There was no statistical difference between the students' variety of spontaneous play actions ( $p = 0.2708$ ), scripted language utterances ( $p = 0.7396$ ), or spontaneous language utterances ( $p = 0.7031$ ).

Recommendations were discussed with respect to future research and practical uses of POVM to assist with teaching symbolic play actions, play-associated language utterances, and improving student behavior.



## **1. INTRODUCTION**

The current study investigated the effects of point-of-view video modeling on symbolic play actions and play-associated language utterances in preschool students with autism. This was an effort to explore the evidence base for teaching students with autism social and language skills needed for inclusion in the general education curriculum.

### **Statement of the Problem**

Language development and play are both critical in the development of cognition, academic achievement, social competence, and positive peer relationships. There are negative ramifications for those who fail to develop play skills or language sufficiently or at the time that their peers are developing these skills, including difficulty engaging in social interactions, difficulty negotiating conflicts, inability to communicate needs, and proneness to peer rejection (Craig-Unkefer & Kaiser, 2002). Students with language impairments are at risk for problems with academic skills, specifically in the areas of reading, comprehension, and spelling (Hay, Elias, Fielding-Barnsley, Homel, & Freiberg, 2007). Early intervention is essential for students at risk of developing difficulty in school and appropriate interventions may enhance language and play skills in the older preschool years (Craig-Unkefer & Kaiser, 2002, 2003; Mallory, Kelly-Vance & Ryalls, 2010; Sualy, Yount, Kelly-Vance, & Ryalls, 2011). Language and play development are

correlated (Ungerer & Sigman, 1981; Vaughn et al., 2003) and impact overall development in early childhood (Spencer, 1996).

Play is fundamental to a child's development and is a normalized, contextually relevant experience for preschool-aged children (Barton, 2012; Kelly-Vance & Ryalls, 2008). It involves a number of complex behaviors that are linked to cognitive, social, and language development (Vaughn et al., 2003). Higher levels of play skills enhance a child's ability to practice social skills and develop positive peer relationships (Vaughn et al., 2003). Play skills also increase the likelihood of learning in inclusive settings (Buysse, Wesley, Keyes, & Bailey, 1996), reinforce properties for other skills (Morrison, Sainato, Benchaaban, & Endo, 2002), set the occasion for interactions with peers (McConnell, 2002), and provide a context for embedding strategies for other goals (Barton, 2012). However, young children with autism often struggle to develop play skills due to the nature of the disability, which includes impairments in language, social skills, and repetitive patterns of behavior (e.g., lining up toys by size) (Paterson & Arco, 2007). Many youth with autism do not develop spontaneous play skills, and social, communicative, and cognitive consequences exist for failing to engage in play (Herrera et al., 2008).

Language development is essential for children's social skills, cognitive development, and academic outcomes (Hay et al., 2007). The overall development of social competence is dependent on language development (Craig-Unkefer & Kaiser, 2002). As language develops between the ages of 12 months and 36 months, play becomes more complex, flexible, generalized, and symbolic (Rescorla & Goossens,

1992). Young children with autism often fail to develop language during this time, thus intervention is required in order to make progress in this domain.

Stanley and Konstantareas (2007) reported that symbolic play in children with autism “is not uniquely tied to one area of development but is rather linked to a number of other areas of functioning” (p. 1221). As such, it is important to consider several domains simultaneously. Further, deficits in social skills associated with autism may contribute to less social interactions than typical peers and impairments in reading environmental, nonverbal cues. As such, this would hinder language acquisition and the ability to comprehend different perspectives (deficits in the development of a theory of mind). Both a theory of mind and language acquisition are necessary to engage in play with pretense. For children who have weak nonverbal cognitive abilities, these impairments are likely compounded, introducing another barrier to learning skills necessary to engage in appropriate symbolic play (Stanley & Konstantareas). Object play provides opportunities for social interactions and communication with peers (McConnell, 2002) while also providing a context for implementing instruction (Barton & Wolery, 2010; Sandall, Hemmeter, Smith, & McLean, 2005). Pretend play may increase engagement in inclusive settings (Lieber, 1993; Morrison et al., 2002) resulting in more positive perceptions of individuals with autism by peers without disabilities (Strain, 1985).

Impaired symbolic play is a symptom of autism spectrum disorders (American Psychiatric Association [APA], 2000; Stanley & Konstantareas, 2007). Children with autism display fewer play behaviors and less variety in their play with objects than their

typically developing peers (Jarrold, Boucher, & Smith, 1996; Ungerer & Sigman, 1981). Children with autism have been described as having play that is simple, repetitive, stereotypical, and lacking in the complexity and diversity that distinguishes the play of children without autism (Jarrold et al., 1993; Stanley & Konstantareas, 2007; Whyte & Owens, 1989). Even children with autism who have normal verbal and nonverbal intelligence quotients (IQs) present with basic play that is stereotypical and relies on sensory manipulation of objects (Stanley & Konstantareas).

Prevalence rates of autism spectrum disorders (ASD) are on the rise. Current research from the Centers for Disease Control and Prevention (CDC) (2012) suggests that ASD affects approximately 1 in 88 children in the United States, which reflects a dramatic increase in estimated prevalence of 78% from 2002 to 2008. Consequently, more and more students with high incidence disabilities, such as autism, are being served in public school classrooms (Matson & Neal, 2009). The Individuals With Disabilities Education Improvement Act (IDEA) (2004) and No Child Left Behind (NCLB) (2001) mandate educators to implement evidenced-based intervention and instruction. Further, the National Association of the Education of Young Children's Developmentally Appropriate Practices recommends play activities and classroom routines that promote peer interaction (Copple & Bredekamp, 2009), and including these activities as part of the daily classroom schedule have been shown to influence social skill development and later social success in children with disabilities (Jamison, Forston, & Stanton-Chapman, 2012). Given federal legislation and recommendations such as these, both general and special education teachers need to support an increasingly diverse population and address

the increasing demands for accountability by documenting that students are benefiting from evidence-based instructional programs in their classrooms.

While understanding the causes of and the treatment for autism continues to increase, there is no known cure (Centers for Disease Control [CDC], 2012). Thus, researchers continue to persist in reviewing past and current treatment and developing new interventions that aim to alleviate some of the devastating effects the disorder can have on the individuals affected and their families. Given that autism is pervasive in nature and the negative outcomes associated with symptoms of the disorder, researchers have devoted substantial efforts to designing and evaluating interventions that address the development of social competencies (National Research Council, 2001).

Difficulty with “selecting and implementing effective intervention persists due to the scarcity of school-based social skills programs designed for students with autism” (Peters, 2008, p. 3). According to Bandura (1993), teachers will persevere with challenging tasks more readily if they feel competent and effective. Teachers agree that students with ASD require specialized services in the school, but most educators receive relatively little formal instruction on evidence-based practice for working with children with autism (National Research Council, 2001). Consequently, research should be completed and shared with practitioners in forms that are easily accessible and geared toward their audience. As educators, related service professionals, and parents strive to enhance and build meaningful educational opportunities for students with autism, a significant need for further research on evidence-based strategies for working with students with autism has emerged.

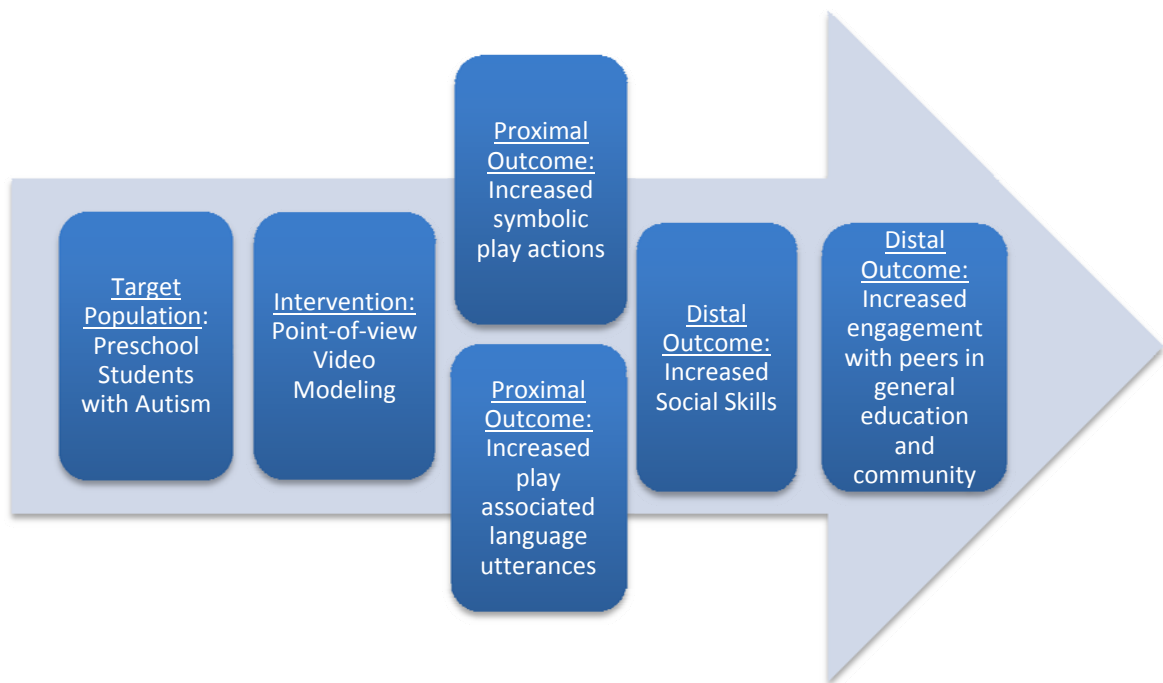
Few commercially available curricula address social and communication skills within a group play-based setting, despite this being the naturalistic environment for social interaction (Krasny, Williams, Provencal, & Ozonoff, 2003). Existing social skills programs often lack generalization of skills outside of the structured setting (LeGoff, 2004). Students may learn social skills in therapy or the classroom setting, but be less likely to practice these skills in less structured, natural settings such as on the playground or during playtime.

It is well known that students with autism “often learn information they can see more easily than spoken information that they can only hear” (Ganz & Flores, 2010, p. 59). Using the strength children with autism may have in visual processing may bypass deficits in memory, attention, organization, and speech and language skills. Modeling, including specific types such as video modeling, offers children with autism a visual strategy that aims to increase the amount and quality of appropriate social interactions and communication with peers.

According to Hine and Wolery (2006), increasing a child’s appropriate actions may reduce repetitive actions, which in turn may promote opportunities for social exchanges with peers. Teaching appropriate play actions may promote increased communication and development of more advanced play skills.

The aforementioned investigations demonstrate potential of point-of-view video modeling (POVM) for teaching social/play, self-help, and behavioral compliance skills. The need for additional research in evidence-based practices for teaching social skills to preschool students with autism in order to increase their ability to engage with typical

peers in the general education curriculum and the community is illustrated in the logic model for this study (see Figure 1). Proximal outcomes aim to increase symbolic play actions and play-associated language utterances in order to achieve the distal outcomes, or long-term objectives, of increasing participation with general education peers (see Figure 1).



*Figure 1.* Logic model. The logic model describes the target population (preschoolers with autism), intervention (POVM), proximal outcomes (increased symbolic play actions, increased play-associated language utterances), and distal outcomes (increased social skills, increased engagement with peers in general education and community) that guided the design of this study.

## **Background of the Problem**

Difficulty with communicating verbally and nonverbally is one of the core deficits for individuals with autism. The ability to use language effectively and relate to others using appropriate social skills is a significant deficit included among the characteristics of students with autism. Social skills intervention should be a standard component of instruction for this group of students (Kam, Greenberg, & Kusche, 2004; Lane et al., 2003). Students with autism often struggle with specific social skills such as listening to others, taking turns in conversation, making and keeping friends, greetings and salutations, joining activities, giving and receiving compliments, accepting consequences, expressing anger in socially appropriate ways, offering help to others, following rules, being organized, and completing high-quality work (Kauffman, 2005). Further, teachers often struggle to find a consistent time to provide social skills instruction within the demands of the academic curriculum.

Children have been taught complex chains of pretend, solitary, sociodramatic play, manipulating figurines while providing the dialog for the characters (D'Ateno, Mangiapanello, & Taylor, 2003; MacDonald, Clark, Garrigan, & Vangala, 2005; MacDonald, Sacramone, Mansfield, Wiltz, & Ahearn, 2009). However, for inclusion settings children with autism need to engage in associative play, not solitary play.

Children with disabilities can be taught to engage in pretend play behavior using adult prompts (DiCarlo & Reid, 2004; Jarrold et al., 1996). A review of the literature by Barton and Wolery (2008) identified 16 intervention studies on teaching pretend play to children with disabilities. Across those studies included in this review, major weaknesses



were identified, four of which pertain to this study. First, pretend play behaviors were measured inconsistently across the studies. Definitions of pretend play were vague and did not define the target behaviors with replicable precision, (e.g., “a single step action that appeared to imitate a real life situation involving objects that corresponded to the toys used in the action,” DiCarlo & Reid, 2004, p. 199). Also, studies included examples, but did not include any nonexamples, making it difficult to discern which behaviors were not included as pretend play behaviors. Nonliteral play with dolls or with miniature objects was defined either as pretend, symbolic, or functional play depending on the report. For example, all of the following play behaviors were defined and measured as pretend play: walking a doll (Kim, Lombardino, Rothman, & Vinson, 1989), using a banana as a phone (Sherrat, 2002), talking into a miniature phone (DiCarlo & Reid, 2004), and bringing an empty cup to mouth (Kasari, Freeman, & Parapella, 2006).

Second, Barton and Wolery (2010) reported that only 3 of the 16 studies completely removed the use of prompts from the measured context (Kasari et al., 2006; MacDonald et al., 2005; Sherrat, 2002). A behavior cannot be considered acquired unless it is preformed independently, without prompts. Thus, the use of prompts during measured contexts limits the conclusions about acquisition of pretend play behaviors.

Third, a limited number of studies measured maintenance and generalization of children’s pretend play behaviors in sessions without adult prompting. Only 4 of the 16 intervention studies measured generalization (Barton & Wolery, 2010). Further, only 2 of these studies specifically included generalization (Lifter, Ellis, Cannon, & Anderson, 2005; Lifter, Sulzer-Azaroff, Anderson, & Edwards Cowdery, 1993) and none of the

studies removed prompts from the generalization sessions. “For pretense behavior to count as generalized pretend play, the behaviors must occur in novel situations in which prompts are not used” (Barton & Wolery, 2010, p. 86).

Fourth, Barton and Wolery (2010) found that only 3 of the 16 play intervention studies described procedural fidelity (Kasari et al., 2006; Stahmer, 1995; Thorp, Stahmer, & Schreibman, 1995). Only the study by Kasari et al. met basic standards for procedural fidelity.

Stahmer, Ingersoll, and Carter (2003) described various behavior-based teaching procedures used for teaching play skills to children with autism. Among those methods, in vivo, or live modeling, has been proven effective in teaching play skills to children with autism (Palechka, 2009). Goldstein and Cisar (1992) demonstrated the efficacy of in vivo modeling by using it to teach reciprocal sociodramatic play scripts to children with autism. Instructing students to engage in play behaviors using in vivo modeling can also lead to generalization of new imitation skills to novel settings and instructors (Egel, Richman, & Koegel, 1981). Additional benefits of in vivo modeling include the development of related novel response and an increase in a child’s social and communication skills (Goldstein & Cisar, 1992). However, in vivo modeling is limited by the time and maintenance of training the model (Taylor, 2001), the potential for stimulus overselectivity (Egel et al., 1981), and the dependency on instructor prompting (Taylor, 2001). The majority of the studies on in vivo modeling are foundational studies and no new research has been reported in the literature, with the exception of Palechka (2009).

The second type of modeling presentation that Stahmer et al. (2003) discussed is known as video modeling. Video modeling is similar to in vivo modeling in that it requires imitation by the learner, but they are different in that video modeling presents the model in a video recorded format.

Rayner, Denholm, and Sigafoos (2009) conducted a meta-analysis on video-based instruction (VBI) and found that many practical and theoretical questions remain unanswered about VBI for individuals with autism. Approximately 30 studies were found to show evidence in learning; however, video modeling packages contain between three and eight different components that varied across intervention programs. Some of these components and variations include: reinforcement (praise or tangible after watching the video model), verbal prompts after the video is watched, rules during or after the video is watched, repeated viewing of the video, multiple exemplars of the social skill, differences in latency of video viewing and opportunity to imitate the trained response from the video, use of error correction procedures and prompting in the test session, and matching the video environment to the test environment (Bellini & Akullian, 2007; Charlop-Christy & Daneshvar, 2003; McCoy & Hermansen, 2007). Therefore, it might be misleading to state that video modeling is an empirically supported procedure. More studies are necessary before researchers and teachers can confidently use video modeling as an empirically supported teaching method.

### **Delimitations**

The delimitations of a study are those characteristics that limit the scope of the inquiry as determined by the conscious exclusionary and inclusionary decisions that were

made throughout the development of the proposal. In this study, the choice of the research questions limits the scope of inquiry to examining preschool children with autism. This study does not examine elementary- or secondary-aged students with autism. Further, this study examines symbolic play actions and play-associated language utterances for students with autism; however, it does not examine the development of symbolic play actions and play-associated language utterances of the play partner participants.

This study is also delimited by characteristics of its research design. Single-subject research design, by nature, struggles with aspects of external validity and the ability to generalize results to a larger population (Gast, 2010). Students with exceptional needs are those who fall into the extreme ends of the normal population and this is the principle reason for using single-subject research methodology to investigate this population. The difficulties students with autism have with being included in the general education curriculum and the general population of students is at the root of this inquiry, as described in the Logic Model (see Figure 1).

### **Research Questions**

The purpose of the current investigation was to determine the effects of using POVM to teach symbolic play actions and play-associated language utterances to preschool students with autism. The specific research questions in this study included:

1. Is there a functional relation between viewing video modeling clips demonstrating symbolic play actions from their perspective and increased

level and slope of the variety of scripted symbolic play actions for preschoolers with autism?

2. Is there a functional relation between viewing video modeling clips demonstrating symbolic play actions from their perspective and increased level and slope of the variety of spontaneous symbolic play actions for preschoolers with autism?
3. Is there a functional relation between viewing video modeling clips demonstrating play-associated language utterances from their perspective and increased level and slope of the variety of scripted play-associated language utterances for preschoolers with autism?
4. Is there a functional relation between viewing video modeling clips demonstrating play-associated language utterances from their perspective and increased level and slope of the variety of spontaneous play-associated language utterances for preschoolers with autism?
5. Do preschool students with autism maintain a variety of scripted or spontaneous symbolic play actions and play-associated language utterances using the car-based play set from the intervention immediately following the conclusion of the treatment phase?
6. Do preschool students with autism maintain a variety of scripted or spontaneous symbolic play actions and play-associated language utterances using the car-based play set from the intervention 1 week after the conclusion of the treatment phase?

7. Do preschool students with autism generalize a variety of scripted or spontaneous symbolic play actions and play-associated language utterances to other car-based play sets?

### **Definition of Terms**

In order to increase internal validity and potential for replication of this study, terms were operationalized. Operational definitions of commonly used terms in this study are in this section.

*Autism*: For the purposes of this study participants were identified as having autism if they met the federal definition of the disability under IDEA (2004). According to IDEA,

*Autism* means a developmental disability significantly affecting verbal and nonverbal communication and social interaction, generally evident before age three, that adversely affects a child's educational performance. Other characteristics often associated with autism are engagement in repetitive activities and stereotyped movements, resistance to environmental change or change in daily routines, and unusual responses to sensory experiences.

(§300.8 (c)(1)(i))

Under this definition, "autism does not apply if a child's educational performance is adversely affected primarily because the child has an emotional disturbance" (§300.8 (c)(1)(ii)) and "a child who manifests the characteristics of autism after age three could be identified as having autism if the criteria in paragraph (c)(1)(i) of this section are satisfied" (§300.8 (c)(1)(iii)).

*Inappropriate play behaviors:* actions that were not related to the toy/situation or self-stimulatory responses that involved non-goal-directed repetitive behavior that did not involve an object (e.g., mouthing a toy, rocking, hand flapping). Repetitive motor responses were defined as repetitive behaviors that were inconsistent with appropriate manipulation of the toy during play (e.g., rapidly tapping on the moving piece of the garage ramp over and over, holding the tow truck at eye level and spinning the wheels).

*Instructor-created video:* a video that the instructor makes of the task or activity that he or she wants the student to learn. These videos include actors performing the target skill and are recorded and edited by the instructor.

*Play-associated language utterances:* play sounds, words, phrases, and sentences that are related to the play scheme.

*Preschool-aged students:* students who are ages 2-5 enrolled in and attending a preschool program at a public school.

*Point-of-view modeling (POVM):* type of video modeling that is recorded from over the shoulder of the person who is completing a task. The participant viewing the video sees the actions from the perspective, or point of view, of the person performing the task.

*Scripted:* a skill that was performed in the video model. Scripted actions or play-associated language skills would be imitations of those that were demonstrated in the video model.

*Spontaneous*: a skill that is novel and was not presented in the video model. Spontaneous actions or play-associated language skills are new words or actions that the child says or does that have not been explicitly demonstrated to him or her.

*Symbolic play actions*: the actions of pretending something is there when it is not, or giving an object or person abilities that it does not have. Symbolic play is often one of the following three types of actions: substitution, imaginary play, or agent play. Substitution is the act of using one object in place of another (e.g., pretending a tissue is a blanket for a figurine). Imaginary play is giving an object attributes that it does not have or pretending that an object is there when it is not. Agent play is when a child pretends that a doll or other object performs the action.

*Video modeling*: technique used to teach a target skill that is modeled by another individual. The actor performs the target task while his or her movements and words are video recorded. The person then watches the video clip of the target skill(s) and is expected to imitate the behavior of the actor that was observed in the video clip.



## **2. LITERATURE REVIEW**

This chapter is divided into four sections. The first section presents an overview of the literature on video modeling and point-of-view video modeling (POVM). The second section presents an overview of the literature on play while the third section presents an overview of the literature on language. The final section presents a summary of the current literature on video modeling and students with autism.

### **Video Modeling**

Video modeling is infused throughout the world of instruction. Sport instruction videos, computer program tutorials, home improvement and cooking television shows, and airplane safety instructional videos are examples of video models that may be encountered in daily life. Traditional general education programs emphasized lecture-type instruction with visually dynamic images. However, today, with the integration of video-based instruction, teaching has become more interactive and complex (Essex, 2006).

Theoretically rooted in Bandura's social learning theory (1977), video modeling involves learning a new behavior from watching a model perform the behavior. The basic premise of his theory was that watching a model experience the consequences of the behavior would influence whether or not the observer would engage in the behavior himself or herself (Bandura, 1965). During video modeling procedures, a new behavior is

taught by showing a model exhibiting the targeted appropriate behavior and then providing the individual with the material and opportunity to engage in those behaviors (Charlop-Christy, Le, & Freeman, 2000; Nikopoulos & Keenan, 2007). For example, during video modeling instruction an individual views a video clip of a model actor washing a window then is given the material to complete the task (e.g., cleaning cloth, cleaning spray, a dirty window) and provided with the opportunity to wash the dirty window.

Since Bandura's seminal work, research has emerged on the use of in vivo, or live modeling and video modeling. One potential intervention to enhance early play and language skills in children with autism is the incorporation of technology into teaching situations (Goldsmith & LeBlanc, 2004). Video is a popular technology enhancement due to its ease of use, accessibility, and low cost. A video can provide an appropriate model for a child with autism to imitate. Video modeling involves the learner observing a video of an actor correctly performing the target behavior and then the learner performs the target behavior seen in the video clip (Delano, 2007). Video modeling has been successfully employed to teach a variety of skills to children with autism including social initiations (Nikopoulos & Keenan, 2004), perspective taking (Charlop-Christy & Daneshvar, 2003; LeBlanc et al., 2003), giving compliments (Apple, Billingsley, & Schwartz, 2005), and engaging in conversational speech (Charlop & Milstein, 1989).

Within the past 10 years video modeling has become an increasingly popular method for teaching play and social skills to children with autism. Researchers have used video modeling to teach reciprocal commenting skills in conversation (Charlop-Christy et

al., 2000), play statements during play with siblings (Taylor, Levin, & Jasper, 1999), and initiation of play interactions with peers (Nikopoulos & Keenan, 2003, 2004). Children with autism also have been taught complex chains of pretend, solitary, sociodramatic play and manipulating figurines while verbalizing the dialog for the characters (D'Ateno et al., 2003; MacDonald et al., 2005; MacDonald et al., 2009).

A variety of type of actors, or model types, can be selected from when considering who will model the target behavior in a video model clip. Charlop and Milsten (1989) investigated the learning differences between adult and child actors used in video models. The results indicated that there were no significant learning differences based on the age of the actor. Mechling and Moser's (2010) results confirmed no clear preference patterns for the three different types of video images they examined (self, familiar adult, or familiar peer model). Also, Van Laarhoven, Zurita, Johnson, Grider, and Grider (2009) compared different model types and the results indicated that all conditions' (self, other, and subjective) video models were effective. Since adult actors are the easiest to train, this has become the most common type of actor used in video modeling. Preliminary findings indicate that peer actors (Nikopoulos & Keenan, 2004) and self-modeling (Buggey, Toombs, Gardener, & Cervetti, 1999) are effective for video-based instruction; however, it is unclear as to whether or not any outstanding benefits are present when using either of these types of models.

### **Instructor-Created Videos**

Teacher-created videos differ from those that are commercially available. While commercially made videos are often specifically designed for children, these videos may

or may not have been created with the intent of generating specific play skills. Typically, these videos are intended for entertainment or promotional purposes such as promoting accompanying toy sets available in retail stores featuring the characters from the video. On the other hand, instructor-made videos are created by teachers/researchers to target a specific response from the learner (Mechling, Pridgen, & Cronin, 2005).

Palechka and MacDonald (2010) compared the effects of commercially available videos relative to instructor-created videos on the acquisition of play skills with three children with autism ages 3-5 years old. During baseline the play scenarios were established with all characters and play material and the researcher instructed the participants to play and allowed the participants to interact with the materials for 5 minutes. Treatment sessions began by having the participants watch either an instructor-created video or a commercially available video, based on assignment as part of the alternating treatment design within participant and across model types. The researcher started the video and instructed the participant to watch the movie. The participant watched each video two consecutive times before being instructed to play. After 5 minutes, the experimenter ended the session by telling the participant that playtime was over. Palechka and MacDonald illustrated similar results to MacDonald et al. (2009), which both indicated that all the participants were able to learn complex scripted play from watching instructor-created videos. Further, the participants maintained acquired skills during mastery probes when no videos were shown prior to the play sessions. Two of the three participants acquired play skills more rapidly using the instructor-created video format relative to the commercially available videos. The third participant had

similar acquisition rates under both conditions. All the participants attended to the videos and toys equally across both video formats.

Charlop-Christy et al. (2000) examined the difference between video modeling and in vivo modeling, where participants observed live models perform the target behavior. The results indicated that video modeling was more effective than in vivo modeling for teaching participants different tasks from the curricula. The data also suggested that video modeling promotes generalization.

### **Students With Autism Using Video Modeling**

The National Center for Professional Development on Autism Spectrum Disorders (Franzone & Collet-Klingenberg, 2008) included video modeling in the category of modeling as an evidence-based practice (EBP). To be considered an EBP for individuals with autism, evidence must be established through peer-reviewed research in scientific journals using two randomized or quasi-experimental design studies, five single-subject design studies from three different investigators or research groups, or a combination of these two designs (Horner et al., 2005). Video modeling met the criteria as an EBP with eight single-subject research studies. The studies included in the review of effectiveness used video modeling to target skills in the domains of communication, social, academic/cognition, and play both in the home and in school settings. Five of the eight studies in this review included participants who were preschool aged (Apple et al., 2005; D'Ateno et al., 2003; Gena, Couloura, & Kymissis, 2005; Kroeger, Schultz, & Newsom, 2007; Sherer et al., 2001).

Charlop-Christy et al. (2000) highlighted advantages of POVM versus in vivo, or live modeling. The first advantage they discussed was the ease of implementation. Showing the video to a participant takes away the responsibility of the implementer having to perform the behavior each time. Second, distracting or irrelevant stimuli may be edited out of the video. Charlop-Christy et al. suggested that children with autism might focus on environmental stimuli irrelevant to the task. Through a video presentation of the model, the researcher is able to accentuate only relevant content and minimize distracting or irrelevant features by showing the model close up. Third, Charlop-Christy et al. suggested that video-based instruction might be effective because it presents concepts in a systematic way in a relatively simple format while keeping the child's attention. Last, video modeling preserves resources like time, labor, and money. For example, with video modeling, teachers spend less time having to model the appropriate behavior because once it is modeled and recorded the skill does not need to be demonstrated again.

There are many other advantages to video modeling beyond those cited by Charlop-Christy et al. (2000). Video modeling allows individuals to learn skills that they have been unable to learn through observation of their natural environment (MacDonald et al., 2009). Weiss and Harris (2001) stated that video modeling allows the trainer to focus on prompting the child to imitate the model rather than performing the model. Also, video models can utilize strategies that promote generalization such as providing multiple exemplars, incorporating common stimuli, and natural contingencies and environments (Reagon, Higbee, & Endicott, 2006; Charlop & Milstein, 1989). Moreover, video

modeling also has the advantage of being a permanent product and thus after it is used with one student, it may be available for use with other children who need to build the same skills (Corbett & Abdullah, 2005).

A video model allows redundant, systematic repetition of a skill that is consistent throughout the intervention (Hine & Wolery, 2006; Reagon et al., 2006). It decreases the variation in the model presentation and is more consistent than the small variations that are inevitable with in vivo models, thus reducing issues related to procedural integrity (Palechka, 2009). Some students with autism benefit from predictable, controllable, routine environments and video modeling meets this need.

Previous research illustrates that individuals with autism are often reported to have greater strength in the area of visuospatial skills (Minshew, Goldstein, Muenz, & Payton, 1992). Thus, many individuals with autism may learn better through visual rather than traditional, auditory teaching methods (Quill, 1997). As compared to more traditional teaching strategies, visually presented instructional materials may better assist individuals with autism in organizing their environment by capitalizing on cognitive strengths (Schreibman, Whalen, & Stahmer, 2000).

Video modeling can also be combined with and enhance the efficacy of other teaching procedures. Murzynski and Bourret (2007) combined video modeling and least-to-most prompting to teach daily living skills to two boys with autism. The results indicated that least-to-most in combination with the video model was more effective than least-to-most prompting alone. Moreover, when Tereshko, MacDonald, and Ahearn's (2009) participants failed to imitate video models, they introduced a segmented video

modeling teaching procedure. The participants viewed segments of a larger video and the researchers gradually increased the number of segments until the participants met the set criterion. This procedure was effective in teaching an 8-step response chain to children who were previously unable to imitate the video model, possibly due to the fact that the initial video was too long and complicated to learn at one time.

With a video model, the instructor is able to edit out distracting or irrelevant stimuli in the learning environment, thus increasing the likelihood that the participant will concentrate on the most relevant and salient cues (Charlop-Christy et al., 2000; Tetreault & Lerman, 2010). One format that may further reduce extraneous stimuli is point-of-view video modeling (POVM). For this format, the camera angle is presented at the participant's eye level and shows only what participants might see from their perspective during the targeted activity. In this type of modeling, it is common for the participant to see a pair of hands manipulating the materials to complete a task in POVVM.

### **Point-of-View Video Modeling**

Recently, studies have successfully incorporated the use of first person perspective into video models (i.e., point of view models), where the view is directly from the actor's point of view. Point-of-view video modeling (POVM) depicts a skill performed from a first person perspective (i.e., by the person doing the action), rather than as a third person observer of a scene. The extent to which POVVM has been used in previous studies is unclear because many studies did not include detailed descriptions of the video modeling procedures. To date, only five studies have explicitly evaluated the POVVM technique (Alberto, Cihak, & Gama, 2005; Hine & Wolery, 2006; Schreibman et



al., 2000; Shipley-Benamou, Lutzker, & Taubman, 2002; Tetreault & Lerman, 2010). Of these five studies, four have demonstrated that point-of-view video modeling can be effective (Alberto et al., 2005; Hine & Wolery, 2006; Shipley-Benamou et al., 2002). POVM is one study shy of having enough evidence to support it as an EBP.

Hine and Wolery (2006) investigated the use of POVM to teach two preschool girls with autism how to play with materials during sensory bin activities. They created video clips with a digital camera and participants viewed them on a laptop computer. Adult hands manipulated the toys and demonstrated appropriate play with the sensory material. Hine and Wolery used a multiple baseline across settings design to assess the effectiveness of POVM for teaching sensory bin play. During baseline, the participants were placed in front of the sensory bins with no additional instruction. During the treatment condition, the children were shown a video demonstration of adult hands manipulating the toys appropriately in the sensory bin. In the baseline condition, the students performed no more than two types of actions; however, during the treatment condition, the number of actions performed increased to four. Maintenance data were collected following the withdrawal of the intervention and the practice session. It was not reported how long after the withdrawal of the POVM that the maintenance probes were taken. Hine and Wolery reported the number of play actions remained high for both participants, ranging from two to five out of a total of six play actions during maintenance sessions.

Shipley-Benamou et al. (2002) implemented POVM to determine the effects on learning a functional task. This investigation used a multiple probe design across tasks

and participants. The tasks included making orange juice, preparing a letter to be mailed, and setting the table. During the treatment condition, participants viewed the video and were then told to complete the task as they had seen in the video. All three participants in this study demonstrated an increase in their ability to perform these tasks. Maintenance data were collected after one month and the skills learned were maintained.

Alberto et al. (2005) examined the effectiveness of static picture prompts and point-of-view video modeling to teach eight students ages 11-15 years old how to withdraw money from an ATM and purchase items using a debit card. The researchers implemented an alternating treatment design to examine the differential effects of static picture prompts and video modeling. Baseline procedures occurred during community-based instruction at a grocery store. Students were instructed to withdraw \$20 and buy groceries with the debit card. During intervention, students viewed videos ranging from 7 minutes and 35 seconds to 8 minutes and 12 seconds on how to use a debit card to make a withdrawal at the ATM and purchase items with the debit card. For the static picture instruction, students were shown a picture album and the teacher stated the motor response (e.g., I'm swiping the debit card) that corresponded to the picture. The duration of exposure to each picture was comparable to that of the video model. All eight participants acquired and maintained the skills to withdraw \$20 from the ATM and buy two items at the grocery store. Although there were minor differences between the two types of interventions, five out of eight students acquired the skills in less time and more efficiently under video modeling conditions than given static picture prompts. No functional difference was present between the static picture prompts and video modeling

in terms of the number of steps completed correctly, the number of errors, and the number of instructional sessions to reach criterion. The authors did not report how many days after the withdrawal of the intervention the maintenance, or follow-up session, occurred.

Schreibman et al. (2000) assessed the effectiveness of POVM as a priming strategy to reduce behavior problems in young children with autism during a transition period. The multiple baseline design study included three children ages 3 years, 3 months to 6 years, 5 months in age. The study examined the effects of the POVM on reducing problem behaviors such as whining, crying, screaming, aggression, pulling, verbal resistance, and dropping to the floor during transition. During baseline, no videos were shown to the participants and data were collected on the children's problem behaviors occurring when they transitioned to different situations. Then during treatment, children watched a 1- to 4-minute POVM of the transition setting and were immediately engaged in the scenario. For generalization probes, the participants did not view a video clip or viewed an irrelevant video clip of a novel setting and were then engaged in a transition setting. Immediate posttreatment data were collected as well as 1 month after the conclusion of the treatment condition. Results indicated that video priming techniques demonstrated a functional relation with reducing problem behaviors during transition for all children. The reductions in problem behavior were also generalized to untrained, novel transition situations and were maintained during immediate posttreatment and 1-month follow-up probes.

Tetreault and Lerman (2010) investigated the effectiveness of using POVM to teach three children with autism to initiate and maintain conversation with a partner using a multiple baseline across scripts design. Participants between the ages of 4 years, 4 months and 8 years, 2 months were instructed on how to engage in eye contact and vocal behavior while watching the POVM clip during the treatment condition. The treatment package included both POVM and reinforcement of the target behavior. The results of the study were inconclusive as to the overall effectiveness of POVM to teach social exchanges to these three individuals with autism. Only one of the three participants responded to all three scripts using POVM and reinforcement contingencies. The second participant was taught using the POVM package intervention but the scripts required modification and the third participant required response prompts to increase the frequency of eye contact and social initiations.

Currently, only one study (Cotter, 2010) has directly compared the effects of camera angle on learning when video models are used as teaching tools. Cotter's results suggest that POVM had a slight advantage over scene type video modeling. Participants mastered more skills (10 skills mastered) using the point of view condition than the scene condition (6 skills mastered). Also some participants only mastered one of the paired skills and in this case the skills mastered were more likely to be in the point of view condition (five instances) than in the scene condition (one instance). Furthermore, three participants struggled with the perspective-taking skills that they were required to perform in the scene modeling condition. Cox (1978) suggests that typically developing children as old as 7, and possibly even older, may continue to struggle with more

complex perspective taking tasks. Therefore, providing a video already in first person perspective may be advantageous to children younger than 7 years old. According to Cotter, attending was slightly higher in the point-of-view condition (77.6%) than in the scene condition (74.3%). However, the *t*-test revealed no statistically significant difference in attention between the point-of-view and scene condition ( $t = 1.3000, p = .216$ ).

Burke (2009) examined the difference between POVM and self-video modeling to determine which was more effective in producing imitation of modeled responses. The study did not assess learning over time, but rather identified whether the subjects imitated a video model of play scheme without training or explicit reinforcement. The results from this study suggested that verbal responses were more readily acquired through the use of POVM than from self-video modeling.

Research is emerging and continues to evolve in support of POVM as an evidence-based practice. It is still unclear whether it is superior to other types of video modeling for teaching behaviors such as social, communication, and play skills.

### **Play**

The literature reviewed in this section includes studies based on children with autism. The review of existing research has purposefully been narrowed in order to focus on the domains central to this research study.

Emerging in young children, play is active engagement with objects, activities, or persons that appear to be motivating, spontaneously performed, and flexible (Barton, 2012). According to Barton play (a) has no specific form, (b) is contextually relevant, (c)

is flexible, (d) is voluntary, (e) is symbolic in nature, (f) includes environmental variables, and (g) has a functional goal. The skills learned through play enhance language, physical, cognitive, and social development (Salkind, 2002). In the preschool years, learning during play provides the foundation for the aforementioned skills, and play during school years continues to support cognitive and social development (Bronson, 1995; Caplan & Caplan, 1974), as well as providing the foundation for language building (Caplan & Caplan). According to Piaget (1962) there are three type of play that can be distinguished in typical children: sensory-motor play, pretend play, and games with rules. These three types of play are rooted in development in motor skills, language, and social skills (Ginsburg, 2007).

Play is by nature flexible and child-directed (Barton & Pavilanis, 2012). It provides a context in which other goals may be embedded and opportunities to embed instruction across a variety of skills (Barton, 2012; Barton & Pavilanis). Providing opportunities to young children with autism may increase the variety, frequency, and engagement in pretend play. However, “many children with autism will not play without systematic teaching” (Barton & Pavilanis, p. 16). According to Barton and Pavilanis, when children with autism engage in pretend play, there is an increased opportunity for learning and independence within an organic, social setting. Further, because pretend play is flexible and child-directed, it provides a meaningful context in a natural setting in which children with autism can learn alongside of typical peers.

Pretend play has been associated with language and social communication (Craig-Unkefer & Kaiser, 2002, 2003; Mallory et al., 2010; Sualy et al., 2011). Play provides

opportunities for social interaction and social communication (McConnell, 2002).

Unstructured play is valuable for neurological development. Children learn to think creatively, problem solve, and develop reasoning and motor skills at early ages through both structured and unstructured play. Free play also teaches them how to entertain themselves (Barton, 2012).

Impairment in the development of reciprocal social interaction is considered one of the hallmarks of autism. The deficits in play skills are described in the *Diagnostic and Statistical Manual of Mental Disorders – 4<sup>th</sup> Edition, Text Revision (DSM-IV-TR)* (American Psychiatric Association, 2000) as failure to use objects appropriately, lack of varied play, and failure to develop make-believe play skills. According to Toth, Munson, Meltzoff, and Dawson (2006), “children with autism show specific impairments in symbolic play as early as 18 months of age relative to children with delayed and typical development” (p. 995). Children with autism have fewer novel play acts (Charman & Baron-Cohen, 1997) and less complex and diverse play relative to their neuro-typical peers (Ungerer & Sigman, 1981).

Teaching play is challenging (Charlop-Christy et al., 2000; D’Ateno et al., 2003). The presence of inappropriate behaviors may interfere with both instruction and learning. Children with autism do not generally learn easily from casual observation; they appear to require direct instruction (Leaf & McEachin, 1999).

Lovaas, Schaeffer, and Simmons (1965) suggested that children with autism are not reinforced by engaging in social events, thus they do not readily respond to social interaction patterns. Their repetitive and restricted patterns of behavior may preempt

contact with alternate sources of reinforcement and may explain their lack of sensitivity to social interactions (Koegel & Covert, 1972). Conversely, stereotypical behavior may be an outcome of behavioral insensitivity to social events (Jahr, Eldevik, & Eikeseth, 2000).

Hobson, Lee, and Hobson (2009) suggested that the foundations of play are more complicated than previously thought. They speculated that there are multiple factors that are interrelated to the development of play including social-emotional motivation, perspective taking, flexibility, and replication. Furthermore, they suggest that play is intrinsically motivating to children and the desire to engage in play because it is fun should not be overlooked.

Researchers are beginning to differentiate between functional and symbolic play. Functional play has been described as using an object in the way that it was designed, for example, bouncing a ball (Baron-Cohen, 1987; Jarrold, Boucher, & Smith, 1993; Libby, Powell, Messer, & Jordan, 1998; Ungerer & Sigman, 1981). Williams, Reddy, and Costall (2001) suggest that functional play can be broken down into simple functional play acts and more elaborate functional play acts. Compared to children with Down Syndrome and typically developing infants, children with autism in this study had play composed almost entirely of simple acts involving single objects (e.g., pushing a car along the ground). Children with autism also spent less time in integrated functional play and produced fewer functional sequences than typically developing peers. Ungerer and Sigman's (1981) results distinguished a unique pattern of findings between symbolic and functional play in children with autism when they found that in the prompted condition of



functional play participants reached typical levels while symbolic play continued to be deficient.

Williams et al. (2001) also identified the progression of play skills in children. First, simple functional play responses develop including the combination of two or more objects that are related (e.g., putting a cup on a saucer) and appropriate use of a single object (e.g., banging with a play hammer). Next, more elaborate functional play responses involve using multiple objects appropriately, appropriate vocalizations that support an appropriate action, and doll-directed acts (e.g., feeding a baby doll).

Researchers have investigated different strategies and procedures to teach appropriate play skills to individuals with autism. Such methods include the Developmental Play Assessment (Lifter, Edwards, Avery, Anderson, & Sulzer-Azaroff, 1988), least-to-most prompting (Goldstein & Cisar, 1992), pivotal response (Pierce & Schreibman, 1997; Stahmer, 1995), prompting and reinforcement (Eason, White, & Newsom, 1982), and video modeling (Lifter et al., 1993; Nikopoulos & Keenan, 2004; Palechka & MacDonald, 2010; Stahmer, 1995; Taylor et al., 1999).

The use of video modeling to teach play has been examined in the recently expanding body of literature. Past studies primarily focused on investigating the effects of video modeling on relatively simple behaviors (Tetreault & Lerman, 2010). For example, Nikopoulos and Keenan (2003, 2004) used video modeling alone to teach three children with autism to initiate an interaction, through gesturing or vocally requesting an adult to join the child in play.

Few studies have investigated video-based training for more complex social skills. Maione and Mirenda (2006) used video models to increase the frequency of social initiations and responses of a young boy with autism during two different play contexts. Results of this study also illustrated that while the frequency of the participant's use of both scripted and spontaneous verbalizations increased during play sessions, reinforcement, video feedback, and prompter were needed to generalize this behavior to a novel play context.

### **Symbolic Play**

One distinguished category of play is symbolic play (Baron-Cohen, 1987; Jarrold et al., 1993; Libby et al., 1997; Rutherford & Rogers, 2003; Ungerer & Sigman, 1981). It is well documented and replicated across the literature that “children with autism present with a reduced frequency, complexity, novelty, and spontaneity in pretend play compared to both children with other kinds of delays and to typically developing children” (Rutherford, Young, Hepburn, & Rogers, 2007, p. 1025). Ricks and Wing (1975) provided the first published review of play in children with autism and concluded a central problem in understanding symbolic gestures in language and pretend play. Two years later, Wing, Gould, Yeates, and Brierley (1977) reported a marked decreased frequency in pretend play in children with autism. Additionally, they noted that the pretend play of children with autism was repetitive and stereotypic in nature compared to that of children of similar mental ages. In 1984, Sigman and Ungerer described autism-specific characteristics of pretend play which included three different related areas: frequency of spontaneous pretend play acts, frequency and complexity of symbolic

sequences, and frequency of different symbolic acts produced both spontaneously and in response to an adult play model.

In order to provide consistent, measurable definitions for assessing and teaching pretend play, Barton and Pavilanis (2012) developed a taxonomy of pretend play (Barton, 2010; Barton & Wolery, 2008, 2010).

The taxonomy includes four types of pretend play: (a) functional play with pretense (e.g., taking a sip from an empty cup), (b) object substitution (e.g., using a bowl as a hat), (c) imagining absent objects (e.g., talking on the phone with an empty hand), and (d) assigning absent attributes (e.g., saying “the baby is hungry” referring to a doll). (Barton & Pavilanis, p. 7)

A complete list of types and sequences of pretend play can be found in Table 1.

Rutherford and Rogers (2003) discussed the lack of engagement of children with autism in symbolic or pretend play. This investigation “compares theories that consider either a theory of mind (ToM) or executive function (EF) to be causally important deficits in the development of pretend play in autism and important factors in pretend play” (p. 289). Joint attention, executive function, and pretend play were measured in 28 children with idiopathic autism (IA), 24 children with other developmental disorders (DD), and 26 typically developing children. The participants with autism were free from other medical conditions, had no vision or hearing impairments, received a clinical diagnosis of autism, and met the criteria for autism on at least two of three diagnostic assessments: DSM-IV (APA, 1994), Autism Diagnostic Interview – Revised (ADI-R) (LeCouteur, Lord, & Rutter, 2003), and Autism Diagnostic Observation Schedule (ADOS) (Lord, Rutter,

Table 1

*Types and Sequences of Pretend Play*

Type of Pretend Play	Definition	Example	Sequences
Functional play with pretense	Nonliteral use of actual objects in the manner in which they were intended without the reality-based outcome	Putting an empty spoon to your mouth	Stirring a spoon in a bowl and putting it up to your mouth
Object substitution	Use of an object as if it were a different object	Pretending a block is a train and pushing it back and forth on a train track	Pushing a block on a train track, and connecting it to another block to make a longer train and pushing it across a track
Imagining absent objects	Performing an action as if an object was pretend in the object's absence	Putting fist to your mouth and chewing (as if holding a spoon)	Moving fist around a bowl to stir, bringing to mouth to taste, and giving to a stuffed bear
Assigning absent attributes	Assigning roles or emotions to the self, others, or objects	Saying "I am the doctor. Can I check your ears?"	Saying you are the doctor, checking a doll's ears, and listening to her heart

*Note.* Adapted from Barton and Pavilanis (2012).

DiLavore, & Risi, 1999). The results indicated that children with autism were significantly delayed on pretend play scores and in the ToM measure, but not in the EF measures. More specifically,

an ANOVA revealed that there were significant group differences in overall (spontaneous and prompted) pretend play scores [ $F(2,75) = 8.48, p < .001$ ] and for spontaneous pretend play [ $F(2,75) = 7.67, p = .001$ ]. Post hoc analyses, a Tukey *t-test*, showed that the IA group produced significantly less overall pretend play and significantly less spontaneous pretend play than the two control groups

( $p = .001$  and  $p = .009$ , respectively), which did not differ from each other.

(Rutherford & Rogers, 2003, p. 296)

Further, the scores in the area of pretend play were lower for the group of children with autism ( $p = .001$ ) than for the two control groups ( $p = .03$ ).

Paterson and Arco (2007) investigated the use of video modeling to teach pretend play skills to two participants diagnosed with autism. The researchers collected data on the levels of repetitive motor and vocal behaviors while watching a video model of appropriate play. The results indicated that after training a first play set using video modeling, generalization occurred with related play sets, but not with unrelated play sets. Each unrelated play set required individual training to obtain an increase in appropriate play behavior. The results also indicated that when appropriate play behaviors increased, stereotypic behaviors decreased. A follow-up session was conducted 7 days after the withdrawal of the video modeling intervention. Paterson and Arco found that when the video model was withdrawn there was an increase in the level of stereotypic behaviors and decreased levels of appropriate play 1 week after the conclusion of the intervention across all three toys. These results were inconsistent with those obtained in previous studies on video modeling. For example, Charlop and Milstein (1989) found that behaviors acquired maintained over a 15-month period of time.

Rutherford et al. (2007) conducted a longitudinal study of pretend play in children with autism. The study examined predictors of pretend play competence in a group of 28 children with autistic disorder (AD), 18 children with other developmental disorders (DD), and 27 typically developing children. Participants were matched on overall mental

age, divided into two clinical groups and seen twice over a 24-month period. The participants were recruited from various health and early education agencies. In order to be included in this study, children with autism needed to be free from other medical conditions, have vision and hearing within normal limits, have a diagnoses of autism by an outside agency, have a current clinical diagnosis of autism, and meet the criteria for autism on at least two of three diagnostic measures: Diagnostic and Statistical Manual – 4<sup>th</sup> Edition (DSM-IV) (APA, 1994), ADI-R (LeCouteur et al., 2003), and ADOS (Lord et al., 1999). The results indicated that children with autism were “profoundly delayed given both competence (prompted) measures as well as performance (spontaneous) measures” (p. 1024).

### **Cooperative Play**

Jahr et al. (2000) used a nonconcurrent multiple baseline design across participants to examine the use of video modeling with six children with autism (five male, one female) who had little to no cooperative play. Participants in this study had a diagnosis of autism based on the criteria from the *Diagnostic and Statistical Manual of Mental Disorders* – 3<sup>rd</sup> Edition, Revised (DSM-III-R) (APA, 1987) from independent clinicians. Two of the six participants lived in a residential home for children with autism, while the remainder of the participants lived at home with their parents and attended their neighborhood school. All participants had received a minimum of 6 months of one-to-one behavior treatment before the start of the intervention. During training, play partners were adults and included researchers, residential home staff, and teachers, but during probes in novel settings, play partners were typically developing

peers for those participants with autism in schools and residential staff members for those participants in the residential center. Variability of play was defined by within-episode variability and across-episode variability. Within-episode variability measured the extent to which the participants engaged in a new or variable play response. Across-episode variability was measured by the play responses that used objects in a novel way that had not occurred earlier during a particular probe session. The mean within-episode variability for participants was 2% (range 0-10%) during pretraining and was 92% (range 75-97%) during posttraining. The mean across-episode variability for all participants through posttraining was 76% (range 62-89%), novel settings and novel peers was 78% (range 62-89%), and follow-up was 85% (range 75-92%). Results indicated that the participants failed to acquire cooperative play until the verbal description was included in the training procedure. Jahr et al. reported that during pretraining probe sessions none of the participants demonstrated consistent cooperative play. Following the implementation of the verbal description, all participants could initiate play, sustain play that was initiated by their play partner, take turns, vary their play within and between play schemes, and generalize skills across play partners and settings. Participants were reported to maintain mastered cooperative play skills at 6 months and 16 months after training.

### **Motor Imitation in Play**

According to Toth et al. (2006), motor imitation ability has been associated with the development of language and social communication skills. Through imitation, children learn about others' actions and intentions. Imitation plays an important role in early social development and can be used to predict language ability in typically

developing children. The purpose of this study was to better understand the contribution of each of three early abilities (joint attention, imitation, and toy play) on the early language abilities of young children with autism. In this study, 60 children with autism (42 with Autistic Disorder and 18 with Pervasive Developmental Disorder, Not Otherwise Specified) were assessed using measures of joint attention, imitation, toy play, language, and communication ability. Participants were between 3 and 4 years old and diagnosed with autism based on the DSM-IV (APA, 1994), ADI-R (LeCouteur et al., 2003), and ADOS (Lord et al., 2000). Each participant was assessed while seated at the table with his or her parent and the researcher. The results illustrated that initiating protodeclarative joint attention ( $M = 7.9, SD = 8.7$ ) and immediate imitation abilities ( $M = 2.9, SD = 1.7$ ) were most strongly associated with concurrent language skills. Initiating protodeclarative joint attention was a frequency score of the number of times the participant with autism used eye gaze, alternating eye gaze, showing, and/or pointing behaviors to direct and/or share attention with the examiner with respect to an active toy. Immediate imitation abilities referred to the total number of immediate imitation items the participant reproduced. The results of this study highlight the relationship between early skill domains and development of language and communication in preschool-aged children with autism. Toth et al. suggest targeting joint attention and imitation skills to promote competency in communication skills of children with autism through early intervention.



## **Language Utterances**

Between the ages of 12 and 18 months, children speak their first words and begin to produce symbols, such as play gestures (Rescorla & Goossens, 1992). As children start putting words together to form sentences, they begin to engage in pretend play (Rescorla & Goossens, 1992). Tamis-LeMonda and Bornstein (1994) conducted a longitudinal study and found that language comprehension was related to symbolic play at 13 months of age, while semantic diversity in language was related to symbolic play at 20 months of age. Further, they found that the presence of symbolic play at age 13 months was a predictor of semantic diversity in language at 20 months. When a child has deficits in language there are also deficits in their symbolic play (Rescorla & Goossens, 1992). Moreover, children who begin speaking earlier in life are more likely to demonstrate pretend play behaviors earlier than children who begin speaking later in life (Lyytinen, Poikkeus, & Laakso, 1997).

Instructors who use strategies that teach skills directly have been proven to improve children's play skills (Craig-Unkefer & Kaiser, 2002, 2003; Fenson & Ramsay, 1981; Mallory et al., 2010; Stahmer, 1995; Sualy et al., 2011). Two such strategies are modeling and facilitating play (Mallory et al., 2010; Sualy et al., 2011). Modeling is a demonstration of a target behavior to others (Vaughn et al., 2003). Fenson and Ramsay (1981) found that sessions that included modeling resulted in a higher frequency of advanced play than in play during sessions without modeling for children ages 12 to 19 months. Vaughn et al. (2003) reviewed the literature on play interventions for children between the ages of 3 and 5 years old. They found that modeling, rehearsal, prompting,

instruction, imitation, free play, and storytelling helped to teach play skills. Craig-Unkefer and Kaiser (2002, 2003) found that modeling during play increased the total number of words and variety of vocabulary used in preschool children.

### **Play-Associated Language Utterances and Autism**

Charlop and Milstein (1989) assessed the effects of video modeling on acquisition and generalization of conversational skills in children with autism. They reported that video models and reinforcement increased conversational responding for three children with autism. Before the intervention, the children demonstrated use of three- and four-word utterances. Scripted exchanges modeled in the video segments used statements with up to eight words per utterance. The exchanges were structured so that the participant would answer a question posed by the conversant and then ask a reciprocal question back, as modeled in the video. Charlop and Milstein reported participants maintained conversational speech skills learned from the study over a 15-month period. Also they found that the participants generalized their conversational skills. While this is one of the most complex behaviors taught through video modeling in the literature, it should be noted that the therapist initiated all exchanges in the conversation.

D'Atendo et al. (2003) used a multiple baseline design across three response categories to investigate the use of video modeling to teach complex play sequences to a preschooler with autism. The video model included both verbal and motor response models. Upon introduction of the video model, the number of modeled motor responses systematically increased from a stable baseline measure of 2.0 responses per session (range = 2-2) to a mean of 9.8 responses (range = 3-11) per session. The mean number of

not-modeled motor responses was 1.5 (range = 0-2) and 0.9 (range = 0-4) during the baseline and intervention sessions, respectively. The results indicated that the video modeling intervention led to a rapid acquisition of both verbal and motor responses for all play sequences. Experimental control was not achieved for novel and not-modeled responses. The number of novel and not-modeled verbal and motor responses remained low throughout both baseline and intervention sessions. The researchers concluded that video modeling was an effective intervention to promote comparatively long sequences of play behavior in the participant without prompting, correction, or reinforcement from adults.

Taylor et al. (1999) examined the use of video modeling procedures to increase the number of play-related statements directed to siblings made by two boys with autism. During the video modeling intervention, one participant viewed a video of his sibling making comments during play. After the participant watched the video, his play comments directed toward his sibling increased immediately. The other participant viewed a video of his sibling as the actor in the video along with an adult. The video consisted of the pair playing with material while making comments. The participant then viewed this video and practiced the play routine using the same exact play materials that were shown in the video model. The results illustrated that his comments increased when he played with his sibling. Additionally, play related comments were noted to increase when he played with different materials, suggesting that these skills may have generalized to untrained materials.

Reagon et al. (2006) examined the effects of video modeling procedures to teach play scenarios and scripted statements using a sibling as a model and a play partner. The participant in this study was a 4-year-old boy with autism. The researchers taught the participant to play with four different play scenarios. Results indicated that participation in the steps of all four of the play scenarios and scripted statements increased following the implementation of the video modeling procedure. Further, the skills acquired were maintained and generalized to different play partners. Follow-up data for the play schemes were collected on the same day during a 3-minute play session for each scenario. Maintenance and generalization sessions were conducted in the participant's home with a different sibling and the mother as the play partner. The researchers did not report how long after the conclusion of the video modeling intervention the maintenance and generalization data were collected.

MacDonald et al. (2009) conducted a study in which they taught reciprocal pretend play to two children with autism including modeled verbalizations and play actions. Three different play schemes were used to assess pretend play skills: airport, zoo, and grill. The interventions were effective in enhancing the participants' reciprocal play skills and the participants' performance maintained over time. Follow-up probes were conducted 1 month following mastery of each of the play schemes. Of particular interest, the participants in this study demonstrated an increase in unscripted verbalizations. This may suggest that video modeling not only facilitates the acquisition of target skills, but may also have additional indirect consequences such as the acquisition of spontaneous, unscripted responses.

## **Summary**

The review of the literature presented in this chapter summarizes the critical areas of research that guided and supported the current study. Existing research, although limited, affirms that young children with autism can participate and succeed in learning play and language skills. In view of recent mandates by federal education laws, more evidence-based interventions are needed to ensure and augment meaningful learning for students with autism.

### **3. METHODOLOGY**

This chapter presents the methods for the research study examining the effects of point-of-view video modeling (POVM) on the symbolic play actions and play-associated language utterances of preschool students with autism. The descriptions of the overall design, implementation, and analysis of the current project are discussed in this section.

#### **Research Design**

Single-subject research design is derived from the early work of Skinner (1938) on individual behaviors of organisms. Skinner's work evolved into behavior analysis based on four essential characteristics including refraining from formal development and testing of theories, studying a few participants intensively, using visual analysis of the data instead of statistical analysis, and emphasizing the behavior itself as important (Poling, Methot, & LeSage, 1995). Single-subject methodology targets possibilities that other quantitative and qualitative methods do not provide. For example, single-subject methodology allows exploration of the effectiveness of a treatment for an individual participant, measures change over time, and has the ability to measure small numbers of heterogeneous participants, such as participants with idiosyncratic disabilities like autism (Franklin, Allison, & Gorman, 1996; Michael, 1993). Horner et al. (2005) outlined several advantages for using a single-subject research design to explore evidence-based practices in special education. The advantages they identified include (a) focus on the

individual case, (b) analysis of both responders and nonresponders to treatment, (c) analysis of relationship between an educational intervention and outcomes, (d) appropriateness for natural education settings, (e) appropriateness for predicting conditions when the change occurs, and (f) cost-effective for identifying evidence-based intervention.

In single-subject research, the individual participant is the core component (Barlow & Hersen, 1984). The individual case serves as its own control for the intervention (Richards, Taylor, Ramasay, & Richards, 1999). When working with unique populations, it may be difficult to find a group of homogenous subjects with the same characteristics, thus applying a research design that allows for each individual case to serve as its own control is essential (Denenberg, 1982; Garnezy, 1982; McReynolds & Kearns, 1983). Moreover, in single-subject research methodology, the individual also receives the treatment, unlike in a group experimental design where participants receive either the control or the treatment (Barlow & Hersen, 1984). Additionally, single-subject methodology is rooted in the ability to establish a functional relation between the targeted behavior and the intervention over the course of repeated introduction and manipulation of a particular treatment (Gast, 2010). When the effectiveness of a treatment is established and other confounding variables are ruled out, the intervention effect needs to be replicated within and/or across participants and conditions (Gast, 2010; Horner et al., 2005; Kazdin, 1982a, 1982b, 1998; Richards et al., 1999).

For the aforementioned reasons, it is not surprising that the most frequently used design to examine the use of video-based instruction for students with autism employs

single-subject methodology. Schreibman et al. (2000) stated that multiple baseline across the participants was the most frequently used design within single-subject methodology. This design was mostly used with video modeling to determine the effectiveness of one video format.

### **Multiple Baseline Design**

Multiple baseline design is one of the most powerful single-subject research designs because it allows the examination of behaviors across baseline and treatment phases that are replicated within the same study (Richards et al., 1999). Through a multiple baseline design, the functional relation between dependent and independent variables can be replicated across participants, behaviors, or settings (Baer, Wolf, & Risley, 1968). During baseline, data starts being collected simultaneously for all participants. When the baseline is stable and predictable for the first participant, then the research introduces the intervention to the participant. During this time, the rest of the participants stay in the baseline condition. When the preestablished mastery criterion is met for the first participant, the intervention is implemented with the next participant. The first participant continues to receive the treatment and is joined by the second participant. The remainder of participants stay in the baseline condition. This process continues so that each subsequent participant is introduced to the treatment in a staggered fashion. Experimental control is established when the performance of each participant improves only when the intervention is introduced and the performance of the other participants remains on the same baseline level (Cooper, Heron, & Heward, 1987; McReynolds & Kearns, 1983; Poling et al., 1995). Several situations warrant the use of a



multiple baseline design, for example, when the withdrawal of an intervention in the reversal design is unethical, when more than one participant needs the intervention, or when the achieved target behavior cannot be reversed (Alberto & Troutman, 2009; Baer et al., 1968; Kennedy, 2005). Further, a three-or-more tiers in a baseline design provides the opportunity to establish a stronger functional relation and determine the effectiveness of treatment (Hersen & Barlow, 1976; Kazdin, 1998; Kratochwill et al., 2010; Sidman, 1960).

A multiple baseline was selected and implemented in the current study based on the aforementioned advantages of this particular design. A four-tier, multiple baseline design allowed the researcher to explore the effectiveness of implementing point-of-view video modeling on development of symbolic play actions and play-associated language utterances with four preschoolers with autism.

### **Single Subject Research Design Standards**

Single-subject design standards require four different criteria in order to meet evidence standards. According to Kratochwill et al. (2010), in order to meet evidence standards the study needs to follow the following design criteria:

- (a) “The independent variable (i.e., the intervention) must be systematically manipulated, with the researcher determining when and how the independent variable conditions change.” (p. 14)
- (b) “Each outcome variable must be measured systematically over time by more than one assessor, and the study needs to collect inter-assessor agreement in each phase and on at least twenty percent of the data points in each condition (e.g.,

baseline, intervention) and the inter-assessor agreement must meet minimal thresholds.” (p. 15)

(c) “The study must include at least three attempts to demonstrate an intervention effect at three different points in time or with three different phase repetitions.”

(p. 15)

(d) “For a phase to qualify as an attempt to demonstrate an effect, the phase must have a minimum of three data points.” (p. 15)

This study meets the standards set forth by Kratochwill et al. (2010).

Single-subject evidence standards require four different criteria to be met in order to be considered strong evidence (Kratochwill et al., 2010). First, in baseline, there must be documentation of a research problem and a predictable pattern. Second, there must be documentation of a predictable pattern in each phase of analysis. Third, the data must have documentation of predicted change in the dependent variable when the independent variable is manipulated demonstrating a basic effect. Last, there must be three demonstrations of a basic effect at different points in time to illustrate experimental control. Also, there needs to be no demonstration of intervention failure at any point throughout the study. This study meets the standards set forth by Kratochwill et al. (2010).

### **Participants**

This section addresses the participants' selection criteria, protection of human participants, and the description of the participants. The term *participant* is used to describe individuals who were direct subjects of the research procedures (participants

with autism and play partner participants) as well as indirect consumers of the intervention (professional participants). Others involved in this study are described based on their professional titles and/or nature of their engagement in the study, such as independent observer and researcher.

### **Selection of Participants With Autism**

Criteria for selection of these students included the following: (a) students who are found eligible under the Individuals with Disabilities Education Act (IDEA, 2004) standards for special education services under the primary disability category of autism, (b) students who were in preschool, (c) students who had social and/or play goals on their Individualized Educational Plan (IEP), (d) students whose social and language needs were addressed in a self-contained setting, (e) students who had demonstrated spontaneous language, (f) students who had demonstrated motor and language imitation skills, (g) students who could manipulate toys that are four inches or less in length, and (h) students who were fluent in English.

Burke (2009) researched potential prerequisite skills for successful response to video modeling procedures. She found the following skills necessary prerequisites for response to video modeling interventions: (a) listens to a story for a minimum of 5 minutes, (b) follows one-step directions including one action and one object, (c) repeats or tries to repeat common words immediately after hearing them, (d) makes or tries to make social connections (smiles, makes noise) and (e) imitates simple movements (waves goodbye, claps hands). For this study, participants must have met all of the aforementioned prerequisite skills to be included.

Potential candidates were excluded from this study if they (a) could not hear or see the video modeling clips either aided (e.g., glasses, hearing aid) or unaided, (b) received more than 15 hours per week of their instruction in the general education setting, or (c) did not give permission to the researcher to video record the sessions. Participants were not excluded from this study for being multiple language learners (as long as they were fluent in English) because their curriculum and instructional school program were presented in English.

The participants with autism in this study were eligible to receive special education through the Individuals with Disabilities Education Act (IDEA, 2004) under the primary eligibility category of autism. A team of educators and parent(s) determined each student's disability at an eligibility for special education services meeting. Decisions were made based on discussions, formal and informal assessments, observations, social history reports, and any additional information relevant to the individual student.

Some students in this study may have received a diagnosis of autism by an independent psychologist or physician according to the criteria set forth by the American Psychiatric Association's *Diagnostic and Statistical Manual of Mental Disorders* – 4th Edition, Text Revised (APA, 2000). For the purpose of this study, this information did not contribute to either include or exclude a candidate from becoming a participant. The additional information was simply noted when describing the participant if it was available. The complete checklist of criteria for inclusion can be found in Appendix A.

### **Selection of Play Partner Participants**

Six play partner participants were recruited to participate in this study. Play partner participants were included if they were (a) not enrolled in special education; (b) had typical development in speech, language, and play skills; (c) were in a preschool program at the public elementary school where the research was being conducted; (d) could follow multistep directions; (e) spoke English fluently; (f) initiated play independently; (g) could listen to a story for a minimum of 5 minutes; and (h) whose parent(s)/guardian(s) gave permission to the researcher for him or her to participate in the study. All six of the recruited play partner participants met the criteria for inclusion, gave written consent to participate, and participated in the study (see Appendix B for complete criteria checklist).

### **Selection of Professional Participants**

Nineteen professionals including general and special education teachers, instructional assistants, and therapists (e.g., speech-language, occupational) were recruited to share their opinions about the effects of video modeling on the play and language skills of the participant(s) with autism with whom they work. Teachers (general and special education), instructional assistants, and therapists who work with a participant with autism on a regular basis (have time devoted in their work schedule to instruct this student) were included in this study. Also, the professional participants needed to be employed by the public school division where the research study was being conducted and be literate in English in order to complete the questionnaire. The complete checklist of criteria for inclusion can be found in Appendix C. All 18 of the recruited

professional participants met the criteria for inclusion, gave written consent to participate, and completed the social validity questionnaire.

### **Protection of Human Participants and Informed Consent**

The Institutional Review Board (IRB) at George Mason University (GMU) reviewed and approved all methods and procedures for this study in order to ensure the rights and welfare of the study participants. Permission was then obtained from the school division and school principal. Following this, parents and/or guardians of the direct student participants (students with autism and play partner participants) were informed of the study and how their child would be involved. They were provided an introduction letter and consent forms granting permission for their child to participate in the study (see Appendix D). Professionals, including general and special education teachers, a speech-language pathologist, an occupational therapist, and instructional assistants who worked directly with student participants were then provided with consent forms granting permission to complete a social validity questionnaire about the study. Professionals were not direct participants of the POVM, but rather were indirect consumers of the intervention.

In order to maintain confidentiality of the participants in this study, each participant was assigned a pseudonym. All person-identifying information was deleted, so that no one including the individual students or their families could be identified. Professional participants completed the social validity questionnaire anonymously. Detailed information that would reveal the schools in which the study was conducted were purposefully eliminated from the descriptions in this section.

## **Participants With Autism**

Four preschool students with autism were selected to participate in this study. The next section describes each participant in terms of his or her past and present levels of performance. Considering the heterogeneity of students with autism each individual is described in detail below.

**Marcos.** Marcos was a 55-month-old Hispanic male at the start of this research study. He was initially found eligible for special education services 25 months prior to the start of this intervention and received 24 months of special education and related services (speech-language therapy and occupational therapy). Marcos lived with his mother, father, and baby brother (less than 12 months old) in an apartment and spoke two languages: Spanish (first language and home language) and English. Marcos was a fluent speaker in both English and Spanish.

At the time of eligibility, Marcos demonstrated appropriate gross motor skills, but skills in all other domains of development (speech production, receptive language, expressive language, pragmatic language, play, social, emotional, cognitive, adaptive, fine motor) were atypical or delayed. His fine motor delays were characterized primarily by deficits in visual motor integration. Marcos presented with a significant lack of social connectedness, limited play schemes, and repetitive play. He mouthed objects and atypically smelled objects and people.

Marcos' Individualized Education Plan (IEP) provided information on the present levels of performance in the areas of speech, language, play, and social skills development. Marcos spontaneously produced a variety of single words and readily

imitated new words. Given approximately three prompts he was able to expand single words utterances to produce three- to five-word phrases to request items for structured activities. His use of eye contact had increased from not making eye contact at all at the beginning of the school year to making inconsistent eye contact, watching peers, and trying to engage them; however, he did not always do so appropriately. He would greet and say goodbye to people who were coming and leaving the classroom. Marcos was able to produce all age-appropriate sounds in isolation and in single words. At times, he would require prompts for accurate consonant productions in multisyllable words. He would reduce s-cluster sounds at the beginning of words (e.g., “snow” was produced as “no”). His receptive language abilities were solidly in the 12- to 18-month range with scattered skills in the 18- to 23-month range. Marcos did not participate in joint attention activities. He played with toys but was not flexible in his play schemes or scripts. For example, he would repeat the same action over and over again with a toy and did not generalize play scripts from one scheme to another similar scheme. He demonstrated a decrease of thumb-sucking and mouthing objects but these behaviors had not ceased.

Further, Marcos’ attention, adaptive skills, fine motor, self-help, behavior, cognitive, and medical health were reported to be as follows at the time of initiation of intervention. Marcos responded to his name 75% of the time and attended up to 5 minutes with preferred tasks, such as looking at a book. He used a fork during mealtime to feed himself, but preferred to use his fingers, and drank from an open container. His teacher and Occupational Therapist noted that Marcos tolerated and enjoyed eating a variety of foods and textures. He was toilet trained and able to dress himself by pulling up on a



zipper after an adult engaged it, putting on gloves and hat independently. Marcos would at times need assistance closing buttons or snaps on his pants after using the bathroom, a typical behavior of most preschool-aged students. He was able to identify four body parts and label familiar objects. Behavior was of concern and included crying, pushing, dropping to the floor, wetting self in pants, and occasional biting. Negative behaviors would occur in order to obtain a desired item/action or escape from an environment that was too loud. A weakness in independent self-regulation was noted. Marcos could count up to 20 consistently, identify both upper- and lowercase letters, recognize some written words from his schedule, and identify shapes and colors. He was unable to sequence events, match numerals to quantities or compare sets of more and less. Marcos cut within ½-inch of line, colored 70% of a picture, imitated drawing closed circles with moderate consistency, and imitated drawing a cross with minimal assistance. He was able to manipulate many small objects including beads and tweezers. Marcos had a remarkable medical history, which included heart surgery to repair an artery at 3 months of age. Otherwise, Marcos was noted to be a healthy, high-energy child.

Marcos received two 30-minute sessions of speech and language therapy per week and two 30-minute sessions of occupational therapy per week as part of his IEP. He also received 30 hours per week of special education in a self-contained preschool classroom for students with autism. The classroom was comprised of one special education teacher, two special education teaching assistants, and five students with autism. The classroom was located in a neighborhood, Pre-K to fifth grade, public elementary school in an urban setting in a Mid-Atlantic state. During the summer of

2011, Marcos received extended school year services (ESY) due to interfering behaviors that impeded his ability to access his academic and social goals.

**Sarah.** Sarah was a 47-month-old European American female at the start of this research study. She was initially found eligible for special education services 5 months prior to the start of this intervention and received 4 months of special education and related services (occupational therapy consultation). Sarah lived with her mother and father in an apartment that was reported to be well equipped with age-appropriate toys. Sarah's primary language was English and she was a fluent speaker of English.

Sarah was reported to be a good eater but picky about food textures and was aversive to touch. Sarah was toilet trained during the daytime. She started waking from nightmares at age 2 and occasionally was reported to sleep walk. She had surgery to fix a tooth and had to adjust to speaking differently. Prior to beginning in the special education preschool class, Sarah's mother would take her regularly to story time at the library. She would often "go blank" or appear to be in her own world when she was taken to a group setting. Sarah was observed frequently flapping her hands and her mother reported that she often lines up her toys. Her parents referred her to Child Find for evaluation due to concerns with her social and play skills, lack of eye contact, and inability to focus. Child Find is a component of IDEA (2004) that requires states to identify, locate, and evaluate all children with disabilities, aged birth to 21, who are in need of early intervention or special education services.

Sarah's IEP provided information on the present levels of performance in the areas of speech, language, play, and social skills development. Sarah talked quickly and

had reduced intelligibility as a result. She met expressive language developmental milestones (syntax, morphology, semantics, phonology) within typical limits, however, had noted deficits in pragmatic language. She had difficulty interacting with children, did not follow directions from peers, and inconsistently followed 2-step simple and novel directions from adults. She would line up toys and objects, flap her hands, and not engage in purposeful play with toys. Sarah was not able to take turns in conversation and unable to maintain play with a peer for up to 5 minutes. Also, Sarah was inflexible in her play and changes in her routine. She would need to repair books with tears in them with tape prior to reading the book and would get very upset if she accidentally ripped the page of a book. She participated in parallel play but did not seek out other children. She would initiate interactions with other children, but only in order to get a toy she wanted. She did not show affection toward others directly. She was noted at times to give someone who looked sad a toy, but did not engage him or her or appear to connect socially. Sarah's mother reported that she had to teach Sarah explicitly about eye contact and other social skills. Her mom was concerned about Sarah's avoidance to physical touch, social and emotional skills, and rigidity in play and routines.

Further, Sarah's attention, adaptive skills, fine motor, self-help, behavior, and cognitive skills were reported in her IEP to be as follows at the time of initiation of intervention. Sarah required assistance in wiping herself, although she was toilet trained during the day. She had difficulty transitioning between activities and locations and noted concerns with vestibular, tactile, auditory, and visual hypersensitivities. Often she would request to wear sunglasses outside. Sarah was able to feed herself. She could put on and

take off her pants and shoes independently. She had a happy demeanor, responded to positive reinforcement and praise, and was easily redirected if she became off-task. Sarah had a short attention span in a large-group setting, but was able to attend to tasks in a one-on-one or small group setting. She had difficulty sitting still during group activities (e.g., circle time) and would often “go blank” during group settings. Also, there were noted concerns about Sarah’s ability to calm herself. She would not become upset easily but when she did she would engage in self-injurious behavior. Sarah had typically developing gross and fine motor skills and had a number of cognitive strengths including vocabulary, word retrieval, long term memory, and visual perception.

Sarah had a remarkable medical history. Sarah’s mother received prenatal care and was induced due to preeclampsia. Sarah tested positive for galactosemia, a genetic disease that masks as lactose intolerance. Since then, she has only had soymilk to drink. Individuals with galactosemia may develop mild intellectual impairment, even in people who avoid galactose. It is also known to be associated with delayed speech and language development, mental retardation, learning disabilities, reduced function of ovaries leading to ovarian failure in females, cataracts, diminished bone density, severe infection with bacteria (*E. coli*), tremors and uncontrollable motor function. She also had a heart murmur and was diagnosed with Anterior Ventricular Septal Defect (VSD) and was followed annually by a cardiologist. Despite these medical complications, Sarah was reported to be a well child and did not take any medications regularly.

Sarah received 30 minutes of occupational therapy consultation per week as part of her IEP. She also received 30 hours per week of special education in a self-contained

preschool classroom. The classroom was comprised of one special education teacher, two special education teaching assistants, and eight students. The classroom was located in a neighborhood, Pre-K to fifth grade, public elementary school in an urban setting in a Mid-Atlantic state.

**Diego.** Diego was a 45-month-old Hispanic male at the start of this research study. He was initially found eligible for special education services 15 months prior to the start of this intervention and received 14 months of special education and related services (speech-language therapy and occupational therapy). Diego lived with his mother and father in an apartment and spoke two languages: Spanish (first language and home language) and English. Diego was a fluent speaker in both English and Spanish.

Diego was initially referred to Child Find for further evaluation due to concerns about his difficulties with speech and language as well as high activity level. His cooperation and attention throughout initial assessments for eligibility were variable. He was active during the evaluations and had to be redirected often to regain his attention. He demonstrated (a) cognitive skills in the average range, (b) avoided eye contact, (c) possessed a decreased level of social awareness, (d) lacked independence, (e) did not answer to his name, (f) flapped his hands, and (g) had a difficult time with transitions.

Diego's IEP provided information on the present levels of performance in the areas of speech, language, play, and social skills development. Diego was communicating via gestures or vocalizations, but had limited verbal language (a few single words). He could imitate some familiar signs (e.g., bathroom, help, stop). He would take turns in play and imitate some words. Diego was unable to use language for varied purposes or name

familiar objects in photographs. He made limited eye contact and had difficulty with transitions when they were out of routine. Diego was able to imitate grown-up activities, initiate play, and was beginning to claim and defend ownership of personal belongings. He had limited play schemes and demonstrated functional use of objects in play. He did not demonstrate imaginative play or use of toys in a symbolic manner. He followed routine 1-step verbal directions with cues and was emerging in his ability to follow 2-step directions. Diego correctly produced /m, b, p, t, h, k/ and all vowel sounds within word approximations and single words. He inconsistently imitated sounds/words upon request. His oral structure was adequate for feeding and speaking.

Further, Diego's attention, adaptive skills, fine motor, self-help, behavior, and cognitive skills were reported in his IEP to be as follows at the time of initiation of intervention. Diego assisted in dressing and undressing, imitated housework activities, cleaned up after himself, drank from an open cup, and fed himself with the use of a utensil. He was in the early stages of toilet training. Diego was described as impulsive, had difficulty sitting still, was easily distracted, and had a short attention span. He was able to focus on self-directed activities for 5 or more minutes, but demonstrated an overall weakness in focus and attention span. He was an active child who often had difficulty following directions without routine and reinforcement. He required structured routines, visual cues (e.g., pictures), and sensory interventions (e.g., gentle rocking) in order to follow routines and directions. Diego could build a six-block tower, build a four-block train, ask for objects by pointing, complete simple puzzles, and name one body part. He was unable to identify any colors or shapes.

Of note, Diego received treatment for metatarsus adductus, a deformity of infancy where there is an inward deviation of the forefoot relative to the hindfoot, and tight hip adductor muscles. Due to his left foot turning inward, he completed exercises at home, which helped him improve his gait. Diego was able to walk and navigated the school building independently and thus did not qualify to receive physical therapy in school as part of his special education program.

Diego received two 30-minute sessions of speech and language therapy per week and two 30-minute sessions of occupational therapy per week as part of his IEP. He also received 30 hours per week of special education in a self-contained preschool classroom for students with autism. The classroom was comprised of one special education teacher, two special education teaching assistants, and five students with autism. The classroom was located in a neighborhood, Pre-K to fifth grade, public elementary school in an urban setting in a Mid-Atlantic state.

Diego differed from the other participants in a few ways. First, he was categorized as a student with autism under IDEA (2004) criteria for the public schools like the other participants in this study; however, he did not demonstrate impairments in all three areas (social interaction, communication, restricted and repetitive behaviors) that are the primary criteria for a diagnosis of classical autism (APA, 2000). The other three participants in this study had impairments in all three domains; however, Diego did not demonstrate any restricted and repetitive behaviors. Diego demonstrated impairments in only social interactions and communication. Further, Diego's classroom teacher (preschool special education teacher) reported that Diego's IEP team had discussed the

possibility of him having Pervasive Development Disorder – Not Otherwise Specified (PDD-NOS) rather than Classical Autism.

Second, Diego differed from the other participants in the fact that he demonstrated spontaneous speech in the classroom and in the hallway. However, when he walked into the room where the research was being conducted, he became silent and did not talk. Diego was familiar with both the room where the research was conducted as well as the researcher and play partner participants from their involvement in his preschool special education classroom. The other three participants in this study acted similarly in the classroom and hallways as they did during the research sessions.

Third, Diego watched the play partner participants closely during the first few baseline sessions before engaging with the toys. While he was not engaged in play during this time, this behavior was still appropriate. Before the POVM was even introduced, Diego appeared to be imitating the in vivo, or live models, produced by the play partner participants in normal play.

**Leo.** Leo was a 40-month-old biracial (Asian and European American) male at the start of this research study. He was initially found eligible for special education services 8 months prior to the start of this intervention and received 6 months of special education and related services (speech-language therapy and occupational therapy). Leo lived with his mother and father in an apartment and spoke Indonesian and English at home. Leo was a fluent English speaker. His fluency level in Indonesian was unknown to the researcher.



Leo was initially referred to Child Find due to his parents' concerns about his language development, social and emotional functioning, and play skills. He had been receiving services from the county's early intervention (birth – 3) service team and had a medical diagnosis of Autism and Attention Deficit Hyperactivity Disorder (ADHD) from his pediatrician. Leo demonstrated receptive language skills in the 9- to 12-month range with scattered skills up to 24 months. His expressive language skills were in the 9- to 21-month range with some scattered skills in the 21-month range. Leo's parents reported that he used 5-10 words consistently but had about 50 nouns in his repertoire. Leo was reported to be more comfortable interacting with adults and older children rather than peers, had difficulty attending and completing tasks, and would inconsistently respond to his name. It was difficult to redirect his attention from items of interest. He would not play with toys appropriately and tended to line up things. He did not like his routine to be disrupted and enjoyed repetitive play. When he would get upset, he would tantrum and vomit. At times, Leo would make eye contact with his parents, but he would not make eye contact with anyone else. He demonstrated difficulty following oral directions and did not use objects for their function (e.g., would spin wheels on car instead of using car as a vehicle for moving items/people). Leo's gross motor functioning was functional within a school setting; however, his fine motor skills were in the poor to very poor range in all areas. He used a pincer grasp to pick up small objects between his thumb and forefinger, but did not initiate or maintain a grasp to pull a zipper up or down. His sensory profile indicated a definitive difference in taste/smell, auditory filtering, and visual/auditory sensory. He was underresponsive and sought out sensations. At the time

of his initial evaluations, Leo appeared to have typical performance for tactile sensitivity and movement sensitivity. He had a very limited food repertoire. His parents reported that he used to eat a variety of foods when he was younger, but at that time, he would only consume Domino's™ cheese pizza, grapes, whole apples, strawberries, and Pediasure™. He would drink the Pediasure™ from a bottle and would drink juice only from a straw when an adult squirted it in his mouth. He would not indicate to others if he had a wet or soiled diaper and his self-help skills were assessed to be at the 16- to 21-month range. Leo's cognitive skills were assessed to be at the 22- to 24-month range, but were considered to be a low estimate of his actual abilities since he refused to do activities that did not involve letters. He demonstrated a relative strength in the area of preacademics. Leo's social/emotional development was assessed to be at the 12-month level with some scattered skills into the 28-month level.

Leo's IEP provided information on the present levels of performance in the areas of speech, language, play, and social skills development. Leo communicated his wants using simple words and phrases (e.g., "I want grapes" and "no") and gestures. He exhibited echolalia and had difficulty with social communication, eye contact, initiation, and answering/asking questions. He could follow simple commands and identify familiar vocabulary words in pictures. However, he had difficulty understanding more complex actions and multistep directions. Leo preferred solitary play, lined up toys, spun parts of toys (e.g., wheels on a toy car), and preferred interactions with adults. He did not share or engage in imaginative or cooperative play. Described as a curious child by his IEP team, Leo greeted teachers and classmates by name when prompted with name labels. At that

time, he was beginning to let same-aged peers into his space and allow them to hug him. Transitions and flexibility in routines were areas of significant concern for Leo. His articulation, fluency, and voice were appropriate for his age and gender.

Further, Leo's attention, adaptive skills, hearing, gross and fine motor, self-help, behavior, and cognitive skills were reported in his IEP to be as follows at the time of the initiation of intervention. Leo would assist with dressing and undressing. He had a limited appetite, would feed himself using his fingers, and drink Pediasure™ from a bottle. He would not use utensils to eat or drink from an open cup. His attention was inconsistent but sustained longer when given preferred tasks. Described by his IEP team as an active child, Leo often had difficulty following instructions without routine or reinforcement. He required structured routines, visual cues such as pictures, and sensory interventions such as deep pressure to maintain behavior and engage in academic work. Leo understood concepts of shape and color, knew all upper- and lowercase letters, identified animals, and could rote count to 100. Leo loved activities involving letters and would say the letters in words he saw on labeled items around the school (e.g., "spelling" the words on the weather poster) or spell memorized words (e.g., grapes) when requesting desired, nonpresent items. Leo's hearing was screened and within normal limits. He walked up stairs using alternating and time-step patterns. He sat upright in his chair for 20 minutes and carried a ball instead of throwing it at a target. Leo would run and climb independently on the playground and during physical education activities. He was able to coordinate the use of both hands for classroom tasks, had a functional grasp on classroom tools (e.g., markers, crayons, paintbrush), and used a pincer grasp. When

given highly motivating tasks or activities, Leo would more readily engage in fine motor activities. He had weak visual motor integration, low energy, and difficulty with sensory processing. He had hypersensitivity to taste, smell, auditory, and visual stimuli. However, Leo had typical sensory reactions to tactile and vestibular stimuli. Of particular note, Leo's IEP team determined that he qualified for ESY following the 2011-2012 school year in speech and social skills due to the nature of severity of his disability and occupational therapy based on emerging skills and breakthrough opportunity.

Leo received two 30-minute sessions of speech and language therapy per week and two 30-minute sessions of occupational therapy per week as part of his IEP. He also received 25 hours per week of special education in a self-contained preschool classroom. The classroom was comprised of one special education teacher, two special education teaching assistants, and seven students. The classroom was located in a neighborhood, Pre-K to fifth grade, public elementary school in an urban setting in a Mid-Atlantic state.

### **Summary of Participants With Autism**

Table 2 summarizes the characteristics of the participants with autism, including each participants' characteristics of autism and suggested diagnostic category of autism.

Table 2

#### *Summary of Characteristics of Participants With Autism*

Participant	Impaired Social Interaction	Impaired Communication	Restricted and Repetitive Behavior	Suggested Diagnostic Category
Marcos	✓	✓	✓	Classical Autism
Sarah	✓	✓	✓	Classical Autism
Diego	✓	✓		PDD-NOS
Leo	✓	✓	✓	Classical Autism

## Play Partner Participants

Six play partner participants were recruited and participated in this study, two at each school site. One school site had two participants with autism who were involved in this study (Marcos and Diego). All play partner participants were in general education preschool classes and met the selection criteria described later (see Appendix B).

Two different play partner participants were matched with each participant with autism. The play partner participants were preschool students who spent time in the same location with the participant with autism during special classes (e.g., physical education, music, art, recess). For each participant with autism in each session, a random assignment was given to either one or the other play partner participant to engage in a 7-minute play session with the participant with autism. Of note, all play partner participants were between age 52 to 59 months because enrollment in general education preschool programs in this school division was restricted to only children who had turned 48 months by September 30 of the current school year. Teacher recommendations were considered in the pairing process as well. Table 3 describes the play partners.

Table 3

### *Description of Play Partner Participants*

Play Partner	Gender	Ethnicity	Age (in Months)	School	Participant With Autism
1	Male	Caucasian	52	A	Leo
2	Female	Biracial	59	A	Leo
3	Female	South Asian	56	B	Sarah
4	Male	Middle Eastern	54	B	Sarah
5*	Female	Caucasian	57	C	Marcus/Diego
6*	Female	Hispanic	56	C	Marcus/Diego

*Note.* \*Marcos and Diego were located at the same school and had the same two play partner participants.

## **Professional Participants**

Eighteen professionals including general and special education teachers, instructional assistants, and therapists (e.g., speech-language, occupational) were recruited to share their opinions about the effects of video modeling on the play and language skills of the participant(s) with autism with whom they work. A total of eight general and special education teachers, seven instructional assistants, and three therapists participated in completing the social validity questionnaire.

## **Setting and Selection of Site**

This study was conducted in three different elementary schools in an urban public school district in the Mid-Atlantic region of the United States. All three of the elementary schools included prekindergarten through fifth grade. Services for students with autism were delivered over a continuum of services within the school division. The levels of support from least-to-most restrictive included consult/monitor, resource (less than 15 hours of special education services), self-contained (more than 15 hours of special education services), self-contained specialized autism program, and private day school.

School A was a fully accredited school and the participant who attended there was Leo. During the 2011-2012 school year, the school served 578 prekindergarten to fifth grade students, of which 68 were students in prekindergarten. This school had a focus on English as a Second Language, general education, special education, was a specialty school (Spanish Immersion) and had a Talented/Gifted program. During 2009-2010 this school failed to meet No Child Left Behind (NCLB) standards for Adequate Yearly Progress (AYP), then in 2010-2011 it made AYP, and finally in 2011-2012 (the school

year of this study) the school did not make AYP. This school was in its third year of school improvement. In 2010-2011, the last reported year, the school safety report card indicated no incidences of offense against students, offenses against staff, other offenses against person, weapon, alcohol/tobacco/drug, property, disorderly or disruptive behavior, technology offenses, or other offenses. Ninety-two percent of core academic classes were taught by teachers who met the federal definition of highly qualified. During the 2010-2011 school year (the last reported year) 35% of teachers in this school had a bachelor's degree, 59% a master's degree, and 7% a doctoral degree.

School B was a fully accredited school and the participant who attended there was Sarah. During the 2011-2012 school year, the school served 594 prekindergarten to fifth grade students, of which 30 were students in prekindergarten. This school had a focus on English as a Second Language, general education, special education, and had a Talented/Gifted program. During the 2009-2010, 2010-2011, and 2011-2012 school year, this school met No Child Left Behind (NCLB) standards for Adequate Yearly Progress (AYP). In 2010-2011, the last reported year, the school safety report card indicated no incidences of offense against students, offenses against staff, other offenses against person, weapon, alcohol/tobacco/drug, property, disorderly or disruptive behavior, technology offenses, or other offenses. All core academic classes (100%) were taught by teachers who met the federal definition of highly qualified. During the 2010-2011 school year (the last reported year) 14% of teachers in this school had a bachelor's degree, 81% a master's degree, and 5% a doctoral degree.

School C was a fully accredited school and the participants who attended there were Marcos and Diego. During the 2011-2012 school year, the school served 543 prekindergarten to fifth grade students, of which 53 were students in prekindergarten. This school had a focus on English as a Second Language, general education, special education, and had a Talented/Gifted program. During 2009-2010 this school failed to meet No Child Left Behind (NCLB) standards for Adequate Yearly Progress (AYP), then in 2010-2011 it made AYP, and finally in 2011-2012 (the school year of this study) the school did not make AYP. This school was not in school improvement. In 2010-2011, the last reported year, the school safety report card indicated no incidences of offense against students, offenses against staff, other offenses against person, weapon, alcohol/tobacco/drug, property, disorderly or disruptive behavior, technology offenses, or other offenses. All core academic classes (100%) were taught by teachers who met the federal definition of highly qualified. During the 2010-2011 school year (the last reported year) 27% of teachers in this school had a bachelor's degree, 68% a master's degree, and 5% a doctoral degree.

The classroom settings at each of the three schools were similar in the fact that they all three included a large, open space in the middle of the room in which the participants could sit on the floor and play. School A and C's classrooms were dedicated "newsrooms" off a larger room (the library at School A and the computer lab at School C). The intervention classroom at School B was the computer lab. All of the classrooms had desks and chairs along the perimeters of the room. There were computers that were



on each of the desk that lined the rooms in all of the schools. Schools A and C had carpet on the floor of the open space and School B's classroom had tile flooring.

### **Independent Variable**

The video model acted as the independent variable for this investigation. It was an instructor-created video that was recorded from the point-of-view of the participant, meaning the perspective from which the participant views the materials to complete the task. The script included symbolic play actions and play-associated language utterances that were developmentally appropriate for the participants' age and language level. In addition, many of the utterances were broad enough so that they could generalize to other play and classroom activities. For example, words and phrases such as "look!" "oh no!" "all-done," "yes," "bye," "here I come," "ready to go," "I can help you," "it's broken," "can you fix it?" "thank you," "ready, set, go," "my turn," "it is full," "watch me go up," "go down," "I will wait," "are you done yet?" and "take it away" could be used in a variety of settings to convey multiple messages.

Further, the language presented in the script was developed based on age-appropriate morphological development. Morphology is the aspect of language concerning the rules that govern change in word meaning. Brown's Fourteen Grammatical Morphemes (Brown, 1973) were considered in the development of the script in order to ensure that the language level was appropriate based on the age of the participants with autism. A further description of the video validation process, including the script, can be found in the subsequent section titled "Validation of Independent

Variable.” See Table 4 for a complete listing of Brown’s Fourteen Grammatical Morphemes.

Table 4

*Brown’s Fourteen Grammatical Morphemes*

Morpheme	Example	Age of Mastery* (in months)
Present Progressive –ing	Mommy driving	19-28
In	Ball in cup	27-30
On	Doggy on sofa	27-33
Regular plural –s	Kitties eat my ice cream	27-33
Irregular past	Came, fell, broke, sat, went	25-46
Possessive ’s	Mommy’s balloon broke	26-40
Uncontractible copula	He is (response to “who is sick?”)	28-46
Articles	I see a mouse	28-46
Regular past –ed	Mommy pulled the wagon	26-48
Regular third person –s	Kathy hits	28-50
Irregular third person	Does, has	28-50
Uncontractible auxiliary	He is (response to “who is sitting?”)	29-48
Contractible copula	Man’s big. Man is big.	29-49
Contractible auxiliary	Daddy’s eating. Daddy is eating.	30-50

*Note.* \* Used correctly 90% of the time in obligatory contexts. Adapted from Brown and Bellugi (1964), Brown (1973), and Miller (1981).

## Materials

During the baseline, intervention, and maintenances phases, one set of identical toys was given to each participant. More specifically, both participants were given a gallon size Ziplock® bag with a yellow car, a red car, an orange tow truck with a black tow hook, and two Fisher Price Little People® figurines, one male and one female (see Appendix E for photographs of participant materials used in baseline, intervention, and maintenance). Both participants in the dyad shared the Fisher Price Little People® car garage (see Appendix E for front and back view of the car garage). The car garage was

approximately 19” (length) x 11” (width) x 17” (height) and had several action items included on it. Examples of action items included a three-story ramp, smaller two-story ramp, elevator including areas of one car and one person, gas pump, two-car garage, two parking decks, fire hydrant, and tire repair location. All the materials given to the participants during play were identical to those used in the video clips.

During the generalization phase, a different set of identical car toys were given to each participant. More specifically, both participants were given a gallon size Ziplock® bag with a yellow car, a red car, an orange tow truck, and two different Fisher Price Little People® figurines from the intervention (see Appendix F for photographs of participant materials used in generalization). Both participants in the dyad shared a different car-based play set from Fisher Price Little People®. This play set included a circular roadway with two small ramps for entering/exiting the circle, a bridge, a tire repair station, a car wash, a hose, and a fueling station (see Appendix F).

One video model was used during this intervention. The researcher used the video camera on an iPad2™ to create the point-of-view video model clip. The video clip was then uploaded to an iMac™ Apple® computer and saved. Then the researcher saved it to the video clip in iMovie™ on the same iMac™ Apple® computer. Finally, the video clip was uploaded to iTunes™ where it could be viewed by participants on the iPad2™.

The only items visible on the video were the model’s hands and the play materials relevant to the task. The video was recorded approximately 1 foot from the materials and hands modeling the task. Additionally, the video was recorded while the actors were

sitting on the floor, since this is the position in which the participants were expected to play with the toys.

The actors in the video were two adult models: one male and one female. The researcher selected to use one model from each gender so that both the play partner participant and the participant with autism had a same gendered actor from which to relate and imitate behavior. Also the models were selected because of their clear speech production in English and ability to narrate the script with natural expression and tone.

In the video, the models narrated the script and physically manipulated the materials according to the actions specified in the script. The script consisted of 25 symbolic play actions (e.g., putting gas in the toy car) with corresponding play-associated language utterances (e.g., “put the hose in”) based on the language level of the participants ranging in length from one to four words. (See Appendix G for complete list of scripted symbolic play actions and scripted play-associated language utterances). The video clip was 2 minutes and 30 seconds in length.

### **Validation of Independent Variable**

The POVM script was developed between the researcher, who was a speech-language pathologist, and a general education teacher. The researcher had a master’s degree in Speech-Language Pathology, held her American Speech Language Hearing Association (ASHA) Certificate of Clinical Competence in Speech-Language Pathology (CCC-SLP), and 7 years of experience as a speech-language pathologist working with preschool-aged students with and without autism in the public schools. The general education teacher was recently retired, held a master’s degree in Education and had 26

years of experience working in the public schools with general and special education elementary school-aged students. Further, during the past 5 years, the general education teacher had been administering formal and informal assessments to preschool-aged students to evaluate their kindergarten readiness skills. The script followed age-appropriate developmental norms and considered the preschool curriculum used in the school division where the participants with autism and play partner participants attended preschool.

The POVM went through a validation process by three expert reviewers with extensive experience and expertise in related fields of study: a speech-language pathologist (different from the researcher), special education teacher, and general education teacher (different from the one who helped develop the POVM script). The speech-language pathologist held an M.A. in Speech-Language Pathology, an Ed.S. in Educational Leadership, had her CCC-SLP, and 35 years of experience working with preschool- and elementary-aged students. The special education teacher held an Ed.D. in Education and had 12 years of experience working with school-aged students in special education. The general education teacher held her M.A. in Education and had 32 years of experience working with preschool- and elementary-aged students.

To validate the videos, the three expert reviewers read the script and used the “Point-of-View Video Modeling Script” (see Appendix G) to check that each statement listed was said as it was written in the POVM. The expert reviewers also watched the videos and used the “Scripted Symbolic Play Action” and “Scripted Play-Associated Language Utterances” (see Appendices H and I) data collection sheets to check that each

item listed was addressed in the POVM. Further, all three experts validated the content of the language presented in the video script was age-appropriate and followed developmental norms. During the video validation process, the expert reviewers could stop, start, fast forward, and rewind the video as many times as needed to complete this task. They watched the POVM on an iPad2™, to simulate the same context in which the participants viewed the video in this study.

### **Dependent Variables**

The dependent variables of this investigation were (a) scripted symbolic play actions, (b) spontaneous symbolic play actions, (c) scripted play-associated language utterances, and (d) spontaneous play-associated language utterances. For all appropriate responses, the sequences did not have to be imitated in the exact order to be recorded as correct. Responses were recorded on data collection sheets (see Appendices H, I, J, K, and L).

### **Scripted Symbolic Play Actions**

Based on Hine and Wolery's (2006) research and findings, the researcher chose to target increasing the use of modeled symbolic play actions as a dependent measure for four main reasons. The first reason is that previous studies of symbolic play typically "measure actions on materials from which a theme, routine, or narrative can be inferred" (p. 86). Also, increasing a child's appropriate actions may reduce repetitive actions, promoting more opportunities for positive social exchanges during integration with typically developing peers. When a child increases appropriate play actions, there are an increased number of behaviors on which adults can comment and expand, further

addressing communication goals. Last, increasing appropriate actions “reduces the apparent difference between the participants” and their typically developing peers” (p. 86).

The researcher used the following definition from Palechka and MacDonald (2010) to define scripted symbolic play actions.

Scripted actions were defined as motor responses that matched the action shown on the video or were similar to the video model but resulted in the same change to the environment that occurred in the video. Actions that were similar to the video could include the participant using their hands to create actions done by vehicles or characters in the script. (p. 461)

For example, if the participant used his or her finger as a hook and towed the car to the garage to be fixed this was recorded as a scripted symbolic play action. Also recorded as a scripted symbolic play action was when the participant pushed the car down the ramp but it got stuck somewhere in the middle of the three-story ramp and the participant unstuck the car and put it at the bottom of the ramp. Since this action results in the same change to the environment as pushing the car down the ramp and it successfully making it to the bottom independently, it was recorded as a scripted symbolic play action. Each time the participant engaged in an appropriate action, it was recorded on the data sheet titled “Scripted Symbolic Play Actions” by writing a checkmark (✓) in the “Completed” column of the corresponding action on the data collection sheet (see Appendix H). If a behavior was repeated, it was only recorded once.

There were a total of 25 different scripted symbolic play actions presented in the POVM. The variety of scripted symbolic play actions was measured, rather than the frequency, in order to determine how the participants increased in their flexibility of play. Following the Logic Model presented in Chapter 1, the primary purpose of this study was to help preschool children with autism improve social skills and increase participation in settings with their typically developing peers. Monitoring the frequency of scripted symbolic play actions would not provide information on the flexibility of the participant's play. For example, if the participant put the car in the elevator and moved the elevator up and down again and again with a high frequency, this would not illustrate flexible, varied play, but rather repetitive. As discussed in Chapters 1 and 2, repetitive play is characteristic of play in children with autism and distinguishes them from their typically developing peers. Using a measure of variety illustrates the flexibility in play and was thus used to determine the effects of POVM on scripted symbolic play actions, similar to the method used by Hine and Wolery (2006) in their research. Results of scripted symbolic play actions were described for each participant using six different measures: level, trend, variability, immediacy of change, overlap between phases, and consistency.

### **Spontaneous Symbolic Play Actions**

These actions were defined as unscripted, novel actions that related to the context and play set but were not demonstrated in the video clip. For example, when the modeled action was hooking the tow truck up to the broken-down car and driving it to the garage, the addition by the participant of taking it off the tow hook and putting the broken car into the garage was recorded as a spontaneous symbolic action. Responses also included



any motor response not meeting the preceding criterion but appropriate to the situation, or a demonstration of appropriate object manipulation (e.g., pretending to start the car with a key). Spontaneous symbolic play actions were recorded on the data sheet titled “Spontaneous Symbolic Play Action” (see Appendix J). Each novel action the participant demonstrated was described in behavioral terms (e.g., participant drove the car in reverse up the ramp) and was recorded on a separate line of the data sheet. If a behavior was repeated, it was only recorded once.

### **Scripted Play-Associated Language Utterances**

Scripted play-associated language utterances were defined as verbal statements (e.g., word approximations, words, phrases, sentences) or play sounds that imitate those words presented in the video clip. For example, the statement, "ready, set, go" or the play sound "vroom" while driving the toy car along the floor was recorded as scripted language if presented in the video. The occurrences of verbal statements or play sounds in the absence of related motor play behavior, such as talking about objects not in view or unrelated to play or making sounds with no corresponding motor play action were not recorded as spontaneous play-associated language utterances. Appropriate scripted play-associated language utterances were recorded on the data sheet titled “Scripted Play-Associated Language Utterances” by writing a checkmark (✓) in the column of the corresponding type of language utterance (sound, word approximation, word, phrase, sentence) and transcribed verbatim in the transcription column for the corresponding utterance (see Appendix I). Each utterance was only recorded once because the research

question focused on examining the variety of scripted play-associated language utterances spoken during the play sessions.

### **Spontaneous Play-Associated Language Utterances**

Spontaneous play-associated language utterances were defined as verbal statements (e.g., word approximations, words, phrases, sentences) or play sounds that related to the context and play set but were not demonstrated in the video clip, for example, when the participant closed the garage door and said “goodnight” to the car. All spontaneous play-associated language utterances were recorded on the data sheet titled “Spontaneous Play-Associated Language Utterances.” Each novel utterance the participant said was recorded by writing a checkmark (✓) in the column of the corresponding type of language utterance (sound, word approximation, word, phrase, sentence) and transcribed verbatim in the transcription column for the corresponding utterance (see Appendix K). Each utterance was only recorded once because the research question focused on examining the variety of spontaneous play-associated language utterances spoken during the play session.

### **Supplemental Measure**

The researcher added this measure to this study in response to an observable change in play behavior over the course of the intervention. Play actions that were not related to the toy and situation or self-stimulatory responses that involved non-goal-directed repetitive behavior that did not involve an object (e.g., mouthing a toy, rocking, hand flapping) were recorded as inappropriate play behavior (see Appendix L). Repetitive motor responses were defined as repetitive behaviors lasting 1 second or

longer that were inconsistent with appropriate manipulation of the toy during play (e.g., rapidly tapping on the moving piece of the garage ramp over and over or holding the tow truck at eye level and spinning the wheels) and were scored as inappropriate. The frequency of inappropriate play behaviors were recorded using partial interval recording across 15-second intervals during the 7-minute play session. There were a total of 28 intervals per session. Data were recorded on the “Inappropriate Play Behaviors” coding sheet (see Appendix L). The observer watched the video recording of the participants playing while simultaneously listening to a recording that had a beep to indicate the end of each session. Beeps were spaced 15 seconds apart across the 7-minute recording. Between beeps, the recording was silent. If the student engaged in an inappropriate play behavior at any point during the interval, the occurrence of the behaviors was marked on the recording sheet. A checkmark (✓) was recorded in the cell for the interval indicating that inappropriate play behavior occurred at any point during that interval. Upon conclusion of watching each video, the observer added up the total number of checkmarks to determine during how many partial intervals the inappropriate play behavior occurred. Thus, the frequency of inappropriate play behaviors was collected and recorded.

### **Procedures**

The procedures described illustrate the sequence of activities that occurred before, during, and after the research study. Prior to each session in all phases, the researcher checked the operation of the video recording, viewing equipment, and play materials to ensure that everything functioned properly.

## **Play Partner Participant Training**

Play partner participants were trained to initiate the interactions between themselves and the participants with autism. Individuals with autism often have deficits in the area of initiating a social interaction. By having the partner participant initiate the interaction, it compensated for this potential deficit. Partner participants were trained during two 15-minute training sessions with the researcher on two different days. Both training sessions occurred within the same week before the study began. Play partner participant training sessions occurred in the same room as the intervention took place for consistency.

During the training sessions, the researcher instructed the typically developing partner participant on how to (a) initiate the play session, (b) stay on topic, (c) ask questions, and (d) engage the partner (the participant with autism) in play. Both training sessions covered all four of these topics. The play partner participant practiced role-playing scenarios with the researcher during both training sessions.

First, the researcher showed the play partner participant the video model. She explained,

Now we are going to watch a video of two friends playing with cars. Listen to some of the things the people say. Then you're going to get a chance to play with me. We will use the same toys from the video. After we will talk about some things that happen when we play with friends.

Then the play partner participant and the researcher played with the toys.

Next, to teach the play partner participant about how to initiate play with the participant with autism, the researcher gave instruction about initiation. The researcher instructed the partner participant with a similar dialog.

I have a friend that I want you to play with. Sometimes he/she might need help to get started playing with you. I want you to wait for him/her to start playing with you, but if they don't, then it will be your job to start the play. If this happens, I will point at you and say, "go" when it is time for you to start the play. Don't start the play until I point to you and say, "go." Let's practice now. Let's pretend I'm your friend and you are playing with me.

Then the researcher practiced with the play partner participant. The first three times, the researcher did not initiate the play. This is when she pointed to the play partner participant and said, "go" and the play partner participant initiated play. The fourth time they practiced, the researcher initiated play. In this case the play partner participant did not need to initiate the play. The researcher then gave varied prompts for play initiation so that the play partner participant would practice what to do in each situation.

Last, to train the play partner participant to stay on topic, ask questions, and engage the participant with autism in play, the researcher instructed him or her to only talk about the cars and the garage. For example, the researcher used a similar dialog when instructing the play partner participant.

I only want you to talk about these toys and characters when you play. Make the cars do things that happen in real life. Characters can talk like you and me. If your partner starts to walk away or stops talking about the toys or characters, I want

you to invite him/her back to play. You could say, “Come back and play with me” or “It’s your turn” or you could ask him/her a question about what they want to do next with the toys. If you are playing with your friend and the play gets stuck or off track, I will look at you and say, “talk about the cars.” It is your job to help the play get back on track. If you hear the words “talk about the cars” make sure you help your friend to use his/her words in play. Let’s practice this.”

The researcher and the play partner participant then role-played different scenarios such as the participant with autism walking away, talking about a different subject (e.g., outer space, Thomas the Train), and engaging in repetitive play.

### **Random Assignment of Participants**

This study used regulated randomization procedures for multiple baseline design. A triple randomization procedure was used, meaning that participants were randomly assigned to each tier of intervention, randomly assigned the treatment starting point from a designated interval of acceptable starting points, and randomly assigned one of two play partner participants who were at his or her school.

First, participants in this study were randomly assigned the order in which they received the treatment intervention. A person not affiliated with the study wrote the name of each participant and assigned each one a number, one through four. The piece of paper with this information was then folded and placed in an envelope that remained unopened until after completion of the next step. Then the researcher used the random integer generator on <http://www.random.org/integers> to determine the tier of intervention in which each participant was assigned. For Part I of the random integer generation, the

researcher had the program generate 100 random integers with each integer between the value of one and four in a format of five columns. Then in Part II of the random number generator, the researcher selected “get numbers.” Moving down the columns created, the researcher recorded the numbers one through four in the order that they first occurred in the column. For example the number sequence (4, 4, 3, 4, 4, 1, 4, 4, 2) was recorded as 4 (first tier), 3 (second tier), 1 (third tier), and 2 (fourth tier). The researcher then opened the envelope and matched the participants’ assigned number to the respective tier of intervention. Figure 2 depicts the participants’ randomly selected tier of intervention.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Marcos	B	B	B	B	B	B <sup>x</sup>	T <sup>x</sup>	T	T	T	T	T	*T	T	*T	T	T	IM	DM
Sarah	B	B	B	B	B	B	B	T <sup>x</sup>	T <sup>x</sup>	T	T	T	*T	T	*T	T	T	IM	DM
Diego	B	B	B	B	B	B	B	B	B	B <sup>x</sup>	T <sup>x</sup>	T	T	*T	T	T	T	IM	*DM
Leo	B	B	B	B	B	B	B	B	B	B	B <sup>x</sup>	T <sup>x</sup>	T	T	T	T	T	*IM	*DM

*Figure 2.* Randomly selected tiers and start dates of intervention. Randomly selected tiers and starting points for the POVM across baseline (B), treatment (T), (<sup>x</sup>) one of the two potential start points from which the actual start point was randomly selected, immediate maintenance (IM), 1-week delayed maintenance (DM), and generalization probes (\*) across four preschoolers with autism.

Second, the participants in this study were randomly assigned to a predetermined treatment starting point before the study began. The researcher used a regulated randomization procedure, meaning that the starting point of the treatment would be randomly assigned on either session 6 or 7 for tier one, session 8 or 9 for tier two, session 10 or 11 for tier three, and session 12 or 13 for tier four. These intervals were preselected by the researcher prior to the study to allow at least five data points in the first

participant's baseline and in the last participant's treatment phase. Thus, the standard for minimum data points in each phase was met (Kratochwill et al., 2010). The researcher used the random integer generator on <http://www.random.org/integers> to determine the treatment starting point for each tier. For Part I of the random integer generation, the researcher had the program generate one random integer between the value of six and seven. Then in Part II of the random number generator, the researcher selected "get numbers." Looking at the number, the researcher recorded the number (six or seven) that was randomly generated. This was then assigned as the number of the session in which the participant in the first tier received the treatment. This procedure was then repeated for each tier using the respective predetermined range of numbers discussed above. See Figure 2 for a diagram depicting the participants' randomly selected start date for the intervention.

Third, a schedule of randomly assigned play partners was predetermined for each participant (see Appendix M). A person not affiliated with this study wrote the name of each participant at each school and assigned each one a number, one or two. For example, School A had two play partner participants. The name of each child was written down on a piece of paper and one was assigned the number one and the other a number two. The piece of paper with this information was then folded up and placed in a sealed envelope and remained unopened until after completion of the next step. Then the researcher used the random integer generator on <http://www.random.org/integers> to determine the play partner participant for each session. For Part I of the random integer generation, the researcher had the program generate 19 random integers (one for each session) with each



integer between the value of one and two in a format of five columns. Then in Part II of the random integer generation, the researcher selected “get numbers.” Moving down the columns created, the researcher recorded the numbers one through two in the order that they occurred. The researcher then opened the envelope and matched the participants’ name to their assigned number as it occurred. This procedure was then repeated for Leo and Sarah. Since Marcos and Diego were both located at the same school with only two partner participants at this location, Marcos was randomly assigned a partner using this procedure and Diego was assigned the other play partner participant (the one not assigned to Marcos). Marcos was arbitrarily selected and assigned the randomly generated play partner simply because he was listed first on the recording sheet after being assigned to tier one (Diego was assigned to tier three).

The decision to only randomly select one partner for Marcos and then assign the other to Diego was to make sure the workload was even for both play partner participants on any given day. Also, given the age of the play partner participants, it may have caused fatigue, frustration, or boredom to have to repeat the play session with both participants on the same day. This may have possibly reduced the number of opportunities for the participant with autism to demonstrate skills based on the dependent variables if this was the case. To protect against this aversive reaction from the partner participant, if one of the play partner participants were to be assigned to the same session for both participants with autism, the researcher would have had to extend the time frame of intervention for all participants in order to have the assigned play partner only participant in one session per day. This could have potentially doubled the time frame for the study and had

dramatic effects on the fatigue, frustration, and/or boredom of all the others involved in the study if this was the case. This would have also unnecessarily added confounding variables such as maturation to the study.

### **Baseline**

Prior to the start of all the sessions, three iPad2™ video cameras and one Cannon PowerShot SD890 IS Digital Elph with a Sunpak 620-1212DCC Tripod were set up at four different angles (front, back, left, right) and activated to start recording before the dyad entered the room. Baseline sessions began with the student participants from one dyad sitting in front of the play set. Next, the participant with autism and the play partner participant were both given their own gallon size Ziplock® bag with a yellow Fisher Price Little People® car, a red Fisher Price Little People® car, an orange Fisher Price Little People® tow truck with a black tow hook, and two Fisher Price Little People® figurines, one male and one female (see Appendix E for photographs of participant materials used in baseline). Then the researcher said, “It’s time to play with cars,” and pressed start on the timer. No additional directions or reminders were given to either the play partner participant or the participant with autism. The participants had 7 minutes to interact with the materials. After 7 minutes, the timer beeped to indicate that 7 minutes were completed. The researcher turned off the timer, said, “It’s time to cleanup” and began singing the classroom cleanup song. Responding to the timer and singing the cleanup song was an existing classroom routine. The song lyrics to the cleanup song were as follows, “cleanup, cleanup, everybody everywhere, cleanup, cleanup, everybody do your share.” After they finished cleaning up by putting the people and vehicles back in

the plastic bag, the researcher walked the students back to their classes. Upon returning to the room where the research was being conducted, the researcher turned off all the video recording devices. This procedure was repeated for each of the dyads, one at a time. All baseline sessions were video recorded and later scored by the researcher and a trained observer.

### **Point-of-View Video Modeling Intervention**

Similar to the baseline procedures, prior to the start of all the treatment sessions, three iPad2™ video cameras and one Cannon PowerShot SD890 IS Digital Elph with a Sunpak 620-1212DCC Tripod were set up at four different angles (front, back, left, right) and activated to start recording before the dyad entered the room. When the participant with autism entered the room with the researcher, he or she sat on the floor in the middle of the field of the four video cameras. The researcher sat down next to him or her and said, “it’s time for a movie.” The video model clip was saved in the Photos application on the iPad2™. The researcher navigated to the location of the video on the iPad2™ and pressed play to start the video model clip. Then the participant with autism and the researcher watched the instructor-created video that was taken from the perspective of the participant with autism and corresponded with the location he or she was seated in front of the play set. The video model would play one time all the way through. When the video model completed playing one time, the researcher would close up the iPad2™ case and said, “Let’s get \_\_\_\_\_ [name of play partner participant assigned to the participant with autism that day].” While the participant with autism was watching the video model clip with the researcher, the play partner participant sat outside in the hall, with the door

closed, playing with the Starfall ABC iPad application on a different iPad2™ loaned to him or her by the researcher.

The only difference in this procedure was on the first session that the play partner participant had with the participant with autism in the intervention phase, they remained in the room with the participant with autism and researcher to view the video model. This was a booster session to remind the play partner participant about the symbolic play actions and play-associated language utterances that were in the script. The first and only other time they watched the video model was during their first play partner participant training session. Play partner participants were not allowed to watch the POVM during every session in order to avoid confounds of the in vivo modeling and focusing on the POVM too much during their play with the participants with autism. The play partner participants saw the POVM a total of two times, once during the training sessions and again immediately before the first treatment session.

Next, the participant with autism and the play partner participant were both given a gallon size Ziplock® bag with a yellow Fisher Price Little People® car, a red Fisher Price Little People® car, an orange Fisher Price Little People® tow truck with a black tow hook, and two Fisher Price Little People® figurines, one male and one female (see Appendix E for photographs of the participant materials used in intervention). The student participants were instructed, “Do and say the things you saw in the movie. It’s time to play with cars” and then the researcher pressed start on the timer. The participants had 7 minutes to interact with the materials. After 7 minutes, the timer beeped to indicate that 7 minutes were completed. The researcher turned off the timer, said, “It’s time to

cleanup” and began singing the classroom cleanup song. Responding to the timer and singing the cleanup song was an existing classroom routine. The song lyrics were as follows, “cleanup, cleanup, everybody everywhere, cleanup, cleanup, everybody do your share.” After they finished cleaning up by putting the people and vehicles back in the plastic bag, the researcher walked the students back to their classes. Upon returning to the room where the research was being conducted, the researcher turned off all the video recording devices. This procedure was repeated for each of the dyads, one at a time. All treatment sessions were video recorded and later scored by the researcher and a trained observer.

### **Maintenance**

Maintenance probes were taken both immediately following the intervention and again two weeks after the completion of the intervention phase. During maintenance the participants with autism did not watch the POVM.

Video recording equipment was set up at four different angles (front, back, left, right) and activated to start recording before the dyad entered the room. Maintenance sessions began with the student participants from one dyad sitting in front of the play set. Next, the participant with autism and the play partner participant were both given their own gallon size Ziplock® bag with a yellow Fisher Price Little People® car, a red Fisher Price Little People® car, an orange Fisher Price Little People® tow truck with a black tow hook, and two Fisher Price Little People® figurines, one male and one female (see Appendix E for photographs of participant materials used in maintenance). Then the researcher said, “It’s time to play with cars,” and pressed start on the timer. The

participants had 7 minutes to interact with the materials. After 7 minutes, the timer beeped to indicate that 7 minutes were completed. The researcher turned off the timer, said, “It’s time to cleanup” and began singing the classroom cleanup song. Responding to the timer and singing the cleanup song was an existing classroom routine. The song lyrics were as follows, “cleanup, cleanup, everybody everywhere, cleanup, cleanup, everybody do your share.” After they finished cleaning up by putting the people and vehicles back in the plastic bag, the researcher walked the students back to their classes. Upon returning to the room where the research was being conducted, the researcher turned off all the video recording devices. This procedure was repeated for each of the dyads, one at a time. All maintenance sessions were video recorded and later scored by the researcher and a trained observer.

### **Generalization**

During generalization, the same procedures were followed as with baseline and maintenance, with one exception: The participants were given a different car-based play set (see Appendix F for photographs of the toys used during generalization). The participants did not watch a POVM or any other type of video model during generalization probes.

Prior to the start of all generalization sessions, three iPad2™ video cameras and one Cannon PowerShot SD890 IS Digital Elph with a Sunpak 620-1212DCC Tripod were set up at four different angles (front, back, left, right) and activated to start recording before the dyad entered the room. Generalization sessions began with the student participants from one dyad sitting in front of the generalization play set. Next, the

participant with autism and the play partner participant were both given their own gallon size Ziplock® bag with a yellow Fisher Price Little People® car, a red Fisher Price Little People® car, a red Fisher Price Little People® tow truck with a blue tow hook, and two Fisher Price Little People® figurines, one male and one female (see Appendix E for photographs of participant materials used in baseline). The materials during the generalization phase were different from those used during intervention (a) in color (e.g., an orange tow truck with black hook in intervention versus a red tow truck with blue hook in generalization), (b) age of person (e.g., a young boy and girl figurine for intervention versus man and woman figurine for generalization), and (c) play set (e.g., the intervention set was a car garage with ramps, an elevator, garages, and a gas tank, while the generalization set was a circular road with a bridge, a car wash, air pump, and gas tank). To start the play the researcher said, “It’s time to play with cars,” and pressed start on the timer. The participants had 7 minutes to interact with the materials. After 7 minutes, the timer beeped to indicate that 7 minutes were completed. The researcher turned off the timer, said, “It’s time to cleanup” and began singing the classroom cleanup song. Responding to the timer and singing the cleanup song was an existing classroom routine. The song lyrics were as follows, “cleanup, cleanup, everybody everywhere, cleanup, cleanup, everybody do your share.” After they finished cleaning up by putting the people and vehicles back in the plastic bag, the researcher walked the students back to their classes. Upon returning to the room where the research was being conducted, the researcher turned off all the video recording devices. This procedure was repeated for

each of the dyads, one at a time. All generalization sessions were video recorded and later scored by the researcher and a trained observer.

### **Reliability and Scoring**

This section presents information on reliability during data collection and reliability of scoring procedures on the dependent measures and one supplementary domain (inappropriate play behaviors). Reliability of (a) scripted symbolic play actions, (b) spontaneous symbolic play actions, (c) scripted play-associated language utterances, (d) spontaneous play-associated language utterances and (e) inappropriate play behaviors were assessed.

### **Independent Observer's Training**

Prior to the reliability checking, the researcher met and trained an independent observer. The independent observer was a speech-language pathologist who held an M.A. in Speech-Language Pathology, an Ed.S. in Educational Leadership, had her CCC-SLP, and 35 years of experience working with preschool- and elementary-aged students. The researcher introduced the independent observer to the description of the dependent and independent variables and explained the use of the data recording sheets (see Appendices H, I, J, K, and L). Training with the data collection procedures was conducted using practice videos of a preschooler with autism engaging in play from a classroom and students that were not involved in this research project. The researcher also showed the independent observer the POVM clip used in this study. Training on the data collection procedures was conducted using practice videos that included footage of the researcher setting up and then providing play sessions for students who were not involved in this



research project. During the training session, the researcher watched the practice videos with the independent observer and collected data simultaneously with her. The researcher instructed and modeled how to collect data for one play session by watching the video recordings from all four different angles and recording the data on one data collection sheet. After the researcher and independent observer were done analyzing the practice videos, they discussed any questions regarding the forms or analyzing the data. The training took place in a quiet conference room in the independent observer's school.

### **Interobserver Agreement for Dependent Measures**

All four dependent variables and inappropriate play behaviors were recorded using three iPad2™ video cameras and one Canon PowerShot SD890 IS Digital Elph with a Sunpak 620-1212DCC Tripod from four different angles (front, back, left, right) of play. Scripted symbolic play actions were defined as the action of pretending something is there when it is not, or giving an object or person abilities that it does not have that were presented in the video model. If the participant with autism was engaging in any of the three symbolic play types of actions (substitution, imaginary play, or agent play) it was recorded as engaging in symbolic play. Spontaneous symbolic play actions were defined in the same way as scripted symbolic play actions, except for the fact that these symbolic play actions were those that were not modeled in the video clip. Scripted play-associated language utterances were defined as play sounds, words, phrases, and sentences that are related to the play scheme and were presented in the video model. Spontaneous play-associated language utterances were defined as play sounds, words,

phrases, and sentences that are related to the play scheme that were not presented in the video model.

Event recording was used to determine the number of various symbolic play actions or play-associated language utterances demonstrated during the seven-minute play session. Interobserver reliability in event recording was based on an event-by-event appraisal of agreement. Any unusual behavior or circumstances during the observation on the video recording were written as anecdotal notes on the recording forms (see Appendices H, I, J, K, and L).

Interobserver agreement was assessed for 31.58% of the observations for (a) scripted symbolic play actions (b) spontaneous symbolic play actions, (c) scripted play-associated language utterances, and (d) spontaneous play-associated language utterances in all phases for all participants. Observations took place in the baseline, treatment, maintenance, and generalization phases. The percentage of agreement for the aforementioned variables was calculated by dividing the total number of agreements by the total number of agreements plus disagreements and multiplying by 100.

The mean interobserver coefficient of agreement was calculated to be 92.82% (range = 86.44% - 100%) for all participants for the dependent variable of scripted symbolic play actions: Marcos ( $M = 88.00\%$ ), Sarah ( $M = 96.83\%$ ), Diego ( $M = 86.44\%$ ), and Leo ( $M = 100\%$ ). The mean interobserver coefficient of agreement was calculated to be 86.25% (range = 78.67% - 90.63%) for all participants for the dependent variable of spontaneous symbolic play actions: Marcos ( $M = 88.89\%$ ), Sarah ( $M = 86.82\%$ ), Diego ( $M = 78.67\%$ ), and Leo ( $M = 90.63\%$ ). The interobserver agreement for Diego's

spontaneous symbolic play actions was calculated below 80% but no retraining was conducted because there were so few instances from which this number was calculated that retraining would not have been conducive to this situation. The mean interobserver coefficient of agreement was calculated to be 93.02% (range = 80.39% - 100%) for all participants for the dependent variable of scripted play-associated language utterances: Marcos ( $M = 80.39\%$ ), Sarah ( $M = 91.67\%$ ), Diego ( $M = 100\%$ ), and Leo ( $M = 100\%$ ). The mean interobserver coefficient of agreement was calculated to be 85.54% (range = 75% - 100%) for all participants for the dependent variable of spontaneous play-associated language utterances: Marcos ( $M = 84.35\%$ ), Sarah ( $M = 82.79\%$ ), Diego ( $M = 100\%$ ), and Leo ( $M = 75\%$ ). The interobserver agreement for Leo was calculated below 80% because one observer recorded three spontaneous play-associated language utterances while the other observer recorded four. Since the variety of spontaneous play-associated language utterances was so small, retraining was not conducive to this situation. Thus, in most instances, the design standard for interassessor agreement was met (Kratochwill et al., 2010).

### **Interobserver Agreement for Supplemental Measure**

Inappropriate play behaviors were recorded using three iPad2™ video cameras and one Cannon PowerShot SD890 IS Digital Elph with a Sunpak 620-1212DCC Tripod from four different angles (front, back, left, right) of play. Inappropriate play behaviors were defined as actions that were not related to the toy/situation or self-stimulatory responses that involved non-goal-directed repetitive behavior that did not involve an object (e.g., mouthing a toy, rocking, hand flapping). Repetitive motor responses were

defined as repetitive behaviors that were inconsistent with appropriate manipulation of the toy during play (e.g., rapidly tapping on the moving piece of the garage ramp over and over, holding the tow truck at eye level and spinning the wheels).

Partial interval recording was used to analyze the impact of the inappropriate behaviors on play. Targeted behaviors were recorded whether they occurred or not during any portion of the 15-second interval. Interobserver reliability in partial interval recording was based on an interval-by-interval appraisal of agreement. Any unusual behavior or circumstances during the observation on the video recording were written as anecdotal notes on the recording forms (see Appendices H, I, J, K, and L).

Interobserver agreement was assessed for 31.58% of the observations for inappropriate play behaviors in all phases for all participants. Observations took place in the baseline, treatment, maintenance, and generalization phases. The percentage of agreement for inappropriate play actions was calculated by dividing the total number of agreements by the total number of agreements plus disagreements and multiplying by 100. The mean interobserver coefficient of agreement was calculated to be 96.43% for all participants for the supplemental measure of inappropriate play actions: Marcos ( $M = 90.91\%$ ), Sarah ( $M = 100\%$ ), Diego ( $M = 100\%$ ), and Leo ( $M = 85.71\%$ ). Thus, the design standard requiring 80% agreement on at least 20% of the data points across conditions and participants was met (Kratochwill et al., 2010).

### **Procedural Reliability**

In order to ensure the procedural reliability of this study, a checklist for procedural reliability was completed by an independent observer for 68% of sessions

across all phases and participants. The independent observer was a recently retired general education teacher who held a master's degree in Education and had 26 years of experience working in the public schools with general and special education elementary school-aged students.

Prior to the reliability checking, the researcher met and trained the independent observer. The researcher introduced the independent observer to the procedural reliability checklists and explained the use of the data recording sheets (see Appendices H, I, J, K, and L). Training on the data collection procedures was conducted using practice videos that included footage of the researcher setting up and then providing play sessions for students that were not involved in this research project. During the training session, the researcher watched the videos with the independent observer and collected data simultaneously with her. The researcher instructed and modeled how to collect data for one play session by watching the video recordings from all four different angles and recording the data on one data collection sheet. After the researcher and independent observer were done analyzing the practice videos, they discussed any questions regarding the checklists or analyzing the data. The training took place in the researcher's office.

The procedural reliability checklist included criteria for the design and implementation in order to determine whether procedures were adhered to appropriately. For example, during intervention, observers checked to ensure whether both participants were given their own set of toys and materials from the play set in the video (see Appendices N and O for complete procedural reliability checklists). Reliability scoring for the baseline, maintenance, and generalization condition was assessed for the presence

of 10 instructional procedures. Reliability scoring for the treatment condition was assessed for the presence of 14 instructional procedures. The procedural reliability was calculated using the number of steps completed divided by the number of steps planned and then multiplying that number by 100. Procedural reliability was calculated to be 100% for all participants (Marcos, Sarah, Diego, and Leo) across all phases (baseline, treatment, maintenance, and generalization).

### **Social Validity**

Increasing student engagement with curriculum standards and peers for students with autism is socially important. The impact of the intervention across the variables was measured using a questionnaire that was distributed to school staff working with the participants. The teachers, instructional assistants, and therapist(s) (speech-language pathologist and/or occupational therapist) responded to six statements regarding the video modeling intervention. For example, “I believe there is a noticeable difference in the play skills, including language, my student with autism demonstrates since starting in this study.” The school staff members taking the questionnaire were instructed to circle the one number that best describes their opinion about the video modeling intervention (5 = strongly agree, 4 = agree, 3 = neutral, 2 = disagree, 1 strongly disagree) (see Appendix P for Professionals Social Validity Questionnaire). These questions helped the researcher to determine if school staff felt that the video modeling intervention was relevant and appropriate for classroom use. A mean score was calculated for each item on the questionnaire. Professional participants completed the questionnaire one time after the final maintenance session. They returned their questionnaires to a manila envelope placed

in the classroom of the student with autism. The researcher established a time to collect the questionnaires 1 week following the distribution of them to the professional participants.

In addition to the measure used for the adults, a Student Participant Social Validity Questionnaire was used to gather student reactions to the intervention, materials, and procedures. The researcher asked the participants with autism and play partner participants three different question. Both participant types used the same questionnaire (Student Participant Social Validity Questionnaire, see Appendix Q). First they were asked to “show me how you liked watching the video.” When presented with a visual rating scale to help answer the Student Participant Social Validity Questionnaire (see Appendix Q) there were three pictures of different faces to represent three different feelings. From left to right, the first picture was a face with a smiling mouth, the second a face that was neither smiling nor frowning, and the third picture was a face with a frowning mouth. The pictures were labeled “like,” “okay,” and “don’t like” respectively. Using this rating scale to describe feelings including Boardmaker™ pictures of the faces with a smiling mouth, flat mouth, and frowning mouth, was an existing classroom routine. After the question was asked, the researcher removed the visual rating scale from the student’s visual field. She recorded the response on the Student Participant Social Validity Questionnaire (see Appendix Q). Then she put the visual rating scale back after 5 seconds and instructed the participant, “Show me how you liked playing with the toys.” After answering this question, the researcher removed the visual rating scale one last time and recorded the answer on the Participant Social Validity Questionnaire form. Last, the

researcher put the visual rating scale back in front of the participant 5 seconds later and asked him or her to “show me how you liked playing with a friend.” The answer to the final question was recorded on the Participant Social Validity Questionnaire form. A mean score was calculated for each participant and also for each item on the questionnaire. Participants with autism and play partner participants both completed the questionnaire one time, after the final maintenance session.

### **Data Analysis**

Immediately following each session, the researcher watched the four video recordings from each session (all four angles) and recorded the data on the data collection sheets. Data from the sessions recorded on the data collection sheets (see Appendices H, I, J, K, and L) were then transferred into a Microsoft Excel™ document so it could be graphed.

### **Visual Analysis**

Visual analysis is the fundamental characteristic of single-subject research methodology (Baer, 1977; Kazdin, 1982b; Skinner, 1938). Conclusions about the effectiveness of intervention are made based on the visual inspection of graphed data points within and across phases (Horner et al., 2005; Richards et al., 1999). In addition, there are other techniques used to examine single-subject research data. A non-regression effect size supports visual analysis because it is based on the same principles of visual inspection.

A visual analysis was conducted for the data collected across the four dependent variables for each participant (scripted symbolic play action, scripted play-associated



language utterances, spontaneous symbolic play action, and spontaneous play-associated language utterances) as well as for the supplementary data on inappropriate behaviors. The visual analysis involved interpretation of the level, trend, variability, overlap, immediacy, and consistency of data points (Kratchowill et al., 2010). Level refers to the mean performance during a phase of the study. Trend refers to the degree at which the best-fit straight line either increases or decreases relative to the dependent variable within a condition. Variability refers to the degree to which performance fluctuates around the mean or slope during a particular condition. Overlap refers to the percentage of data from the intervention phase that enters the range of data from the previous phase. Immediacy of change refers to the magnitude of change between the last three data points in one phase and the first three data points in the next phase. Consistency refers to the extent to which data patterns are similar in similar phases. Also a vertical analysis was conducted to examine the degree to which change occurred across participants during the same session. For example, the researcher examined the data to see if when the intervention was introduced to the first participant in tier one, that the participants in tier two, three, and four remained at low levels.

### **Percent of Non-Overlapping Data**

Percent of non-overlapping data (PND) is a nonparametric method used to analyze single-subject research studies developed by Scruggs, Mastropieri, and Casto (1987). The PND score is calculated to compare data points between phases (Kazdin, 1998; Richards et al., 1999). PND represent the improvement over the highest data point obtained during the baseline condition. Therefore, the number of treatment data points

exceeding the highest (or lowest) point in the baseline are divided by the total number of observations in the treatment phase and then multiplied by 100. Scruggs, Mastropieri, Cook, and Escobar (1986) have suggested that a PND higher than 90% indicates highly effective outcomes, 70-90% illustrates fair outcomes, 50-70% represents questionable outcomes, and a PND of less than 50% suggests an unreliable treatment. PND was used in this study to describe the overlap of data in the visual analysis.

### **Randomization Tests**

Visual analysis in single-subject research can be cumbersome due to the variability of data (Park, Marascuilo, & Gaylord-Ross, 1990). There is a high level of variability within and across participants in each phase. For that reason, visual inspection of the data was supplemented with objective randomization tests. According to Gast (2010) “randomization tests attempt to address the problem of autocorrelation by not relying on probability values generated from parametric tests, such as  $t$  and  $F$  distributions” (p. 428). Random assignment of the starting point where the intervention was first introduced as well as the case randomization, where individual participants were randomly assigned to different tiers entering the intervention in a staggered fashion, were incorporated into the research procedures (Levin, Lall, & Kratochwill, 2011; Wampold & Worsham, 1986). Particularly, Koehler and Levin’s (1998) regulated randomization procedures were used in this study. With this approach, the researcher predetermines a potential interval during when the intervention may be introduced (e.g., during either Session 6 or Session 7 for Marcos in tier one; during Session 8 or Session 9 for Sarah in tier two; during Session 10 or Session 11 for Diego in tier three; and during Session 12

and 13 for Leo in tier four). The actual intervention starting point within each potential interval is determined randomly (see Figure 2) (Kohler & Levin, 1998).

The null hypothesis for randomization tests is that there will be no differences in measurements regardless of the randomly assigned order or intervention starting point. The statistics of randomization tests are based on rearrangements of raw scores and the differences between the means that these arrangements produce. The statistic test is first computed for the actual data set followed by the statistic calculations for the randomly generated permutations of data. The proportion of data permutations with a test statistic greater or equal to a test statistic for the actual data is the  $p$ -value (Onghena & Edgington, 1994). If that probability is less than  $\alpha = .05$ , one can conclude that there is a statistical difference between the students' performance with and without the intervention.

Thus, randomization tests were run to determine the probability of having a difference between the baseline and video modeling phases within and across the participants by chance. Randomization tests were conducted using the ExPRT (Excel Package of Randomization Tests) software for single-subject data analysis (Levin, Evmenova, & Gafurov, in press). The calculations of statistical significance were based on the mean differences between baseline and treatment phases across four participants for each dependent variable.

### **Summary**

To summarize the methods procedures, a summary table was added for clarification. Table 5 includes information on the research question, the type of data collection used to answer the research question, and how the data were analyzed.

Table 5

*Methodology Summary*

Research Question	Type of Data Collection	Analysis Method
1. Is there a functional relation between viewing video modeling clips demonstrating symbolic play actions from their perspective and increased level and slope of the variety of scripted symbolic play actions for preschoolers with autism?	Recordings of participants during play session; number of different (variety) actions coded	Visual analysis across baseline and treatment, PND, Randomization tests
2. Is there a functional relation between viewing video modeling clips demonstrating symbolic play actions from their perspective and increased level and slope of the variety of spontaneous symbolic play actions for preschoolers with autism?	Recordings of participants during play session; number ...	Visual analysis, PND, Randomization tests
3. Is there a functional relation between viewing video modeling clips demonstrating play-associated language utterances from their perspective and increased level and slope of the variety of scripted play-associated language utterances for preschoolers with autism?	Recordings of participants during play session	Visual analysis, PND, Randomization tests
4. Is there a functional relation between viewing video modeling clips demonstrating play-associated language utterances from their perspective and increased level and slope of the variety of spontaneous play-associated language utterances for preschoolers with autism?	Recordings of participants during play session	Visual analysis, PND, Randomization tests
5. Do preschool students with autism maintain a variety of scripted or spontaneous symbolic play actions and play-associated language utterances using the car-based play set from the intervention immediately following the conclusion of the treatment phrase?	Recordings of participants during play session	Visual analysis, PND
6. Do preschool students with autism maintain a variety of scripted or spontaneous symbolic play actions and play-associated language utterances using the car-based play set from the intervention one week after the conclusion of the treatment phase?	Recordings of participants during play session	Visual analysis, PND
7. Do preschool students with autism generalize a variety of scripted or spontaneous symbolic play actions and play-associated language utterances to other car-based play sets?	Recordings of participants during play session	Visual analysis, PND

## **4. RESULTS**

This chapter presents the results of this single-subject research study determining the effectiveness of point-of-view video modeling (POVM) on the symbolic play actions and play-associated language utterances of preschool students with autism. Results in this chapter report the effects of POVVM on the four dependent variables (scripted and spontaneous symbolic play actions and scripted and symbolic play-associated language utterances) and findings from the supplemental measure for inappropriate play behaviors.

As described in Chapter 3, four participants were involved in this multiple baseline across participants study. Participants were randomly assigned to a tier of intervention and then randomly assigned a starting date for the intervention. Further, participants were randomly assigned one of two possible play partner participants from their school during each session. In baseline, data were collected for each participant during a 7-minute play session. In treatment, observational data of the target behaviors were collected immediately following viewing the POVVM during a 7-minute play session. During generalization probes, data were collected on target behaviors in a generalized setting using a novel, but similar, play-based car set and were collected during sessions 12 and 15 for Marcos, 12 and 15 for Sarah, 14 and 19 for Diego, and 18 and 19 for Leo. Throughout maintenance, data were collected on each target behavior

immediately following (1 day) and after a delay of 7 days following the withdrawal of the POVM intervention.

Of note, during sessions 10 and 11 of intervention, the intervention classrooms in School B and School C were temporarily changed to accommodate statewide, standardized assessments that were taking place at that time throughout the school. The room was similar to the initial location, but was not the same room that they were accustomed to playing in with their play partner participants.

### **Scripted Symbolic Play Actions**

Scripted symbolic play actions were measured as being either completed or not throughout each session. Overall findings from this study indicate three out of four participants with autism increased the frequency and variety of scripted symbolic play actions after watching the POVM. Thus, the visual analysis of data on scripted symbolic play actions demonstrated moderate evidence of effectiveness (Kratochwill et al., 2010). During baseline, participants had a mean of 4.49 ( $SD = 2.96$ ) scripted symbolic play actions and increased in level to a mean of 11.39 ( $SD = 3.26$ ) scripted symbolic play actions given the POVM intervention. All four participants maintained scripted symbolic play actions after the POVM was withdrawn ( $M = 12.00$ ,  $SD = 6.28$ ). Further, all four participants generalized scripted symbolic play actions from the intervention to another car-based play set ( $M = 7.13$ ,  $SD = 3.82$ ). The overall mean Percent of Non-Overlapping Data (PND) was calculated to be 69.75% across all participants and phases for scripted symbolic play actions.

## **Marcos**

In response to research question one (Figure 3), the variety of Marcos' scripted symbolic play actions were low ( $M = 4.00$ ,  $SD = 1.10$ ) in each session during the baseline condition. Across the six sessions in baseline, Marcos demonstrated a slightly decreasing variety of symbolic play actions, starting with five and decreasing to three. He had low levels of variability across baseline sessions. Overall, the data in baseline were consistently flat and stable at a low level across six sessions.

Upon introduction of the POVM intervention, Marcos had a change in level between baseline ( $M = 4.00$ ,  $SD = 1.10$ ) and intervention ( $M = 15.73$ ,  $SD = 4.52$ ). Marcos had an immediate increase in the variety of his scripted symbolic play actions from 3 to 12 that continued to increase throughout the treatment phase with an accelerating upward trend. The data had little variability along the increasing trend line, except the last data point in the treatment phase dropped from 22 to 9 scripted symbolic play actions. PND was calculated to be 100% from baseline to treatment for Marcos. Overall, the data in the intervention phase were consistently higher than baseline.

As seen in Figure 3 (in response to research questions five and six), Marcos maintained a high level in the variety of his scripted symbolic play actions ( $M = 16.50$ ,  $SD = 9.19$ ) when the video model was withdrawn. There was a downward change in trend from the immediate withdrawal of the POVM and 1 week after the end of the intervention phase. There was a high level of variability between the data points in maintenance. Upon immediate withdrawal of the POVM, Marcos had a rapid increase in his scripted symbolic play actions from 9 to 23. PND was calculated to be 100% from

baseline to maintenance for Marcos. Overall, the data in the maintenance phase were consistently higher than baseline.

During generalization probes (research question seven, Figure 3), Marcos demonstrated a change in level from baseline ( $M = 4.00$ ,  $SD = 1.10$ ) to generalization probes ( $M = 9.50$ ,  $SD = 0.71$ ) that followed a slightly upward trend. There was a low level of variability between the data points. Marcos had an immediate rapid increase from three scripted symbolic play actions to nine from baseline to generalization. PND was calculated to be 100% from the baseline to generalization probes. The data were consistently higher than baseline throughout the generalization probes.

### **Sarah**

In response to research question one (Figure 3), the variety of Sarah's scripted symbolic play actions were low ( $M = 6.86$ ,  $SD = 1.57$ ) in each session during the baseline condition. Across the seven sessions in baseline, Sarah demonstrated a slightly decreasing variety of symbolic play actions, starting with nine and decreasing to five. She had low levels of variability across baseline sessions. Overall, the data in baseline were consistently flat and stable at a low level across the seven sessions.

Upon introduction of the POVM intervention, Sarah had a change in level between baseline ( $M = 6.86$ ,  $SD = 1.57$ ) and intervention ( $M = 9.80$ ,  $SD = 5.06$ ). Sarah had an immediate increase from 5 to 13 scripted symbolic play actions that continued to increase then decreased and increased again throughout the treatment phase. The data had high levels of variability. The PND was calculated to be 50% from baseline to treatment



for Sarah. Overall, the data in the intervention phase were inconsistently higher than baseline.

As seen in Figure 3, Sarah maintained at a high level of scripted symbolic play actions ( $M = 16.00$ ,  $SD = 4.24$ ) when the video model was withdrawn. There was a rapid upward change in trend from the immediate withdrawal of the POVM to 1 week after the end of the intervention phase. There was a medium level of variability between the data points in maintenance. Upon immediate withdrawal of the POVM, Sarah had a slight decrease in her scripted symbolic play actions from 16 to 13, but then increased to 19 a week after the POVM intervention concluded. PND was calculated to be 100% from baseline to maintenance for Sarah. Overall, the data in the maintenance phase were consistently higher than baseline.

During generalization probes (research question seven, Figure 3), Sarah demonstrated a change in level from baseline ( $M = 6.86$ ,  $SD = 1.57$ ) to generalization probes ( $M = 9.50$ ,  $SD = 0.71$ ) that followed a slightly upward trend. There was a low level of variability between the data points. Sarah had an immediate rapid increase from five scripted symbolic play actions to nine from baseline to generalization probes. PND was calculated to be 100% from the baseline to generalization probes for Sarah. The data were consistently higher than baseline throughout the generalization probes.

### **Diego**

In response to research question one (Figure 3) Diego's scripted symbolic play actions were at a low level ( $M = 6.60$ ,  $SD = 3.57$ ) during the baseline condition. Across the 10 sessions in baseline, Diego demonstrated a slightly increasing number of symbolic

play actions, starting with 2 and increasing to 11. He had medium levels of variability across baseline sessions. Overall, the data in baseline were consistently low.

Upon introduction of the POVM intervention, Diego had a change in level between baseline ( $M = 6.60$ ,  $SD = 3.57$ ) and intervention ( $M = 11.86$ ,  $SD = 2.67$ ). Diego had a slight decrease from 11 to 10 scripted symbolic play actions and then increased throughout the treatment phase. The data had medium levels of variability. The PND was calculated to be 57% from baseline to treatment for Diego. Overall, the data in the intervention phase were slightly higher than baseline.

As seen in Figure 3 (research question five and six), Diego maintained at a high level in the variety of his scripted symbolic play actions ( $M = 17.50$ ,  $SD = 2.12$ ) when the video model was withdrawn. There was a rapid upward change in trend from 15 to 19 scripted symbolic play actions between the final treatment session and the immediate withdrawal of the POVM. There was a medium level of variability between the data points in maintenance. PND was calculated to be 100% from baseline to maintenance for Diego. Overall, the data in the maintenance phase were consistently higher than in baseline.

During generalization probes (research question seven, Figure 3), Diego demonstrated no change in level from baseline ( $M = 6.60$ ,  $SD = 3.57$ ) to generalization probes ( $M = 8.00$ ,  $SD = 1.41$ ). There was a low level of variability between the data points. Diego had an immediate decrease from 11 scripted symbolic play actions to 9 from baseline to generalization probes. PND was calculated to be 0% from the baseline to

generalization probes for Diego. The data were consistently at the same level in baseline and throughout the generalization probes.

### **Leo**

In response to research question one (Figure 3), the variety of Leo's scripted symbolic play actions were at a low level ( $M = 0.50$ ,  $SD = 0.91$ ) during the baseline condition. Across the 12 sessions in baseline, Leo demonstrated a flat trend. He had low levels of variability across baseline sessions. Overall, the data in baseline were consistently low.

Upon introduction of the POVM intervention, Leo had a change in level between baseline ( $M = 0.50$ ,  $SD = 0.91$ ) and intervention ( $M = 8.17$ ,  $SD = 5.42$ ). Leo had a slight increase from one to two scripted symbolic play actions and then the data points followed a rapidly increasing trend throughout the treatment phase. The data had high levels of variability. The PND was calculated to be 80% from baseline to treatment for Leo. Overall, the data in the intervention phase were consistent.

As seen in Figure 3 (research question five and six), Leo did not maintain a variety in his scripted symbolic play actions ( $M = 4.00$ ,  $SD = 1.41$ ) at a level higher than baseline when the video model was withdrawn. There was a slight downward trend from eight to five scripted symbolic play actions between the final treatment session and the immediate withdrawal of the POVM. There was a medium level of variability between the data points in maintenance. PND was calculated to be 50% from baseline to maintenance for Leo. Overall, the data in the maintenance phase were consistently at the same level as in baseline.

During generalization probes (research question seven, Figure 3), Leo did not demonstrate a change in level from baseline ( $M = 0.50$ ,  $SD = 0.91$ ) to generalization probes ( $M = 1.50$ ,  $SD = 0.71$ ). The data followed a slightly upward trend. Leo had no immediate change in level from baseline to generalization probes. There was a low level of variation between the data points. PND was calculated to be 0% from the baseline to generalization probes for Leo. The data were consistently low throughout the generalization probes.

### **Randomization Test Results for Scripted Symbolic Play Actions**

A regulated multiple baseline randomizations test (Kohler & Levin, 1998) was used in this study to confirm and further clarify the visual analysis results. The proportion of all possible data permutations showing the effect that is greater or equal to the actually observed effect represents the statistical probability. The results of the regulated randomization test for scripted play actions was  $p = 0.0078$ . Thus, there was a statistical difference between the students' variety of scripted play actions with and without the POVM intervention.

### **Spontaneous Symbolic Play Actions**

Spontaneous symbolic play actions were measured using event recording for each participant throughout each 7-minute play session. Symbolic play actions were characterized as spontaneous if they were symbolic in nature, related to the play scheme and materials, and those that were not demonstrated in the video model. The variety of spontaneous symbolic play actions was measured, rather than the frequency, in order to determine how the participants increased in their flexibility of play. Results in this section

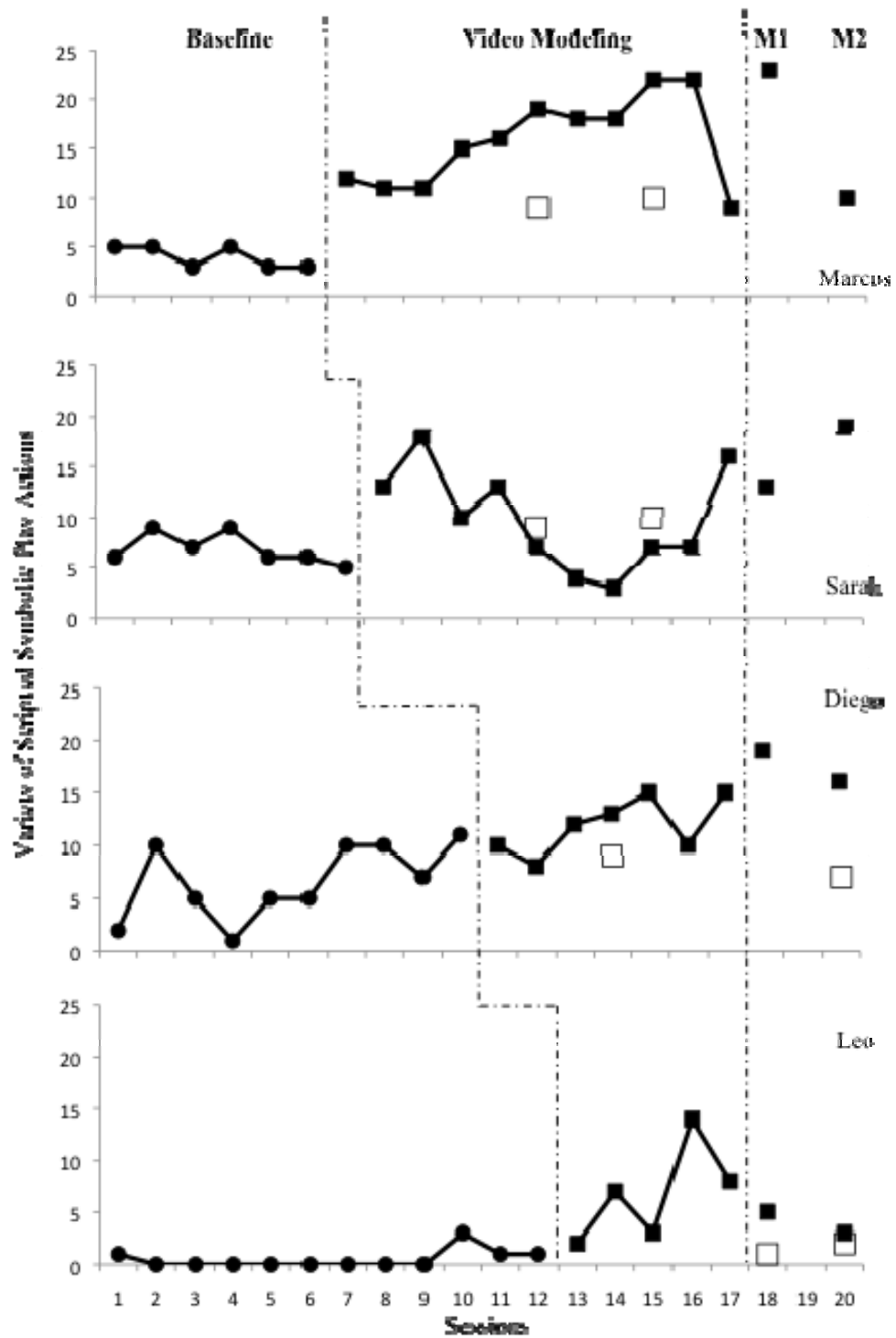


Figure 3. Scripted symbolic play actions. The variety of (number of different actions out of 24 possible) scripted symbolic play actions across baseline (●), POVM (■), immediate maintenance (MI, ■), 1-week delayed maintenance (M2, ■), and generalization to another car-based play set (□) across four preschoolers with autism.

are described for each participant using six different measures: level, trend, variability, immediacy of change, overlap between phases, and consistency.

Overall findings from this study indicate that three out of four participants with autism increased the frequency and variety of spontaneous symbolic play actions after watching the POVM. Thus, the visual analysis of data on spontaneous symbolic play actions demonstrates moderate evidence of effectiveness (Kratochwill et al., 2010). During baseline, participants had a mean of 4.69 ( $SD = 2.69$ ) spontaneous symbolic play actions and increased in level to a mean of 13.47 ( $SD = 4.17$ ) spontaneous symbolic play actions given the POVM intervention. All four participants maintained spontaneous symbolic play actions after the POVM was withdrawn ( $M = 16.75$ ,  $SD = 7.09$ ). Further, all four participants generalized spontaneous symbolic play actions from the intervention to another car-based play set ( $M = 16.38$ ,  $SD = 7.49$ ). The overall mean PND was calculated to be 80.92% across all participants and phases for spontaneous symbolic play actions.

### **Marcos**

In response to research question two (Figure 4), the variety of Marcos' spontaneous symbolic play actions were at a low level ( $M = 6.17$ ,  $SD = 1.72$ ) during the baseline condition. Across the six sessions in baseline, Marcos demonstrated a relatively flat trend. He had low levels of variability across baseline sessions. Overall, the data in baseline were consistently low.

Upon introduction of the POVM intervention, Marcos had a change in level between baseline ( $M = 6.17$ ,  $SD = 1.72$ ) and intervention ( $M = 14.27$ ,  $SD = 3.85$ ). Marcos

had an immediate, rapid change in the variety of his spontaneous symbolic play actions from 9 in the last session of baseline to 14 in the first session in treatment. The data had high levels of variability and followed a downward trend throughout the treatment phase. The PND was calculated to be 91% from baseline to treatment for Marcos. Overall, the data in the intervention phase were consistently higher than baseline.

As seen in Figure 4 (research question five and six), Marcos maintained a high level of variety in his spontaneous symbolic play actions ( $M = 11.50$ ,  $SD = 3.54$ ) when the POVM was withdrawn. Between the final treatment session and the immediate maintenance session, there was only a slight increase from eight to nine spontaneous symbolic play actions, but not immediate change. The data followed an upward trend of spontaneous symbolic play actions from immediate to delayed maintenance. There was a moderate level of variability between the data points in maintenance. PND was calculated to be 50% from baseline to maintenance for Marcos. Overall, the data in the maintenance phase were consistently the same as baseline.

During generalization probes (research question seven, Figure 4), Marcos demonstrated a change in level from baseline ( $M = 6.17$ ,  $SD = 1.72$ ) to generalization probes ( $M = 19.50$ ,  $SD = 7.78$ ) that followed a rapid upward trend. Marcos had an immediate change in level of the variety of his spontaneous symbolic play actions from 9 in the last session of baseline to 14 in the first generalization probe. There was a high level of variability between the data points. PND was calculated to be 100% from the baseline to generalization probes for Marcos. The data were consistently higher than in baseline throughout the generalization probes.

## **Sarah**

In response to research question two (Figure 4), the variety of Sarah's spontaneous symbolic play actions were at a low level ( $M = 5.71$ ,  $SD = 1.98$ ) during the baseline condition. Across the seven sessions in baseline, Sarah demonstrated a slight increasing trend. She had medium levels of variation across baseline sessions. Overall, the data in baseline were consistently low.

Upon introduction of the POVM intervention, Sarah had a change in level between baseline ( $M = 5.71$ ,  $SD = 1.98$ ) and intervention ( $M = 18.70$ ,  $SD = 8.88$ ). Sarah had no immediate change in the variety of her spontaneous symbolic play actions from baseline to treatment. The data had high levels of variability and followed a rapid upward trend throughout the treatment phase. The PND was calculated to be 80% from baseline to treatment for Sarah. Overall, the data in the second part of intervention phase were consistently higher than baseline.

In response to research questions five and six (Figure 4), Sarah maintained a high level of variety in her spontaneous symbolic play actions ( $M = 25.50$ ,  $SD = 7.78$ ) when the POVM was withdrawn. Between the final treatment session and the immediate maintenance session, there was an immediate increase from 27 to 31 spontaneous symbolic play actions. The data followed a downward trend of spontaneous symbolic play actions from immediate to delayed maintenance. There was a medium level of variability between the data points in maintenance. PND was calculated to be 100% from baseline to maintenance for Sarah. Overall, the data in the maintenance phase were consistently higher than baseline.



During generalization probes (research question seven, Figure 4), Sarah demonstrated a change in level from baseline ( $M = 5.71$ ,  $SD = 1.98$ ) to generalization probes ( $M = 18.00$ ,  $SD = 2.83$ ) that followed a downward trend. Sarah had an immediate change in level from 9 to 20 spontaneous symbolic play actions from baseline to generalization probes. There was a moderate level of variability between the data points. PND was calculated to be 100% from the baseline to generalization probes for Sarah. The data were consistently higher than baseline throughout the generalization probes.

### **Diego**

In response to research question two (Figure 4), the variety of Diego's spontaneous symbolic play actions were at a low level ( $M = 6.20$ ,  $SD = 5.14$ ) during the baseline condition. Across the 10 sessions in baseline, Diego demonstrated an upward trend. He had high levels of variation across baseline sessions. Overall, the data in baseline were inconsistently low.

Upon introduction of the POVM intervention, Diego had a change in level between baseline ( $M = 6.20$ ,  $SD = 5.14$ ) and intervention ( $M = 8.71$ ,  $SD = 3.09$ ). There was no immediate change from baseline to treatment. Diego had a decrease from 11 to 6 spontaneous symbolic play actions from baseline to treatment. The data had high levels of variability. There was an immediate upward trend in the first two sessions during the treatment phase, followed by a downward trend for three sessions, and during the last three sessions of treatment began to follow an upward trend again. The PND was calculated to be 0% from baseline to treatment for Diego. Overall, the data in the intervention phase were consistently similar to baseline.

As seen in Figure 4, Diego maintained a high level in the variety of his spontaneous symbolic play actions ( $M = 19.50$ ,  $SD = 0.71$ ) when the POVM was withdrawn. Between the final treatment session and the immediate maintenance session, there was an immediate, rapid increase from 9 to 19 spontaneous symbolic play actions. The data followed a slight upward trend of spontaneous symbolic play actions from immediate to delayed maintenance. There was a low level of variability between the data points in maintenance. PND was calculated to be 100% from baseline to maintenance for Diego. Overall, the data in the maintenance phase were consistently higher than baseline.

During generalization probes (research question seven, Figure 4), Diego demonstrated a change in level from baseline ( $M = 6.20$ ,  $SD = 5.14$ ) to generalization probes ( $M = 22.50$ ,  $SD = 2.12$ ) that followed an upward trend. Diego had an immediate change in level from 11 to 21 spontaneous symbolic play actions from baseline to generalization. There was a low level of variability between the data points. PND was calculated to be 100% from the baseline to generalization probes for Diego. The data were consistently higher than baseline throughout the generalization probes.

### **Leo**

In response to research question two (Figure 4) Leo's spontaneous symbolic play actions were at a low level ( $M = 0.67$ ,  $SD = 1.56$ ) during the baseline condition. Across the 12 sessions in baseline, Leo demonstrated a slight upward trend. He had a moderate level of variation across baseline sessions. Overall, the data in baseline were consistently low.

Upon introduction of the POVM intervention, Leo had a change in level between baseline ( $M = 0.67$ ,  $SD = 1.56$ ) and intervention ( $M = 12.20$ ,  $SD = 5.72$ ). Leo had an increase from four to five spontaneous symbolic play actions from baseline to treatment. The data had a low level of variability and followed a rapid, upward trend. The PND was calculated to be 100% from baseline to treatment for Leo. Overall, the data in the intervention phase were consistently higher than baseline.

In response to research questions five and six (Figure 5), Leo maintained a high level in the variety of his spontaneous symbolic play actions ( $M = 10.50$ ,  $SD = 7.78$ ) when the POVM was withdrawn. Between the final treatment session and the immediate maintenance session, there was an immediate decrease from 21 to 16 spontaneous symbolic play actions. The data followed a downward trend of spontaneous symbolic play actions from immediate to delayed maintenance. There was a high level of variability between the data points in maintenance. PND was calculated to be 100% from baseline to maintenance for Leo. Overall, the data in the maintenance phase were consistently higher than baseline.

During generalization probes (research question seven, Figure 4), Leo demonstrated a change in level from baseline ( $M = 0.67$ ,  $SD = 1.56$ ) to generalization probes ( $M = 5.50$ ,  $SD = 2.12$ ) that followed an upward trend. Leo had no immediate change from baseline to generalization probes. There was a moderate level of variability between the data points. PND was calculated to be 50% from the baseline to generalization probes for Leo. The data were inconsistently higher than baseline throughout the generalization probes.

### **Randomization Test Results for Spontaneous Symbolic Play Actions**

A regulated multiple baseline randomizations test (Kohler & Levin, 1998) was used in this study to confirm and further clarify the visual analysis results. The proportion of all possible data permutations showing the effect that is greater or equal to the actually observed effect represents the statistical probability. The results of the regulated randomization test for spontaneous play actions was  $p = 0.2708$ . Thus, there was no statistical difference between the students' variety of spontaneous play actions with and without the POVM intervention.

### **Scripted Play-Associated Language Utterances**

Scripted play-associated language utterances were measured using event recording for each participant throughout each session. Play-associated language utterances were characterized as scripted if they were demonstrated in the POVM. For example, “I want red car,” “it is full,” “all done,” “wait for the elevator,” “me first,” and “I go up” (see Appendix G for the POVM script). The variety of scripted play-associated language utterances was measured, rather than the frequency, in order to determine how the participants increased in their flexibility in language use. Following the Logic Model presented in Chapter 1, the primary purpose of this study was to help preschool children with autism improve social skills and increase participation in settings with their typically developing peers. Monitoring the frequency of scripted play-associated language utterances would not provide information on the flexibility of the participant’s language usage. For example, if the participant said “red car” over and over again with a high frequency this would not illustrate flexible, varied language use, but rather repetitive. As

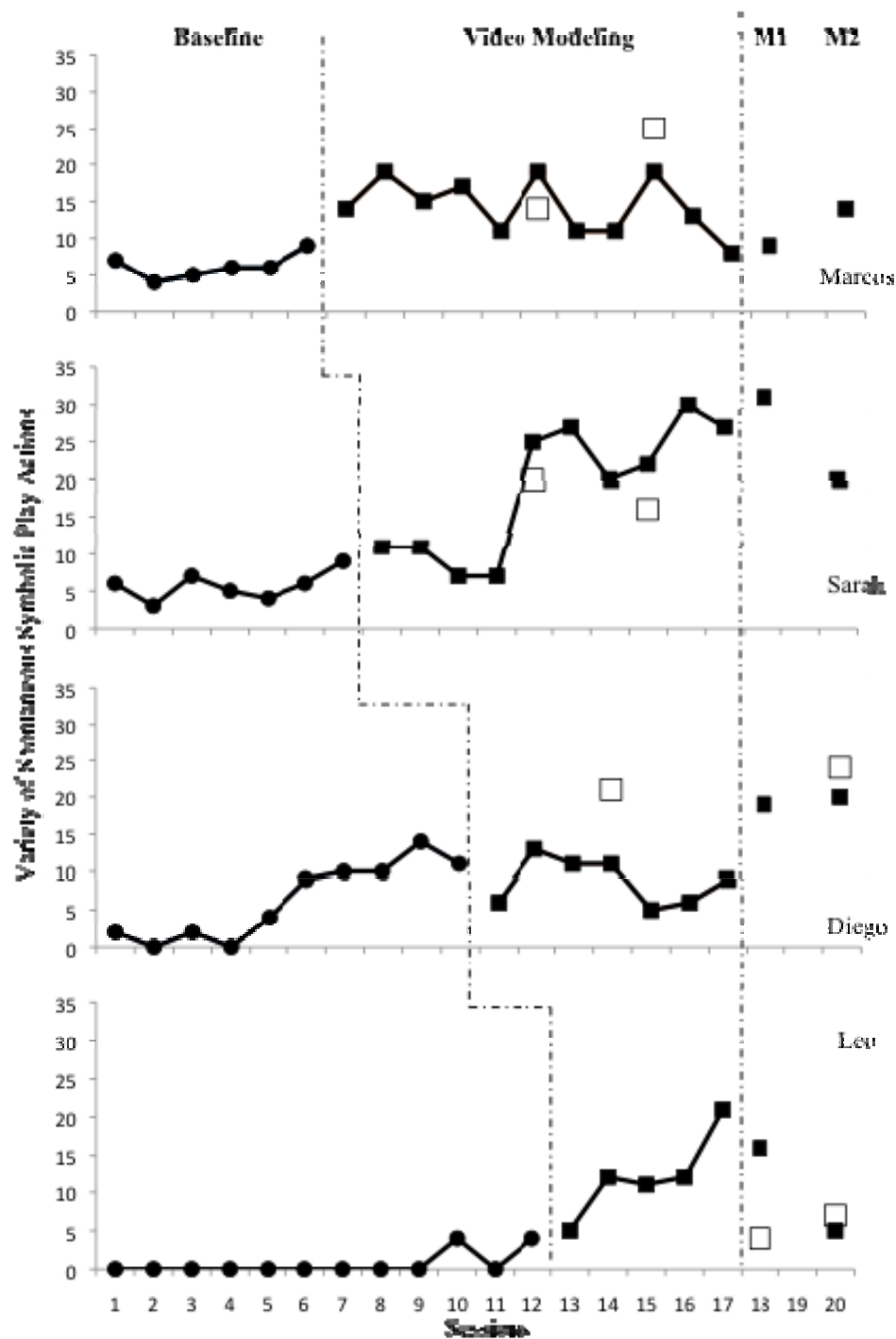


Figure 4. Spontaneous symbolic play actions. The variety of spontaneous symbolic play actions across baseline (●), POVM (■), immediate maintenance (M1, ■), 1-week delayed maintenance (M2, ■), and generalization to another car-based play set (□) across four preschoolers with autism.

discussed in Chapters 1 and 2, repetitive behaviors and patterns are characteristic of children with autism and distinguishes them from their typically developing peers. Using a measure of variety illustrates the flexibility in language use and was thus used to determine the effects of POVM on scripted play-associated language utterances. Results in this section are described for each participant using six different measures: level, trend, variability, immediacy of change, overlap between phases, and consistency. There results for sounds, word approximations, words, phrases, and sentences were combined into one measure due to similarity of findings across all types.

Overall findings from the study indicate one out of four preschool participants with autism increased the frequency and variety of scripted play-associated language utterances from baseline ( $M = 1.19$ ,  $SD = 1.99$ ) to intervention ( $M = 5.21$ ,  $SD = 8.17$ ). Thus, the visual analysis of data on scripted play-associated language utterances demonstrates no evidence of effectiveness (Kratochwill et al., 2010). One of the four preschool participants with autism maintained the frequency and variety of scripted play-associated language utterances after the POVM was withdrawn ( $M = 8.16$ ,  $SD = 12.68$ ). Further, one out of four participants produced scripted play-associated language utterances from the intervention during play with a different car-based play set ( $M = 3.55$ ,  $SD = 6.64$ ). The overall mean PND was calculated to be 41.17% across all participants and phases for scripted play-associated language utterances.

### **Marcos**

In response to research question three (Figure 5) Marcos' scripted play-associated language utterances were at a low level ( $M = 4.17$ ,  $SD = 2.56$ ) during the baseline

condition. Across the six sessions in baseline, Marcos demonstrated a downward trend. He had low levels of variability across baseline sessions. Overall, the data in baseline were consistently low.

Upon introduction of the POVM intervention, Marcos had a change in level between baseline ( $M = 4.17$ ,  $SD = 2.56$ ) and intervention ( $M = 17.45$ ,  $SD = 7.84$ ). Marcos had an immediate rapid jump from 1 to 10 scripted play-associated language utterances from the last baseline session to the first treatment session. The data followed an increasing trend throughout the treatment phase. The data had a moderate level of variability. The PND was calculated to be 100% from baseline to treatment for Marcos. Overall, the data in the intervention phase were consistently higher than baseline.

As seen in Figure 5, Marcos maintained at a high level in the variety of his scripted play-associated language utterances ( $M = 27.00$ ,  $SD = 12.73$ ) when the POVM was withdrawn. There was an upward trend from 19 to 36 scripted play-associated language utterances between the final treatment session and the immediate withdrawal of the POVM. There was a high level of variability between the data points in maintenance. PND was calculated to be 100% from baseline to maintenance for Marcos. Overall, the data in the maintenance phase were consistently higher than baseline.

During generalization probes (research question seven, Figure 5), Marcos demonstrated a change in level from baseline ( $M = 4.17$ ,  $SD = 2.56$ ) to generalization probes ( $M = 13.50$ ,  $SD = 3.54$ ) that followed an upward trend. Marcos had an immediate change in level from 1 to 16 scripted play-associated language utterances from baseline to generalization probes. There was a medium level of variability between the data

points. PND was calculated to be 100% from the baseline to generalization probes for Marcos. The data were consistently higher than baseline throughout the generalization probes.

### **Sarah**

In response to research question three (Figure 5) Sarah's scripted play-associated language utterances were at a low level ( $M = 0.29$ ,  $SD = 0.49$ ) during the baseline condition. Across the seven sessions in baseline, Sarah demonstrated a flat trend. She had low levels of variation across baseline sessions. Overall, the data in baseline were consistent.

Upon introduction of the POVM intervention, Sarah had a slight change in level between baseline ( $M = 0.29$ ,  $SD = 0.49$ ) and intervention ( $M = 1.60$ ,  $SD = 1.27$ ). Sarah had no immediate change in scripted play-associated language utterances from baseline to treatment. The data followed a flat trend throughout the treatment phase. The data had low levels of variability. The PND was calculated to be 60% from baseline to treatment for Sarah. Overall, the data in the intervention phase were consistently low.

As seen in Figure 5 in response to research questions five and six, Sarah had a higher level in the variety of her scripted play-associated language utterances ( $M = 4.00$ ,  $SD = 5.66$ ) when the POVM was withdrawn. There was an upward trend from three to eight scripted play-associated language utterances between the final treatment session and the immediate withdrawal of the POVM. Between the immediate and delayed maintenance sessions, there was a rapid downward trend from eight to zero scripted play-associated language utterances. There was a high level of variability between the data



points in maintenance. PND was calculated to be 50% from baseline to maintenance for Sarah. Overall, the data in the maintenance phase were inconsistently higher than baseline.

During generalization probes (research question seven, Figure 5), Sarah demonstrated a change in level from baseline ( $M = 0.29$ ,  $SD = 0.49$ ) to generalization probes ( $M = 0.00$ ,  $SD = 0.00$ ) that followed a downward trend. Sarah had no immediate change in level from baseline to generalization probes. There was a low level of variability between the data points. PND was calculated to be 0% from the baseline to generalization probes for Sarah. The data were consistently low throughout the generalization probes.

### **Diego**

In response to research question three (Figure 5) Diego's scripted play-associated language utterances were at a low level ( $M = 0.20$ ,  $SD = 0.42$ ) during the baseline condition. Across the 10 sessions in baseline, Diego demonstrated a flat trend. He had low levels of variation across baseline sessions. Overall, the data in baseline were consistently low.

Upon introduction of the POVM intervention, Diego had no change in level between baseline ( $M = 0.20$ ,  $SD = 0.42$ ) and intervention ( $M = 1.00$ ,  $SD = 0.58$ ). Diego had no immediate change in scripted play-associated language utterances from baseline to treatment. The data followed a flat trend throughout the treatment phase. The data had low levels of variability. The PND was calculated to be 14% from baseline to treatment for Diego. Overall, the data in the intervention phase were consistently low.

As seen in Figure 5, Diego maintained a low level of scripted play-associated language utterances ( $M = 1.00$ ,  $SD = 1.41$ ) when the POVM was withdrawn. The data followed a very slight upward trend from one to two scripted play-associated language utterances between the final treatment session and the immediate withdrawal of the POVM. Between the immediate and delayed maintenance sessions, there was a downward trend from two to zero in the variety of his scripted play-associated language utterances. There was a low level of variability between the data points in maintenance. PND was calculated to be 50% from baseline to maintenance for Diego. Overall, the data in the maintenance phase were consistently low.

During generalization probes (research question seven, Figure 5), Diego demonstrated no change in level from baseline ( $M = 0.20$ ,  $SD = 0.42$ ) to generalization probes ( $M = 0.00$ ,  $SD = 0.00$ ) and the data followed a flat trend. Diego had no immediate change in level from baseline to generalization probes. There was a low level of variability between the data points. PND was calculated to be 0% from the baseline to generalization probes for Diego. The data were consistently low throughout the generalization probes.

### **Leo**

In response to research question three (Figure 5), the variety of Leo's scripted play-associated language utterances were at a low level ( $M = 0.08$ ,  $SD = 0.29$ ) during the baseline condition. Across the 12 sessions in baseline, Leo demonstrated a flat trend. He had low levels of variability across baseline sessions. Overall, the data in baseline were consistently low.

Upon introduction of the POVM intervention, Leo had no change in level between baseline ( $M = 0.08$ ,  $SD = 0.29$ ) and intervention ( $M = 0.80$ ,  $SD = 1.20$ ). Leo had a slight change from zero to one in the variety of his scripted play-associated language utterance from baseline to treatment but no immediate change. The data followed an upward trend throughout the first three sessions of the treatment phase and then decreased to zero where it remained for the last two sessions of treatment. The data had low levels of variability. The PND was calculated to be 20% from baseline to treatment for Leo. Overall, the data in the intervention phase were consistently low.

As seen in Figure 5 in response to research questions five and six, Leo maintained a low level in the variety of his scripted play-associated language utterances ( $M = 0.50$ ,  $SD = 0.71$ ) when the POVM was withdrawn. Between the immediate and delayed maintenance sessions, there was no immediate change in scripted play-associated language utterances. The data followed a slight upward trend of scripted play-associated language utterances from immediate to delayed maintenance. There was a low level of variability between the data points in maintenance. PND was calculated to be 0% from baseline to maintenance for Leo. Overall, the data in the maintenance phase were consistently low.

During generalization probes (research question seven, Figure 5), Leo demonstrated a very slight change in level from baseline ( $M = 0.08$ ,  $SD = 0.29$ ) to generalization probes ( $M = 0.50$ ,  $SD = 0.71$ ) that followed an upward trend. Leo had no immediate change in level from baseline to generalization probes. There was a low level of variability between the data points. PND was calculated to be 0% from the baseline to

generalization probes for Leo. The data were consistently low throughout the generalization probes.

### **Randomization Test Results for Scripted Play-Associated Language Utterances**

A regulated multiple baseline randomizations test (Kohler & Levin, 1998) was used in this study to confirm and further clarify the visual analysis results. The proportion of all possible data permutations showing the effect that is greater or equal to the actually observed effect represents the statistical probability. The results of the regulated randomization test for scripted language utterances was  $p = 0.7396$ . Thus, there was no statistical difference between the students' variety of scripted play-associated language utterances with and without the POVM intervention.

### **Spontaneous Play-Associated Language Utterances**

Spontaneous play-associated language utterances were measured using event recording for each participant throughout each session. Play-associated language utterances were characterized as spontaneous if they were related to the play scheme and materials and were not demonstrated in the POVM. For example, “Are the garage doors open?” (said by Sarah during play in session 13). The variety of spontaneous play-associated language utterances was measured, rather than the frequency, in order to determine how the participants increased in their flexibility in language use. Results in this section are described for each participant using six different measures: level, trend, variability, immediacy of change, overlap between phases, and consistency. There results for sounds, word approximations, words, phrases, and sentences were combined into one measure due to similarity of findings across all types.

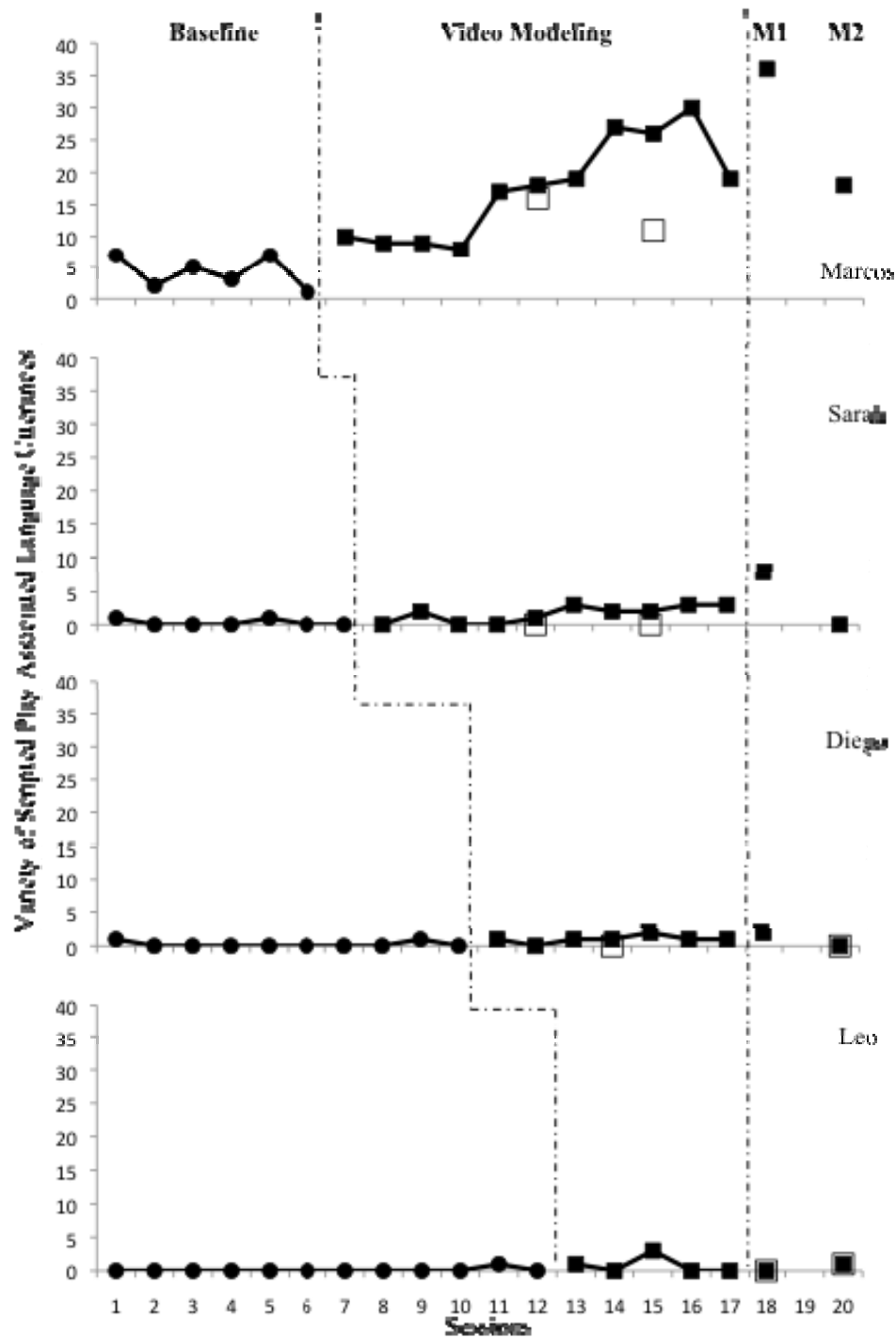


Figure 5. Scripted play-associated language utterances. The variety of (number of different utterances out of 40 possible) scripted play-associated language utterances across baseline (●), POVM (■), immediate maintenance (MI, ■), 1-week delayed maintenance (M2, ■), and generalization to another car-based play set (□) across four preschoolers with autism.

Overall findings from the study indicate two out of four preschool participants with autism increased the frequency and variety of spontaneous play-associated language utterances from baseline ( $M = 2.91$ ,  $SD = 3.59$ ) to intervention ( $M = 16.40$ ,  $SD = 18.70$ ). Thus, the visual analysis of data on scripted play-associated language utterances demonstrates no evidence of effectiveness (Kratochwill et al., 2010). Two of the four preschool participants with autism maintained the frequency and variety of spontaneous play-associated language utterances after the POVM was withdrawn ( $M = 26.88$ ,  $SD = 30.17$ ). Further, two out of four participants produced spontaneous play-associated language utterances from the intervention during play with a different car-based play set ( $M = 16.75$ ,  $SD = 20.73$ ). The overall mean PND was calculated to be 55.75% across all participants and phases for spontaneous play-associated language utterances.

### **Marcos**

In response to research question four (Figure 6), the variety of Marcos' spontaneous play-associated language utterances were at a low level ( $M = 7.83$ ,  $SD = 3.71$ ) during the baseline condition. Across the six sessions in baseline, Marcos demonstrated a downward trend. He had a moderate level of variability across baseline sessions. Overall, the data in baseline were consistently low.

Upon introduction of the POVM intervention, Marcos had a change in level between baseline ( $M = 7.83$ ,  $SD = 3.71$ ) and intervention ( $M = 33.18$ ,  $SD = 14.37$ ). Marcos had an immediate increase from 9 to 24 spontaneous play-associated language utterances from baseline to treatment. The data had a moderate level of variability and followed a rapid, upward trend. The PND was calculated to be 100% from baseline to

treatment for Marcos. Overall, the data in the intervention phase were consistently higher than baseline.

As seen in Figure 6, Marcos maintained a high level in the variety of his spontaneous play-associated language utterances ( $M = 53.00$ ,  $SD = 2.83$ ) when the POVM was withdrawn. Between the final treatment session and the immediate maintenance session, there was an immediate increase from 48 to 51 spontaneous play-associated language utterances. The data followed an upward trend of spontaneous play-associated language utterances from immediate to delayed maintenance. There was a low level of variability between the data points in maintenance. PND was calculated to be 100% from baseline to maintenance for Marcos. Overall, the data in the maintenance phase were consistently higher than baseline.

During generalization probes (research question seven, Figure 6), Marcos demonstrated a change in level from baseline ( $M = 7.83$ ,  $SD = 3.71$ ) to generalization probes ( $M = 45.00$ ,  $SD = 0.71$ ) that followed a flat trend. Marcos had an immediate increase from 9 to 46 spontaneous play-associated language utterances from baseline to generalization probes. There was a low level of variability between the data points. PND was calculated to be 100% from the baseline to generalization probes for Marcos. The data were consistently higher than baseline throughout the generalization probes.

### **Sarah**

In response to research question four (Figure 6), the variety of Sarah's spontaneous play-associated language utterances were at a low level ( $M = 3.29$ ,  $SD = 3.04$ ) during the baseline condition. Across the seven sessions in baseline, Sarah

demonstrated a slight upward trend. She had a low level of variability across baseline sessions. Overall, the data in baseline were consistently low.

Upon introduction of the POVM intervention, Sarah had a change in level between baseline ( $M = 3.29$ ,  $SD = 3.04$ ) and intervention ( $M = 32.00$ ,  $SD = 20.05$ ). Sarah had a decrease from seven to three spontaneous play-associated language utterances from baseline to treatment. The data had a high level of variability and followed a rapid, upward trend. The PND was calculated to be 90% from baseline to treatment for Sarah. Overall, the data in the intervention phase were consistently higher than baseline.

As seen in Figure 6, Sarah maintained a high level of spontaneous play-associated language utterances ( $M = 53.00$ ,  $SD = 18.393$ ) when the POVM was withdrawn. Between the final treatment session and the immediate maintenance session, there was an immediate increase from 35 to 66 spontaneous play-associated language utterances. The data followed a downward trend in spontaneous play-associated language utterances from immediate to delayed maintenance. There was a high level of variability between the data points in maintenance. PND was calculated to be 100% from baseline to maintenance for Sarah. Overall, the data in the maintenance phase were consistently higher than baseline.

During generalization probes (research question seven, Figure 6), Sarah demonstrated a change in level from baseline ( $M = 3.29$ ,  $SD = 3.04$ ) to generalization probes ( $M = 19.50$ ,  $SD = 4.95$ ) that followed an upward trend. Sarah had an immediate increase from 7 to 16 spontaneous play-associated language utterances from baseline to generalization probes. There was a moderate level of variability between the data points.



PND was calculated to be 100% from the baseline to generalization probes for Sarah. The data were consistently higher than baseline throughout the generalization probes.

### **Diego**

In response to research question four (Figure 6), there was no variety of Diego's spontaneous play-associated language utterances ( $M = 0.00$ ,  $SD = 0.00$ ) during the baseline condition. Across the 10 sessions in baseline, Diego demonstrated a flat trend and had no variability across baseline sessions. Overall, the data in baseline were consistently low.

Upon introduction of the POVM intervention, Diego had a slight change in level between baseline ( $M = 0.00$ ,  $SD = 0.00$ ) and intervention ( $M = 0.43$ ,  $SD = 0.79$ ). Diego had an increase from zero to two spontaneous play-associated language utterances from baseline to treatment. The data had a low level of variability and followed a flat trend. The PND was calculated to be 29% from baseline to treatment for Diego. Overall, the data in the intervention phase were consistently low.

As seen in Figure 6, Diego maintained no variety in his spontaneous play-associated language utterances ( $M = 0.00$ ,  $SD = 0.00$ ) when the POVM was withdrawn. Between the final treatment session and the immediate maintenance session, there was no immediate change in spontaneous play-associated language utterances. The data followed a flat trend for spontaneous play-associated language utterances from immediate to delayed maintenance. There was no variability between the data points in maintenance. PND was calculated to be 0% from baseline to maintenance for Diego. Overall, the data in the maintenance phase were consistently low.

During generalization probes (research question seven, Figure 6), Diego demonstrated no change in level from baseline ( $M = 0.00$ ,  $SD = 0.00$ ) to generalization probes ( $M = 0.00$ ,  $SD = 0.00$ ) and the data followed a flat trend. Diego had no immediate change in spontaneous play-associated language utterances from baseline to generalization probes. There was no variability between the data points. PND was calculated to be 0% from the baseline to generalization probes for Diego. The data were consistently low throughout the generalization probes.

### **Leo**

In response to research question four (Figure 6), the variety of Leo's spontaneous play-associated language utterances were at a low level ( $M = 0.50$ ,  $SD = 0.67$ ) during the baseline condition. Across the 12 sessions in baseline, Leo demonstrated a flat trend and had a low level of variability across baseline sessions. Overall, the data in baseline were consistently low.

Upon introduction of the POVM intervention, Leo had no change in level between baseline ( $M = 0.50$ ,  $SD = 0.67$ ) and intervention ( $M = 0.00$ ,  $SD = 0.00$ ). Leo had no immediate change in spontaneous play-associated language utterances from baseline to treatment. The data had no variability and followed a flat trend. The PND was calculated to be 0% from baseline to treatment for Leo. Overall, the data in the intervention phase were consistently low.

As seen in Figure 6, Leo maintained a low level of spontaneous play-associated language utterances ( $M = 1.50$ ,  $SD = 0.71$ ) when the POVM was withdrawn. Between the final treatment session and the immediate maintenance session, there was a slight change

in the variety of his spontaneous play-associated language utterances from zero to two. The data followed a flat trend for spontaneous play-associated language utterances from immediate to delayed maintenance. There was a low level of variability between the data points in maintenance. PND was calculated to be 0% from baseline to maintenance for Leo. Overall, the data in the maintenance phase were consistently low.

During generalization probes (research question seven, Figure 6), Leo demonstrated a change in level from baseline ( $M = 0.50$ ,  $SD = 0.67$ ) to generalization probes ( $M = 2.50$ ,  $SD = 2.12$ ) and the data followed an upward trend. Diego had slight change from zero to one spontaneous play-associated language utterance from baseline to generalization probes, but no immediate change. There was a moderate level of variability between the data points. PND was calculated to be 50% from the baseline to generalization probes for Leo. The data were inconsistently higher than baseline throughout the generalization probes.

### **Randomization Test Results for Spontaneous Play-Associated Language Utterances**

A regulated multiple baseline randomizations test (Kohler & Levin, 1998) was used in this study to confirm and further clarify the visual analysis results. The proportion of all possible data permutations showing the effect that is greater or equal to the actually observed effect represents the statistical probability. The results of the regulated randomization test for spontaneous language utterances was  $p = 0.7031$ . Thus, there was no statistical difference between the students' variety of spontaneous play-associated language utterances with and without the POVM intervention.

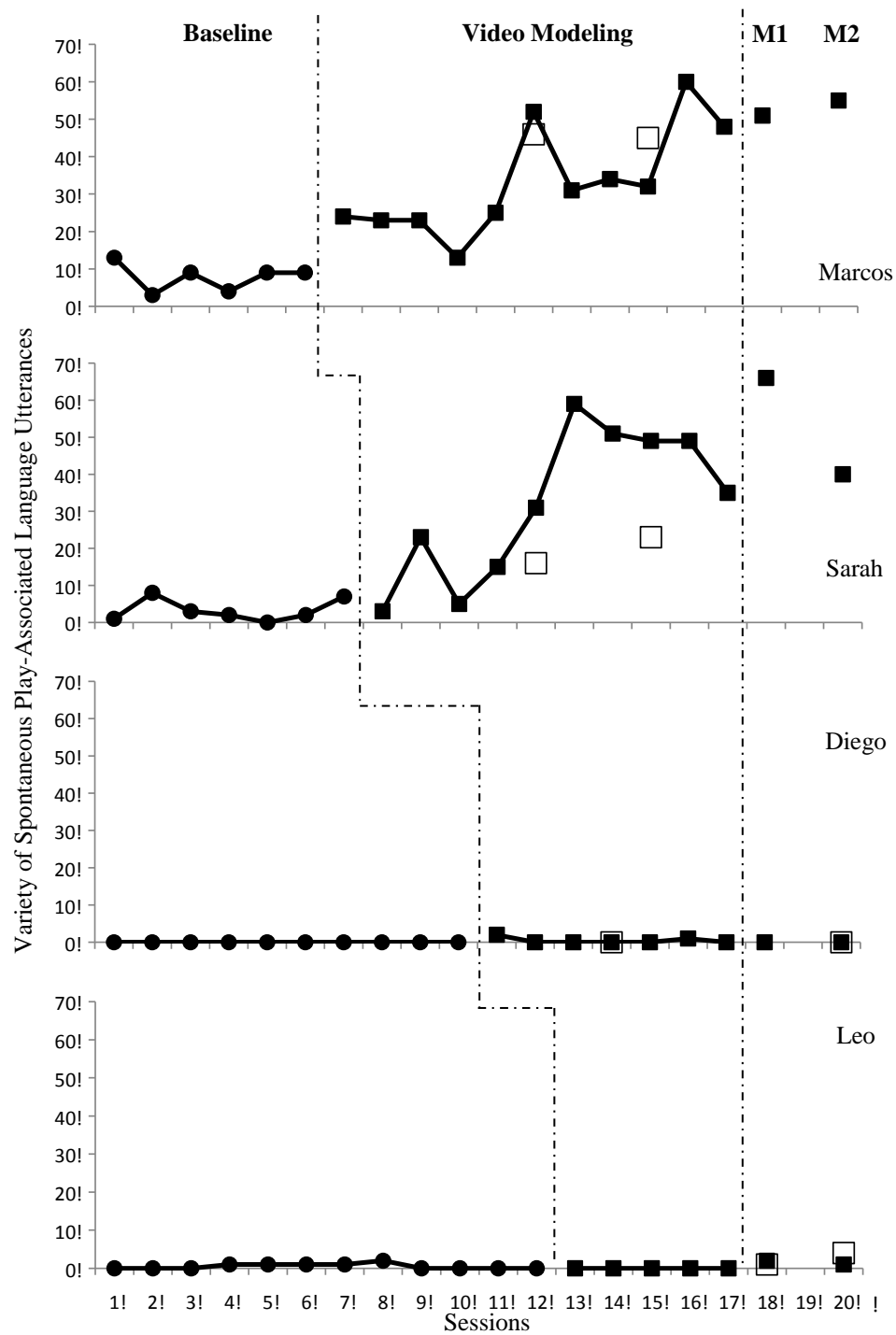


Figure 6. Spontaneous play-associated language utterance. The variety of spontaneous play-associated language utterances across baseline (●), POVM (■), immediate maintenance (MI, ■), 1-week delayed maintenance (M2, ■), and generalization to another car-based play set (□) across four preschoolers with autism.

### **Ancillary Findings: Inappropriate Play Actions**

Initially, the researcher had not intended to explicitly record, analyze, and/or discuss inappropriate play behaviors in this study. However, upon coding of the data, it became apparent that there was a change in the frequency of inappropriate play behaviors across all participants. Based on these findings from the supplemental measure for inappropriate play behavior, an additional analysis of inappropriate play behaviors was added in order to illustrate the effects of the POVM on the preschool students with autism involved in this research study. Inappropriate play behaviors were measured in 15-second partial intervals during the seven-minute play session with their play partner participant.

Inappropriate play behaviors were defined as actions that were not related to the toy/situation or self-stimulatory responses that involved non-goal directed repetitive behavior that did not involve an object (e.g., mouthing a toy, rocking, hand flapping). Repetitive motor responses were defined as repetitive behaviors that were inconsistent with appropriate manipulation of the toy during play (e.g., rapidly tapping on the moving piece of the garage ramp over and over, holding the tow truck at eye level and spinning the wheels of a car or truck). Also, self-stimulatory responses (e.g., guttural noises, repeating a pseudoword such as “di-di-di-da,” spelling preferred words) were considered to be inappropriate language utterances and thus also not included in inappropriate play behaviors. Of note, the POVM did not appear to have any effects on inappropriate language utterances.

Overall findings from the study indicate three out of four preschool participants with autism decreased the frequency of inappropriate play behaviors from baseline ( $M =$

11.17,  $SD = 10.98$ ) to intervention ( $M = 4.08$ ,  $SD = 4.81$ ). Thus, the visual analysis of data on inappropriate play actions demonstrates moderate evidence of effectiveness (Kratochwill et al., 2010). Three out of four preschool participants with autism maintained a decreased frequency of inappropriate play behaviors after the POVM was withdrawn ( $M = 3.25$ ,  $SD = 4.09$ ). Further, three out of four participants generalized the reduction of inappropriate play behaviors from the intervention to a different car-based play set ( $M = 4.75$ ,  $SD = 7.88$ ). The overall mean PND was calculated to be 74.17% across all participants and phases for inappropriate play behaviors.

### **Marcos**

During baseline (Figure 7), Marcos demonstrated a relatively high level in the frequency of inappropriate play behaviors ( $M = 9.33$ ,  $SD = 1.86$ ). His inappropriate play behaviors were characterized by (a) hand and elbow flapping; (b) driving cars back and forth on the floor in a quick, short pattern; (c) wrist twirling with closed fist; (d) staring at himself in the iPad2™ forward facing video camera; (e) putting his hands or shoulders over ears; (f) making facial grimaces; (g) tapping a car and person figurine together in front of his face; (h) hand clapping; (i) bouncing/rocking on knees; (j) tapping figurine on his hand repeatedly; and (k) squeezing figurine in hands. Across the six sessions in baseline, Marcos demonstrated a slightly downward trend and had a moderate level of variation. Overall, the data in baseline were consistently high.

Upon introduction of the POVM intervention, Marcos had a change in level between baseline ( $M = 9.33$ ,  $SD = 1.86$ ) and intervention ( $M = 2.00$ ,  $SD = 1.27$ ). Marcos had an immediate change from seven to three inappropriate play behaviors from baseline

to treatment. The data had a low level of variability and followed a slow downward trend throughout the treatment phase. The PND was calculated to be 100% from baseline to treatment for Marcos. Overall, the data in the intervention phase were consistently lower than baseline.

As seen in Figure 7, Marcos maintained a low level in the frequency of inappropriate play behaviors ( $M = 0.00$ ,  $SD = 0.00$ ) when the POVM was withdrawn. Between the final treatment session and the immediate maintenance session, there was no immediate change in inappropriate play behaviors, as Marcos was already at zero inappropriate play behaviors in the last two sessions of treatment. The data followed a flat trend for inappropriate play behaviors from immediate to delayed maintenance. There was a low level of variability between the data points in maintenance. PND was calculated to be 100% from baseline to maintenance for Marcos. Overall, the data in the maintenance phase were consistently lower than baseline.

During generalization probes (Figure 7), Marcos demonstrated a change in level from baseline ( $M = 9.33$ ,  $SD = 1.86$ ) to generalization probes ( $M = 0.50$ ,  $SD = 0.71$ ) and the data followed a flat trend. Marcos had an immediate change from seven to zero inappropriate play behaviors from baseline to generalization probes. There was a low level of variability between the data points. PND was calculated to be 100% from the baseline to generalization probes for Marcos. The data were consistently lower than baseline throughout the generalization probes.

## **Sarah**

During baseline (Figure 7), Sarah demonstrated a relatively high level in the frequency of inappropriate play behaviors ( $M = 8.43$ ,  $SD = 2.37$ ). Her inappropriate play behaviors were characterized by (a) hand flapping, (b) tip-toe running, (c) staring at herself in the iPad2™ forward facing video camera, (d) tapping figurine on the ground repeatedly, (e) spinning car on the floor, (f) spinning wheels of vehicle (tow truck and/or car), and (g) making facial grimaces. Across the seven sessions in baseline, Sarah demonstrated a flat trend and had a moderate level of variation. Overall, the data in baseline were consistent.

Upon introduction of the POVM intervention, Sarah had a change in level between baseline ( $M = 8.43$ ,  $SD = 2.37$ ) and intervention ( $M = 3.30$ ,  $SD = 1.57$ ). Sarah had an immediate change from nine to three inappropriate play behaviors from baseline to treatment. The data had a moderate level of variability and followed a slow downward trend. The PND was calculated to be 90% from baseline to treatment for Sarah. Overall, the data in the intervention phase were consistently lower than baseline.

As seen in Figure 7, Sarah maintained a low level of inappropriate play behaviors ( $M = 4.50$ ,  $SD = 0.71$ ) when the POVM was withdrawn. Between the final treatment session and the immediate maintenance session, there was an immediate increase from two to five inappropriate play behaviors. The data followed a flat trend for inappropriate play behaviors from immediate to delayed maintenance. There was a low level of variability between the data points in maintenance. PND was calculated to be 100% from



baseline to maintenance for Sarah. Overall, the data in the maintenance phase were consistently lower than baseline.

During generalization probes (Figure 7), Sarah demonstrated a change in level from baseline ( $M = 8.43$ ,  $SD = 2.37$ ) to generalization probes ( $M = 2.00$ ,  $SD = 1.41$ ) and the data followed a slight downward trend. Sarah had an immediate change from nine to three inappropriate play behaviors from baseline to generalization probes. There was a low level of variability between the data points. PND was calculated to be 100% from the baseline to generalization probes for Sarah. The data were consistently lower than baseline throughout the generalization probes.

### **Diego**

During baseline (Figure 7), Diego demonstrated a low level in the frequency of inappropriate play behaviors ( $M = 0.40$ ,  $SD = 0.84$ ). His inappropriate play behaviors were characterized by lining up the vehicles (tow trucks and/or cars) and staring off blankly into space when his play partner talked to him, made eye contact with him, and called his name. Across the 10 sessions in baseline, Diego demonstrated a flat trend and had a low level of variability. Overall, the data in baseline were consistently low.

Upon introduction of the POVM intervention, Diego had a slight change in level between baseline ( $M = 0.40$ ,  $SD = 0.84$ ) and intervention ( $M = 0.00$ ,  $SD = 0.00$ ). Diego had no immediate change in inappropriate play behaviors from baseline to treatment. The data had no variability and followed a flat trend. The PND was calculated to be 0% from baseline to treatment for Diego. Overall, the data in the intervention phase were consistently low.

As seen in Figure 7, Diego maintained no inappropriate play behaviors ( $M = 0.00$ ,  $SD = 0.00$ ) when the POVM was withdrawn. Between the final treatment session and the immediate maintenance session, there was no immediate change in inappropriate play behaviors. The data followed a flat trend for inappropriate play behaviors from immediate to delayed maintenance. There was no variability between the data points in maintenance. PND was calculated to be 0% from baseline to maintenance for Diego. Overall, the data in the maintenance phase were consistently low.

During generalization probes (Figure 7), Diego demonstrated a slight change in level from baseline ( $M = 0.40$ ,  $SD = 0.84$ ) to generalization probes ( $M = 0.00$ ,  $SD = 0.00$ ) and the data followed a flat trend. Diego had no immediate change in inappropriate play behaviors from baseline to generalization probes. There was no variability between the data points. PND was calculated to be 0% from the baseline to generalization probes for Diego. The data were consistently low throughout the generalization probes.

## **Leo**

During baseline (Figure 7), Leo demonstrated a high level in the frequency of inappropriate play behaviors ( $M = 26.50$ ,  $SD = 2.24$ ). His inappropriate play behaviors were characterized during baseline by (a) staring at himself in the iPad2™ forward facing video camera, (b) taking a poster/materials off the wall, (c) walking/stomping/galloping on top of posters from the wall and play materials, (d) laying on the couch/bench away from play partner and toys, (e) touching/pulling at the posters on the wall, (f) mouthing the figurines and vehicles, (g) spinning the wheels on the vehicles (tow trucks and cars), (h) running the wheels of a vehicle back and forth across his chin, cheeks and mouth, (i)

moving his head and body to look at non-play materials upside down, (j) patting stomach in rhythmic pattern, (k) walking behind a curtain that hung on the wall in the room, (l) hitting the bulletin board or wall with his open hand, (m) squeezing between the couch and wall (not play related), (n) putting his hands down his pants, (o) picking up the carpet squares and throwing them on the floor around the room, (p) making arm circles, (q) hand flapping, and (r) kicking play materials across the floor. Across the 12 sessions in baseline, Leo demonstrated a flat trend and had a moderate level of variability. Overall, the data in baseline were consistently high.

Upon introduction of the POVM intervention, Leo had a change in level between baseline ( $M = 26.50$ ,  $SD = 2.24$ ) and intervention ( $M = 11.00$ ,  $SD = 7.52$ ). Leo had an immediate decrease from 22 to 19 inappropriate play behaviors from baseline to treatment. The data had a moderate level of variability and followed a rapid downward trend. The PND was calculated to be 100% from baseline to treatment for Leo. Overall, the data in the intervention phase were consistently lower than baseline.

As seen in Figure 7, Leo maintained a low level of inappropriate play behaviors ( $M = 8.50$ ,  $SD = 6.36$ ) when the POVM was withdrawn. Between the final treatment session and the immediate maintenance session, there was a slight immediate increase from three to four inappropriate play behaviors. The data followed a rapid upward trend for inappropriate play behaviors from immediate to delayed maintenance. There was a high level of variability between the data points in maintenance. PND was calculated to be 100% from baseline to maintenance for Leo. Overall, the data in the maintenance phase were consistently lower than baseline.

During generalization probes (Figure 7), Leo demonstrated a change in level from baseline ( $M = 26.50$ ,  $SD = 2.24$ ) to generalization ( $M = 16.50$ ,  $SD = 0.71$ ) and the data followed a flat trend. Leo had an immediate change from 22 to 17 inappropriate play behaviors from baseline to generalization probes. There was a low level of variability between the data points in generalization probes. PND was calculated to be 100% from the baseline to generalization probes for Leo. The data were consistently lower than baseline throughout the generalization probes.

### **Randomization Test Results for Ancillary Findings**

A regulated multiple baseline randomizations test (Kohler & Levin, 1998) was used in this study to confirm and further clarify the visual analysis results. The proportion of all possible data permutations showing the effect that is greater or equal to the actually observed effect represents the statistical probability. The results of the regulated randomization test for inappropriate behaviors was  $p = 0.0104$ . Thus, there is a statistical difference between the students' frequency of inappropriate behaviors with and without the POVM intervention.

### **Social Validity**

In order to establish the social validity of the study goals, procedures, and outcomes, the research participants participated in a questionnaire at the end of the study. The questionnaire was administered to all of the research participants which included participants with autism, play partner participants, and professional participants. This questionnaire provided important information about the various participants' opinions and preferences in regards to the video modeling intervention. Two different

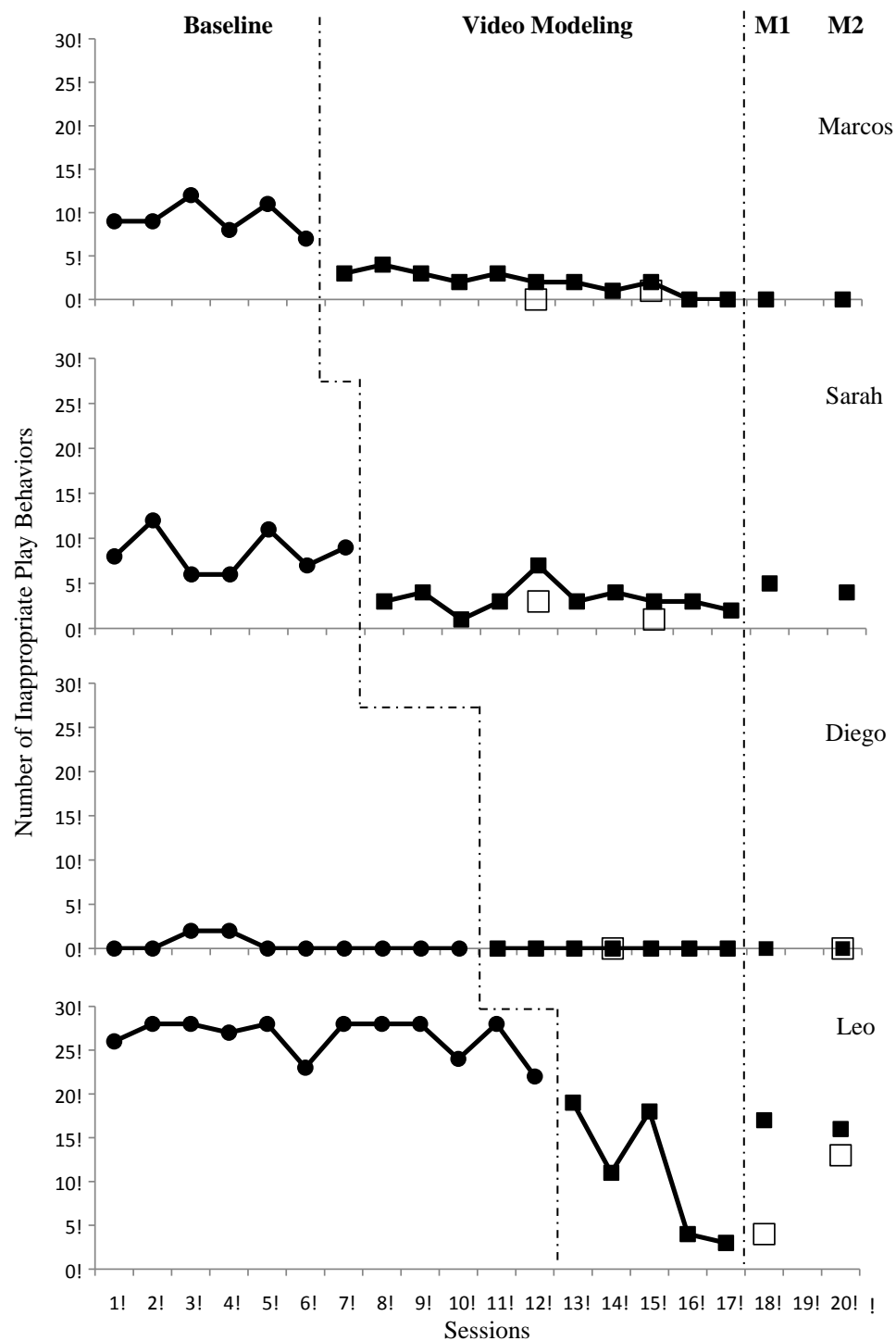


Figure 7. Inappropriate play behaviors. The frequency of inappropriate play behaviors across baseline (●), POVM (■), immediate maintenance (M1, ■), 1-week delayed maintenance (M2, ■), and generalization to another car-based play set (□) across four preschoolers with autism.

questionnaires were administered. One version was used with the student participants (participants with autism and play partner participants), while the other was used with the professional participants (see Appendices P and Q).

### **Student Participant Social Validity Questionnaire**

The questionnaire contained three Likert scale items that were scored 3 (liked), 2 (okay), or 1 (did not like) on the Student Participant Social Validity Questionnaire (see Appendix Q). Using this type of rating scale to describe feelings with Boardmaker™ pictures of faces with a smiling mouth, flat mouth, and frowning mouth was an existing classroom routine. Items were tallied and averaged across student participants (participants with autism and play partner participants) by question. Below is a description of the results for each question.

**Question 1.** Question one asked student participants to share their opinion about watching the video model. The average response for this question was 2.78 out of 3 and 100% of student participants responded that they “liked” or felt “okay” about the video model.

**Question 2.** Question two asked student participants to share their opinion about playing with the toys during the intervention. The average response for this question was 2.78 out of 3 and 100% of student participants responded that they “liked” or felt “okay” about the toys.

**Question 3.** Question three asked student participants to share their opinion about playing with a friend. The average response for this question was 2.67 out of 3. Seven out of the nine participants who responded to the questionnaire indicated that they “liked”

playing with a friend. One out of the nine reported that playing with a friend was “okay” and one out of nine reported that they did not like playing with a friend. The two participants who responded “okay” and “don’t like” for this question were both play partner participants with the same participant with autism (Leo). Of all the participants with autism in the study, Leo had the most inappropriate behavior throughout the study, but it steadily declined with the introduction of the intervention. Leo received the least amount of sessions in the treatment phase, and therefore had the shortest amount of time to improve other opinions about him. This may have contributed negatively to the perceptions that his play partner participants had about him.

### **Professional Participant Social Validity Questionnaire**

The questionnaire contained five Likert scale items that were scored 5 (strongly agree), 4 (agree), 3 (neutral), 2 (disagree), or 1 (strongly disagree) on the social validity professional participant questionnaire. Items were tallied and averaged across professional participants (instructional assistants, teachers, and therapists combined) by question. In the last section of the social validity questionnaire, professional participants were asked to provide any additional comments they may have using an open-ended format for response. The full version of the social validity questionnaire for professional participants can be found in Appendix P. Seven instructional assistants, eight teachers, and three therapists responded to the questionnaire for a total of 18 professional participants. Below is a description of the results for each item on the professional participant social validity questionnaire.

**Question 1.** Question one asked professional participants to rate their opinion about how video modeling could fit within the curriculum that was currently being implemented in their classrooms. There were a total of 18 professionals that responded to this question. The average response was a 4.50 out of 5 for question one. A total of 100% of professional participants (18/18) responded “strongly agreed” or “agreed” that video modeling can fit within the curriculum that is currently being implemented in their classrooms.

**Question 2.** Question two asked professional participants to rate their opinion about whether or not there was a noticeable difference in the play skills, including language in the participant with autism he/she educates since starting the study. There were a total of 18 professionals that responded to this question. The average response was a 3.94 out of 5 for question two. A total of 72.22% of professional participants (13/18) responded “strongly agreed” or “agreed” with this statement. Five out of the 18 professional participants responded “neutral” to this question.

**Question 3.** Question three asked professional participants to rate their opinion about the ability for video modeling clips to help students with autism reach their goals to learn new play actions. There were a total of 18 professionals that responded to this question. The average response was a 4.56 out of 5 for question three. A total of 94.44% of professional participants (17/18) responded “strongly agreed” or “agreed” with this statement. One out of 18 professional participants responded “neutral” to this question.

**Question 4.** Question four asked professional participants to rate their opinion about the ability for video modeling clips to help students with autism reach their goals to



learn new language skills. There were a total of 18 professionals that responded to this question. The average response was a 4.44 out of 5 for question four. A total of 94.44% of professional participants (17/18) responded “strongly agreed” or “agreed” with this statement. One out of 18 professional participants responded “neutral” to this question.

**Question 5.** Question five asked professional participants to rate their opinion about video modeling as a way to help students with autism increase the time they are included in the general education curriculum. There were a total of 17 professionals that responded to this question. The average response was a 4.35 out of 5 for question five. A total of 76.47% of professional participants (13/17) responded “strongly agreed” or “agreed” with this statement. Four out of 17 professional participants responded “neutral” to this question.

**Comments on the professional participant questionnaire.** Professional participants were prompted to “Please write any additional comments below and/or on the back of this sheet” at the end of the questionnaire. Eight out of a total of 18 professional participants wrote comments on the questionnaire. One therapist commented “I have observed increased language/use of language, initiation and engagement with staff and general interest and attention to activities and tasks over the past few weeks.” Another therapist commented, “I have seen less rote counting and more ‘play’ with the objects/manipulatives.” Some of the teachers noted “generalization of skills” and “a lot of new language sprouting up that we had not heard” before in the classroom. Instructional assistants contributed notable comments as well. One of the instructional assistants wrote, “I truly believe that video modeling can be a huge benefit to our kids with autism. They

will grow leaps and bounds with this. Thank you.” Another instructional assistant commented that she “would like to know more about video modeling’s long term effects.”

## **5. CONCLUSIONS AND RECOMMENDATIONS**

The primary purpose of this study was to explore the development of symbolic play actions and play-associated language utterances in young children with autism through the use of point-of-view video model (POVM) using a multiple baseline design across four preschool-aged students who participated in this study. The POVm was examined in order to determine the influence on symbolic play actions and play-associated language utterances in the individual participants.

### **Summary of Findings**

Overall findings from the study relative to Kratochwill et al.'s (2010) evidence of effectiveness criteria indicate that:

1. three out of four preschool participants with autism increased the variety of scripted symbolic play actions after watching the POVm, indicating moderate evidence of effectiveness (Kratochwill et al., 2010),
2. three out of four preschool participants with autism increased the variety of spontaneous symbolic play actions after watching the POVm, indicating moderate evidence of effectiveness (Kratochwill et al., 2010),
3. one out of four preschool participants with autism increased the variety of scripted play-associated language utterances, indicating no evidence of effectiveness (Kratochwill et al., 2010),

4. two out of four preschool participants with autism increased the variety of spontaneous play-associated language utterances, indicating no evidence of effectiveness (Kratochwill et al., 2010), and
5. three out of four preschool participants with autism decreased the frequency of inappropriate play behaviors, indicating moderate evidence of effectiveness (Kratochwill et al., 2010).

In reference to maintenance of behaviors, (a) all four participants maintained the variety of scripted symbolic play actions, (b) all four participants maintained the variety of spontaneous symbolic play actions, (c) one out of four participants maintained the variety of scripted play-associated language utterances, (d) two out of four participants maintained the variety of spontaneous play-associated language utterances, and (e) three out of four participants maintained a reduction in the frequency of inappropriate play behaviors.

Regarding generalization of behaviors for the dependent variables, (a) two out of four of the participants demonstrated a variety of scripted symbolic play actions from the intervention play set when playing with another car-based play set, (b) all four participants demonstrated a variety of spontaneous symbolic play actions during generalization with a different car-based play set, (c) one out of four participants produced a variety of scripted play-associated language utterances from the intervention during play with a different car-based play set, (d) two out of four participants produced a variety of spontaneous play-associated language utterances when playing with the

generalization play set, and (e) three out of four participants were able to maintain a reduced frequency of inappropriate play behaviors during generalization probes.

### **Conclusions and Implications**

In this section, the findings are discussed by dependent variables of symbolic play actions and play-associated language utterances. The seven research questions are divided and discussed in these two areas as follows: symbolic play actions (research questions one and two) and play-associated language utterances (research questions three and four). The maintenance (immediate – research question five; delayed – research question six) and generalization (research question 7) results are discussed and infused within each of the key domains. Also, inappropriate play behavior was monitored, thus becoming an additional dependent variable offering supplemental findings for discussion.

#### **Scripted and Spontaneous Symbolic Play Actions**

Scripted and spontaneous symbolic play actions were measured by the number of pretend play actions participants completed during a 7-minute play session that were presented (scripted) or absent (spontaneous) from the POVM clip. In the present study, visual analysis indicated that three out of four participants increased their scripted and spontaneous symbolic play actions during the treatment and maintenance phases. These findings were further supported by statistical significance with the randomization test.

The play intervention involved students watching a video modeling clip that was taken from their perspective and then engaging in a play session with a typically developing preschool-aged peer. One student, Diego, demonstrated an increase in scripted symbolic play actions during the baseline phase. Since he demonstrated this

increase in the baseline, it cannot be assumed that the elevated number of scripted or spontaneous symbolic play actions during intervention and maintenance were due to viewing the POVM clip. Despite the increase in scripted and spontaneous symbolic play actions during baseline, the researcher chose to implement the POVM in order to determine the effects on the other areas such as play-associated language utterances and inappropriate play behaviors.

Based on the relationships between developmental domains such as autistic symptomatology, expressive language, receptive language, nonverbal cognitive ability, and social development it appears likely that training in symbolic play will help improve a child's skills in other domains (Stanley & Konstantareas, 2007). Increasing students' symbolic play actions when viewing a POVM clip is especially worthwhile since engaging in play is a normalized, contextually relevant experience for preschool students (Barton, 2012; Kelly-Vance & Ryalls, 2008). Having play skills, such as engaging in play with pretense, increases the likelihood of learning in inclusive settings (Buysse et al., 1996), reinforces properties for other skills (Morrison et al., 2002), sets the occasion for interactions with peers (McConnell, 2002), and provides a context for embedding strategies for other goals (Wolery, 1994).

One possible explanation as to the moderate increase in symbolic play actions for the participants was that the POVM clip illustrated the perspective of how the participants viewed the toys and manipulated the figurines and vehicles. Showing the video model from the participant's perspective may use the strength children with autism have in learning visual information more easily than spoken information (Ganz & Flores,

2010). Further, in comparison to scene video modeling, POVM further restricts the stimuli to those that are directly related to the target behavior, thus eliminating the necessity of identifying optimal characteristics of the models and increasing the likelihood that the participant will focus on the most relevant cues (Charlop-Christy et al., 2000, Hine & Wolery, 2006; Krantz, MacDuff, Wadstron, & McClannahan, 1991; Tetreault & Lerman, 2010). Cox (1978) suggests that typically developing children as old as 7, and possibly even older, may struggle with complex perspective taking tasks. Therefore, providing a video in first person perspective may be advantageous to children younger than 7 years old.

For those participants for whom video modeling was effective in increasing symbolic play actions (Marcos, Sarah, and Leo), it is important to consider the behavioral consequences that may be controlled by automatic reinforcement (Bandura & Barab, 1971), that is, when a participant engaged in a behavior that closely matched the POVM they may have been reinforced by the degree of sameness between the POVM and their own behavior. The more closely the behavior of the participant matched the POVM, the greater the level of reinforcement (Bandura & Barab). Therefore, it is likely that the imitative behavior for Marcos, Sarah, and Leo may have come under the control of these reinforcers and their scripted behaviors were acquired and maintained by the reinforcement received from the degree of sameness between their behavior and those demonstrated in the POVM.

This study replicates features of Hine and Wolery's (2006), Schreibman et al.'s (2000), and Tetreault and Lerman's (2010) research involving the use of POVM

techniques in several ways. As in the present study, Hine and Wolery used POVM as a means to teach preschool children with autism play skills. Hine and Wolery used the context of sensory bin play to teach pretend play and the POVM intervention they conducted had less complex play sequences (only 6 steps compared to the 25 in the current study). Schreibman et al. and Tetreault and Lerman used non-play-related contexts and older participants (elementary- and middle school-aged students) to examine the effects of POVM intervention. In addition, none of the previous research on POVM reported play-associated language utterances as done in this study. Male preschool students with autism were not previously included in POVM investigations of play skills, as Hine and Wolery's study only included female participants. Visual analysis and a randomization test confirm the findings of this study that scripted and spontaneous symbolic play actions increased when viewing a POVM for all participants with autism.

Motivating toys and materials may have also contributed to the increase in symbolic play actions during the POVM intervention and maintenance phase. For example, Marcos, Sarah, and Diego were all reported by their teachers to engage with transportation vehicles during playtime in the classroom. While Leo did not show a particular interest or disinterest in car toys before the intervention, he was drawn to interact with the play materials upon immediate introduction to them in the first baseline session.

Another plausible reason that some participants in this study increased their symbolic play actions could have been because the play context offered naturalistic, social reinforcement. The participants engaged in play activities that were similar to play



situations that normally occur in their classrooms (Barton, 2012; Kelly-Vance & Ryalls, 2008). That is, they had the opportunity to use toys and materials that could be available in any preschool classroom and follow similar free playtime procedures, where students can choose what materials to play with and how to interact with the chosen toys. The current investigation did not provide external reinforcement for watching the POVM clip or correct responses during the treatment sessions. This differed from the procedures used by Alberto et al. (2005), Hine and Wolery (2006), Schreibman et al., (2000), Shipley-Benamou et al. (2002), and Tetreault and Lerman (2010), who all used prompts and praise for watching the POVM. Also, participants received reinforcement for correct responding during practice sessions in two of these studies (Hine & Wolery, 2006; Shipley-Benamou et al., 2002) with no explicit mention in the others.

A self-directed play session may have also contributed to the increase in spontaneous symbolic play actions during the POVM intervention and maintenance phase. For example, students were permitted to talk and act out any play situation they desired. While scripted behaviors were central to the POVM, students had the freedom to engage as they wished during the play sessions. Sarah, for example, chose to expand and create new dialogue for the figurines in the play scheme based on what her play partner participant had introduced one time. Thus began her expansion of the characters in the play scheme getting hurt and then calling the doctor for help. Marcos, on the other hand, used the play session primarily for demonstrating the play script from the POVM clip with increasing accuracy and complexity session after session.

It should be noted that although Diego did not appear to make improvements in his scripted and spontaneous symbolic play actions during the intervention phase, he maintained at a higher level than both baseline and intervention once the POVM was withdrawn. This clearly illustrates that Diego learned a variety of symbolic play actions throughout the intervention.

In this investigation, three out of four participants increased the variety of scripted and spontaneous symbolic play actions during the POVM intervention. Explanations for the increases in symbolic play actions include student perceptions of a clear presentation of the target behaviors through the use of POVM, motivating materials, and naturally reinforcing consequences in response to watching the POVM and then engaging in play with a same-aged peer.

### **Scripted and Spontaneous Play-Associated Language Utterances**

Scripted and spontaneous play-associated language utterances were measured by the number of different utterances participants produced during a 7-minute play session that were presented (scripted) or absent (spontaneous) from the POVM clip. In the present study, visual analysis indicated that one out of four participants increased his scripted play-associated language utterances and two out of four participants increased their spontaneous play-associated language utterances during the treatment and maintenance phases. Further, the results of the randomization tests confirm that these findings were not statistically significant.

Play provides children with a context for developing social and language skills (Barton, 2012; Boutot, Guenther, & Crozier, 2005) in addition to free play, which

encourages the use of speech and communication (Fekonja, Umek, & Kranjc, 2005).

Thus, starting with simple functional representational play and progressing to more complex reciprocal play may help children with autism acquire perspective taking, which is limited in children with autism.

This investigation extends the work of Maione and Mirenda (2006), D'Ateno et al. (2005) and Tetreault and Lerman (2010) who investigated the dependent measure of scripted and unscripted verbalization. Maione and Mirenda reported that the participant in their case study had an increase in social initiations and responses (measured by both scripted and unscripted verbalizations) using POVM alone in two of three different play routines. One of the play routines required reinforcement, video feedback, and prompting to increase verbalization behaviors. The participant had a significant increase in unscripted verbalization, which accounted for two to three times the number of scripted verbalizations in several phases of the study. However, Tetreault and Lerman and D'Atendo et al. described results demonstrating no increase in appropriate novel, or spontaneous, language utterances during treatment. The findings in the current study reflect the mixed findings of these previous studies in that two out of four participants demonstrated an increase in spontaneous play-associated language utterances during the POVM intervention while the other two participants did not show any difference in spontaneous play-associated language utterances during the treatment condition. Further, only one participant demonstrated an increase in scripted play-associated language utterances during the treatment condition. The other three participants did not

demonstrate any change from baseline to treatment in their production of scripted play-associated language utterances.

In this study, an increase in play-associated language utterances was especially favorable for Marcos. During baseline, Marcos' scripted play-associated language utterances were characterized by saying "car," "Let's play cars," "Here," and "oh no!" However, during intervention, the quality and length of the scripted play-associated language utterances increased dramatically. In sessions at the end of the intervention phase and during the maintenance phase, Marcos followed the POVM script verbatim by chaining smaller sequences (e.g., riding the elevator, getting gasoline, towing the broken car to the garage, paying the mechanic) to produce a complex play sequence while simultaneously demonstrating associated symbolic play actions. By the end of the intervention, Marcos was producing scripted play-associated language utterances such as "wait for the elevator," "look I go up," "here I come," "oh no! flat tire," "get the tow truck," "it's broken," "wait 10 minutes," etc. Further, Marcos produced spontaneous play-associated language utterances such as "I need help please," "No Emily, I push," "here we go," "I push it," "can you look now?" and "can I come through here?" Of note, Marcos not only produced relevant and extended utterances directly related to play, but also commented about the toys in an appropriate manner and engaged in joint attention with his play partner participants. For example, Marcos pointed to the smiling mouth of one of the figurines, looked at his partner, looked back at the figurine, said to his play partner participant "He happy. Look. Happy" and then looked back at his partner.

Sarah also had favorable results for spontaneous play-associated language utterances. Examples of her spontaneous play-associated language utterances include “is that my house?” “are the garage door is open?” “oh, it’s locked,” “what happened?” “how will I get out?” “starboard boom!” “and “he have a scrape too. Call the doctor.”

Diego and Leo showed no quantitative increase in his play-associated language utterances (either scripted or spontaneous). However, Diego continued to talk spontaneously in the classroom and walking in the hallway with the researcher and his play partner participants. But, when he entered into the research room, he did not speak at all. It is possible that watching the POVM or engaging play in a more contrived setting was off-putting to Diego in some way and decreased his ability to perform. Then once the POVM was removed during maintenance, he was once again able to perform and demonstrate his learning. Leo developed a spontaneous language routine for walking in the hallway based upon an exchange between his play partner and the researcher, but the language was not connected to the intervention activities at all.

Previous video modeling research suggested that a lack of unscripted verbalization could have been due to a failure to include sufficient exemplars in the POVM intervention (D’Ateno et al., 2005). However, Maione and Mirenda (2006) used three different video vignettes to depict many verbal and motor responses, while this study only presented one vignette during the POVM intervention and participants in both studies with and without multiple vignettes demonstrated an increase in spontaneous play-associated language utterances. However, in the current study only two out of four of the participants made improvements in spontaneous play-associated language

utterances. If this study had used multiple vignettes rather than one vignette, it may have changed the results for the two participants who did not show any changes in the area of play-associated language utterances.

It should be noted that no external reinforcement contingencies were implemented in any phase of the study. Previous studies have used reinforcement contingencies during the treatment phase (Charlop & Milstein, 1989; Taylor et al., 1999). The findings in the present study that illustrate an increase for some of the participants following the POVM intervention suggest that these participants may have been reinforced by the natural, social context of interacting with a same-aged peer during play. A case could also be made that the videos in general provided naturally occurring reinforcement contingencies that were correlated with Marcos' high rate of acquisition.

Lasater and Brady (1995) suggested a correlation between the presence of maladaptive behaviors and task difficulty. It is possible that Leo had lower levels of response in the area of language because of the presence of his inappropriate behaviors. Working to reduce these behaviors before implementing the POVM could have resulted in a different outcome.

Another plausible explanation for the varying degrees of response to play-associated language utterances may be due to the age of the participant and/or amount of time that the participant had been receiving special education intervention and related services, such as speech and language therapy. Of note, Marcos and Sarah, the oldest two participants, demonstrated positive changes in the development of play-associated language utterances over the course of the intervention while the younger two

participants, Diego and Leo, did not demonstrate any changes in play-associated language utterances. Further, Marcos had received 24 months of special education and related services (speech-language therapy and occupational therapy) prior to the start of this intervention more than Sarah, Diego, and Leo who had 4, 14, and 6 months of prior intervention respectively. Therefore, age of participant and amount of previous intervention should be a consideration for participation.

### **Ancillary Findings: Inappropriate Play Behaviors**

The presence of inappropriate behaviors may interfere with both instruction and learning. Children with autism do not generally learn easily from casual observation. “Many children with autism will not play without systematic teaching” (Barton & Pavilanis, 2012, p. 16). They appear to require direct instruction (Leaf & McEachin, 1999). Their repetitive and restricted patterns of behavior may preempt contact with alternate sources of reinforcement and may explain their lack of sensitivity to social interactions (Koegel & Covert, 1972). Conversely, stereotypical behavior may be an outcome of behavioral insensitivity to social events (Jahr et al., 2000). Further, according to Barton and Pavilanis (2012), when children with autism engage in pretend play, there is an increased opportunity for learning and independence within an organic social setting. Additionally, because pretend play is flexible and children directed, it provides a meaningful context in a natural setting in which children with autism can learn alongside of typical peers. However, inappropriate play behaviors can prevent children with autism from accessing this natural play setting.

While not a focal point of the research questions, this investigation extends the work of Paterson and Arco (2007) who examined the use of video modeling to teach pretend play skills to two participants with autism. The results of their study indicated that when appropriate play behaviors increase, stereotypic behaviors decrease. This follows the basic principle of incompatible behaviors, which means that individuals cannot be engaged in the inappropriate behavior when they are engaged in the appropriate behavior. Given this explanation, when the participants with autism decrease their inappropriate behaviors, their appropriate behaviors should increase.

In this study, only three out of the four participants with autism exhibited any inappropriate play behaviors during baseline. For all three, their inappropriate play behaviors decreased without the use of any external reinforcement contingencies once the intervention was introduced. One might suggest that such a change was reflective of the attention from the researcher or the play partner. However, the staggered decrease in inappropriate play behaviors indicates a functional relation to the introduction of the intervention. Otherwise, the inappropriate play behaviors would have decreased even during the baseline phase, which they did not. While not monitored explicitly, this infers that appropriate play behaviors increased among the participants with autism.

Another possible explanation for this decrease in frequency of inappropriate behavior that maintained over time could be that participants with autism felt internally reinforced by engaging in play with their play partner participants. Of note, during Leo's immediate maintenance sessions, he entered the room and when he did not see an iPad to view the POVM on he said "iPad. I want iPad." When the researchers followed up with



“No iPad today” Leo laid on the couch and then engaged in a similar pattern of disengaged non-play behaviors to baseline. After this initial inappropriate behavior, Leo was able to engage in appropriate play with the car garage and his play partner participant without any external reinforcement.

In this investigation, three out of four participants decreased the frequency of their inappropriate play actions. While the overall results indicate three out of four participants made gains in this area, it should be noted that Diego did not have any inappropriate behaviors during baseline; therefore, he could not decrease in frequency in this area. Consequently, three out of three participants demonstrated a decrease in frequency of inappropriate play behaviors from baseline to intervention. Furthermore, the results of the regulated randomization test for inappropriate behaviors was  $p = 0.0104$ . Thus, there was a statistical difference between the students' frequency of inappropriate behaviors with and without the POVM intervention. Also, these results can be generalized to the population of children with autism, illustrating the clear treatment effects of POVM on decreasing the frequency of inappropriate behaviors.

### **Other Noteworthy Observations**

It is important to note that Marcos had a bad day during session 17. Data points across all variables were not at the levels they had been during previous sessions. The participants' school imposed a time limit on the study as a whole. Had this not been the case, the researcher would have continued the intervention for a longer period of time in order to determine if the data points during session 17 were outliers or the start of a different trend in the data.

One other situational circumstance arose throughout the intervention as well. Marcos, Diego, and Sarah needed to be relocated to a different, but similar room during sessions 10 and 11 of the intervention due to statewide assessments that were taking place at their schools. For Diego, session 11 was the first time he had received the POVM intervention. This change in location might have negatively impacted Diego's ability to engage in the target behaviors due to a disruption of his routine.

Diego's results were the most dissimilar to those of the other participants. However, it should be noted that when taking the Student Participants Social Validity Questionnaire, Diego reported that he "liked watching the video, liked playing with the toys, and liked playing with a friend." Although his quantitative results did not reflect a significant change in behavior, watching the POVM and engaging in play with his peers was something Diego valued and enjoyed.

### **Limitations**

Some limitations must be imposed in drawing conclusions from these data. Three major limitations of this study include setting, participant characteristics, and the POVM itself.

#### **Limitations to Setting**

First, the setting of this study was a pull-out, contrived play environment. Although the intervention was conducted at the participants' schools, the setting was in a separate classroom without other children, just the two students in the play dyad. Also, the participants' schools imposed a time limit that impacted flexibility to extend phases of the study. It is yet to be determined whether this technology is effective in other

situations or settings. Although it seems likely that POVM would be effective across a variety of applications, such effectiveness needs to be demonstrated through additional research.

### **Limitations to Participant Characteristics**

A primary limitation of this investigation is the sample size; however, the extensive data collected over the 21 sessions allows for the examination of change over time. The fact that not all children were educated with the same intervention team of teachers and therapists is an additional limitation to this study. For example, School A where Leo attended preschool was a Spanish Immersion school and the focus of the teachers and therapists may have been different in teaching language skills from those participants at the other schools. The age of the participants with autism and their maturity was another limitation. Leo was the youngest participant at 40 months old, and Marcos the oldest at 55 months old, making it difficult to compare the participants amongst themselves. Also, participants with autism had varying amounts of time in which they had received previous therapy and special education services. Moreover, it is difficult to compare the participants or generalize the results because of the heterogeneous nature of autism.

Further, this study is limited by the play partner participants that the participants with autism were paired with in dyads. In general, the female play partner participants tended to be more verbal as they played and the male play partner participants tended to be quieter but demonstrated more play actions than the females. This dynamic could have

impacted the participants with autism's response to the POVM and play session, but was not explicitly monitored.

### **Limitations to Point-of-View Video Modeling**

There are some limitations with the use of POVM. The ability to generalize the effectiveness of these results requires further investigation. Since this study did not directly compare POVM with other strategies for facilitating symbolic play actions and play-associated language utterances, it cannot be concluded that POVM is superior. Rather, it can be concluded that POVM could be an effective option available for treatment providers in teaching symbolic play actions and decreasing inappropriate play behaviors to preschoolers with autism.

### **Recommendations**

In the following section, recommendations address both future research as well as classroom implementation. The Logic Model (see Figure 1) discusses the importance of this study in examining and implementing interventions for students with autism that address social skill development necessary for increased inclusion in both school and community. Specific suggestions for researchers and practitioners are as follows.

#### **Recommendations for Setting**

Future researchers should incorporate the principles of POVM shown to be effective in this research study either individually or in a large group/whole class setting. Further evidence is needed to support the effectiveness of POVM intervention being implemented in a variety of settings. The current study was implemented in a contrived play setting with time restrictions. Therefore, researchers should conduct additional

research in a more natural classroom setting over a longer period of time. For example, the classroom where the students are regularly placed would be a more natural location to implement the intervention, preferably with their teachers and classmates as the other participants. Researchers also should aim to extend this study beyond the classroom by implementing POVM in other settings around the school and community such as on the playground, in the lunch room/cafeteria, at the bus stop, while using public transportation, on a job site, or at home.

Relative to the time issue, implementation with unrestricted time to allow for greater responsiveness to variability (e.g., outlier management) and to increase the number of data points to establish complete maintenance and generalization phases would be ideal. In the current study, Marcos experienced a decrease on the last day of the intervention. It was impossible to tell if this was an actual outlier or the start of a change in the trend given the time limitation.

The current study only included two generalization probes and two maintenance probes for each participant. Having only two probes does not provide strong evidence one way or the other as to the effectiveness of this practice in generalizing or maintaining the skills learned. Future research studies should include a full generalization and maintenance phase, which according to the new criteria in single-subject research design would include at least five data points across at least three tiers (Kratochwill et al., 2010). Having a complete generalization phase is needed in order to draw conclusions about the effects of POVM and the ability for the participant to transfer the knowledge learned in one area to another (generalization). Additionally, generalization to other settings,

objects, and with other people should be investigated in future research. A large-scale empirical investigation could contribute to the generalizability of the positive findings that emerged from the present study.

### **Recommendations for Participant Characteristics**

The findings of this study suggest that additional measures and diagnostic tools for autism spectrum disorders (ASD) are needed to distinguish between various types of autism. Also, more information is needed regarding which characteristics of participants predispose success with POVM interventions (e.g., type of autism, performance indicators, age, prior treatment). Service providers and researchers in autism are challenged to categorize clinical variations in level of functioning. It is critical to identify what attributes determine severity of function in autism. Communication (including language) and social skills are two of the most important, if not the most important domains in classifying various subtypes of ASD. Both high and low functioning children with ASD need to be included in studies of this nature to fully understand the complex interactions among key areas of developmental functioning that contribute to the degree of progress in the areas of play (social and cognitive) and language development.

Looking forward, future research should include detailed descriptions of IQ scores (e.g., Stanford-Binet Intelligence Scale) and measures on assessments such as the Vineland Adaptive Behaviors Scale (Sparrow, Balla, & Cicchetti, 1984), Childhood Autism Rating Scale (CARS) (Schopler, Reichler, & Renner, 1988), Differential Abilities Scale (DAS) (Elliott, 1983), and Preschool Language Scale (PLS). This way, participants could be compared based on similar measures to draw conclusions about possible

prerequisite skills necessary for responding to a POVM intervention. Also, it is essential that future research include quantifiable measures for language proficiency for children whose first language is not the language in which the intervention is delivered.

Also, future research can be done to replicate and extend this research study in order to have a larger sample in which to compare participants, including participants from different age ranges and various disability types. If at all possible, researchers should consider implementing this intervention with whole classes of students rather than individually, to examine whether this more practical approach is effective or not. In future studies, stronger criteria for matching play partners and instructional teams may decrease variability in responsiveness. For instance, if the intervention could be done in a single location, every participant with autism could have been randomly assigned to work with all of the play partners and instructional teams on a rotating basis.

### **Recommendations for Point-of-View Video Model**

Future research is needed to determine what skills are effectively taught through video modeling and which are not. Also, future research is needed to extend the implementation of POVM to other content areas, for example, when teaching children to demonstrate a skill such as manipulation of play figurines that require certain positioning or orientation. Scene video modeling would show a child performing a task at a distance and possibly upside down, which could affect their ability to imitate a skill in which orientation and positioning of materials/items is critical for correct imitation. However, POVM would illustrate the nuances of the environment necessary for contextually relevant and appropriate imitation of this type of skill (Cotter, 2010). It is plausible that

the selection of POVM over another type of video modeling or intervention could explain why participants in this study did not make progress in the domain of language using this type of video modeling.

Future studies may also investigate the possible differences related to the types of toys used and the results obtained. Only one type of toy was chosen for this study so the results cannot be compared to those that used differing stimulus items. Materials that are novel or to which participants have less common exposure may contribute to higher or lower rates of response. Further study could determine the effects the type of toys used may have on response acquisition.

At this time, there is a lack of evidence for POVM to be considered an evidence-based practice. Additional research is needed on this specific type of video modeling to determine whether or not it is an effective practice for teaching skills in the core deficit areas (communication, social interaction, and behavior) to the population of students with autism. The results of the regulated randomization test indicating a statistical difference between the students' variety of scripted play actions ( $p = 0.0078$ ) and frequency of inappropriate play behaviors ( $p = 0.0104$ ) in this study means that these results can be generalized to the larger population of children with autism. These results are promising such that other behaviors targeted through POVM may also illustrate results that are statistically significant for the autism population.

### **Suggestions for Practitioners**

Educators can incorporate the principles of POVM shown to be effective in this study with individuals, small groups, or in a large group/whole class setting. It may be



more practical and conducive to academic schedules to implement this intervention to a whole group at a dedicated time during the day. Instructional assistants, teachers, and therapists should work together to operationalize definitions of target behaviors (e.g., symbolic play actions, play-associated language utterances) and provide training so that anyone taking data is doing so in a similar manner (interobserver agreement).

The research from this study illustrates potential applications in everyday teaching across a variety of settings, subject areas, and grade levels. The use of POVM may be extended into the classrooms to enhance educational activities, especially in the area of social skills where teachers often struggle to find curriculum that addresses this core issue for students with autism. POVM can be used with populations other than students with autism. Students with intellectual disabilities may benefit from using POVM to teach functional life skills. Those students who have speech and language impairments could benefit from POVM and other types of video models (e.g., basic/scene video modeling, self-video modeling, video priming) to address goals such as articulation of specific error sounds, decreasing stuttering and hesitations in spoken utterances, and improving vocal quality. Further, students who are English Language Learners could benefit from POVM that models and provides repetitions of native speakers' language structure and word pronunciation. POVM has applications for students who are Deaf or hearing impaired as well. For these students, POVM may be used for teaching sign language, lip reading, and learning techniques such as how to pick up cues from the classroom environment. The possibilities of POVM may be extended to teach content from any subject area, making video modeling an essential teaching tool.

Widespread use of POVM such as that used in this study may be problematic for many practitioners due to the skills and knowledge of various technologies. Although video modeling appeared to be effective in teaching these preschool children with autism symbolic play skills and aided in the decrease in frequency of inappropriate play behaviors, some practical issues may affect the ability of teachers to implement it in a classroom setting, including access to video equipment and the time required to prepare the videos. The video used in the present study was prepared in one session with several takes and took 40 minutes to get a version that clearly presented the targeted skills. Then the POVM was transferred from the video camera to a desktop computer and synced with the iPad2™ that was chosen for its large screen, ease of operation, portability, and ubiquity in these students' classrooms. Further, technology training for educators may need to be addressed before the start of an intervention, which can be lengthy depending on the background knowledge of the person who is implementing the technology. Another practical issue that may impact the use of POVM is access to video recording and viewing equipment. Not all children with autism and their teachers or therapists have access to this type of video equipment, so this must be considered when designing and implementing a similar intervention.

In order to address differences in understanding and use of technology in the classroom, educators should be trained on ways in which to make and implement POVM through professional development activities and on-going coaching. Also, participating in professional learning communities that focus on interventions for students with autism

may be another way to enhance and maintain skills needed for developing and implementing POVM with fidelity.

Another important consideration for the educational implementation of the current research study in practice is the availability of funding sources to secure video recording and viewing equipment. Microgrants, or small grants of \$500 or less, have become increasingly available for educators pursuing unique and novel teaching approaches with their students. Local funding sources such as parent--teacher associations (PTAs) and DonorsChoose.org have in recent years focused on microgrants. Training educators on how to locate, write, implement, and monitor a grant, of any size, may help to access the materials necessary for implementing POVM with students with autism.

The current study was implemented in separate play settings; however, there are many other environments in which using POVM may be appropriate. Educators can apply this study by implementing POVM in other settings around the school and community such as on the playground, in the lunch room/cafeteria, at the bus stop, while using public transportation, on a job site, or at home. With the ubiquitous nature of mobile devices that have video capabilities, training parents and caregivers on how to use POVM at home may also increase and expand the use of POVM. Further, the saturation of mobile devices with video capabilities provides increased opportunities for interaction with this type of technology. Using videos and video models as teaching tools have thus become commonplace and a normal, contextualized experience for children and adults alike.

## **Summary**

The present study pursued the main purpose of determining the effects of POVM used for teaching preschool children with autism symbolic play actions, play-associated language utterances, and appropriate play behavior. The research findings indicate that without reinforcement preschoolers with autism engaged in complex play sequences by increasing their variety of symbolic play actions and decreasing the frequency of inappropriate play behaviors at a statistically significant level. Further, participants were able to maintain learned skills for at least 1 week after the POVM was withdrawn and generalize what they learned to other similar play scenarios. At the time of this study, no previous studies could be found that had investigated the areas of symbolic play actions, play-associated language utterances, and play behavior simultaneously using POVM without reinforcement contingencies.

Further, no previous studies could be found that examined the variety of symbolic play actions and the variety of play-associated language utterances. The frequency of these behaviors was addressed in previous studies, but this reinforces the repetitive nature of actions and verbalizations of children with autism. The findings in this study clearly illustrate that children with autism can learn a variety of scripted symbolic play actions through the use of POVM intervention and use them appropriately in a complex play sequence.

No evidence was found for increasing the variety of scripted and spontaneous play-associated language utterances. Similar to the findings in previous research, two participants in this study had evidence of improvement in this area and two did not. The

findings in this study reiterate previous findings that POVM is effective for some participants but not others. The reason for this inconsistency remains unclear.

POVM intervention provides educators with much-needed means to meet the legal requirements of the No Child Left Behavior Act (2001) and the Individuals with Disabilities Education Improvement Act (2004) and ensure students' social, play, language, and behavior goals are addressed. Addressing the core deficits in communication, social interaction, and behavior for students with autism offers an innovative, practical solution for increased inclusion time in both school and the community.

## Appendix A. Candidacy Checklist: Participants with Autism

Student: \_\_\_\_\_ Student's Teacher: \_\_\_\_\_

Completed by: \_\_\_\_\_ Date: \_\_\_\_\_

Age: \_\_\_\_\_ Ethnicity: \_\_\_\_\_

### **Inclusion Criteria for Participation:**

	Yes	No
1. Is the student found eligible under IDEA standards for special education services under the primary disability category of autism?	<input type="checkbox"/>	<input type="checkbox"/>
2. Is the student in preschool?	<input type="checkbox"/>	<input type="checkbox"/>
3. Does the student have social and/or play goals on his/her IEP?	<input type="checkbox"/>	<input type="checkbox"/>
4. Are the students' social and language needs met in a self-contained setting?	<input type="checkbox"/>	<input type="checkbox"/>
5. Has the student demonstrated spontaneous language use?	<input type="checkbox"/>	<input type="checkbox"/>
6. Does the student manipulate toys that are four inches or less in length?	<input type="checkbox"/>	<input type="checkbox"/>
7. Does the student listen to a story for a minimum of five minutes?	<input type="checkbox"/>	<input type="checkbox"/>
8. Does the student follow 1-step directions including one action and one object?	<input type="checkbox"/>	<input type="checkbox"/>
9. Does the student repeat or try to repeat common words immediately after hearing them?	<input type="checkbox"/>	<input type="checkbox"/>
10. Does the student make or try to make social connections (e.g., smiles, joint attention)?	<input type="checkbox"/>	<input type="checkbox"/>
11. Does the student imitate simple movements (e.g., waving goodbye, clapping hands)?	<input type="checkbox"/>	<input type="checkbox"/>

12. Is the student able to see and hear a video clip either aided (e.g., glasses, hearing aid) or unaided on the iPad2™?

☐☐

13. Does the student receive more than 15 hours per week in a special education setting?

☐☐

Notes: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Appendix B. Candidacy Checklist: Play Partner Participant

Student: \_\_\_\_\_ Student's Teacher: \_\_\_\_\_

Completed by: \_\_\_\_\_ Date: \_\_\_\_\_

Age: \_\_\_\_\_ Ethnicity: \_\_\_\_\_

**Inclusion Criteria for Participation:**

Yes No

- |   |                          |                          |
|---|--------------------------|--------------------------|
| 1. Does the student receive special education services?   | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Is the student in preschool at the public elementary school where the research is being conducted? | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Does the student have typically developing speech, language, and play skills?                      | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Does the student follow multi-step directions?   | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Does the student speak English fluently?   | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. Does the student initiate play independently?  | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. Does the student listen to a story for a minimum of five minutes?                                  | <input type="checkbox"/> | <input type="checkbox"/> |

Notes: \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_



Appendix C. Candidacy Checklist: Professional Participant

Professional's Name: \_\_\_\_\_ Completed by: \_\_\_\_\_

Professional Role: \_\_\_\_\_ Date: \_\_\_\_\_

**Inclusion Criteria for Participation:**

Yes      No

- |  |                          |                          |
|--|--------------------------|--------------------------|
| 1. Is the professional either a teacher (general or special education), instructional assistant, or therapist who works with the participant with autism on a regular basis (have time devoted in their work schedule to instruct this student)? | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. Is the professional working in the preschool at the public elementary school where the research is being conducted?   | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Does the professional literate in English?  | <input type="checkbox"/> | <input type="checkbox"/> |

Notes: \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

## Appendix D. HSRB Informed Consent Forms



### Office of Research Subject Protections

Research Hall  
4400 University Drive, MS 6D5, Fairfax, Virginia 22030  
Phone: 703-993-4121; Fax: 703-993-9590

TO: Anna Evmenova, College of Education and Human Development

FROM: Keith R. Bushey *KRB*  
Chief of Staff, Office of Research

PROTOCOL NO.: 7722 Research Category: Class Project (G)

PROPOSAL NO.: N/A

TITLE: The Effects of Point-of-View Video Modeling on Play and Language Skills in  
Preschool Children with Autism

DATE: December 20, 2011

Cc: Lauren Bonnet

On December 20, 2011, the George Mason University Human Subjects Review Board (GMU HSRB) reviewed and approved the amendment dated December 9, 2011 for the above-cited protocol following expedited review procedures. A copy of the revised approved consent document is attached. Please use this copy with the GMU HSRB stamp of approval.

You may proceed with data collection. **Please note that any further modifications to your research must be submitted to the Office of Research Subject Protections for review and approval prior to implementation.** Any adverse events or unanticipated problems involving risks to subjects including problems involving confidentiality of the data identifying the participants must be reported to the GMU Office of Research Subject Protections and reviewed by the GMU HSRB.

The anniversary date of this study is October 20, 2012. You may not collect data beyond that date without GMU HSRB approval. A continuing review form must be completed and returned to the Office of Research Subject Protections prior to the anniversary date, or upon completion of the project. A copy of the continuing review form is attached. In addition prior to that date, the GMU Office of Research Subject Protections will send a letter to you regarding continuing review procedures.

If you have any questions, please do not hesitate to contact me at 703-993-3088.

The letter of support from the school division has been deleted from this document in order to protect confidentiality.

**Parent Permission for Participating in Research Study: Informed Consent**

Project Title: **The Effects of Point-of-View Video Modeling on Play and Language Skills in Preschool Children with Autism**

**RESEARCH PROCEDURES**

We want to determine if your child will benefit from using videos to learn play and language skills. Play is fundamental to a child's development. However, young children with autism often struggle or do not develop play skills on their own. During the Spring 2011 semester (for 4-5 weeks), your child and a peer will view a 2-4 minute video clip to teach him/her play and language. After watching the video, your child and a preschool-aged peer will be asked to play with the toys seen in the video. We will make sure that this activity does not interfere with your child's participation in his/her regular preschool activities. The whole activity will take no more than 10-15 minutes daily. After 2-3 weeks, there will be a 5-10 minute follow up play session. Sessions will be videotaped so the researcher can take data on the play session and confirm the research procedures were followed.

**RISKS**

There are no predicted risks for your child to participate in this research study.

**BENEFITS**

There are no direct benefits to you or your child from this study. This study may teach us more about the best way of using video with students with autism.

**CONFIDENTIALITY**

The data in this study will be confidential. All data will be coded so that nobody, including individual students or their families, can be identified. We will use codes when sharing information from this study with others. Video recordings will be locked up or in a password protected file while the study is going on and will be destroyed when the study is over.

**PARTICIPATION**

Your child's participation in this project is voluntary. You may withdraw your child from the study at any time and for any reason. There is no penalty for not participating or withdrawing. There are no costs to you or any other part.

**CONTACT**

Lauren Kravetz Bonnet, a PhD candidate from George Mason University, is conducting this research. If you have any questions you can call her at 703-228-2404, or her supervisor, Dr. Pam Baker, at 703-993-1787. You may also contact the George Mason University Office of Research Subject Protections at 703-993-4121 if you have questions about being a part of this research.

This research has been reviewed according to George Mason University procedures governing your participation in this research. You received two copies of this consent form. If you choose to have your child participate, please sign below. Please keep one copy for your records and return the other.

I have read this form and agree to participate in the study.

\_\_\_\_\_  
(Student's Name)

\_\_\_\_\_  
(Parent Signature)

Date \_\_\_\_\_

Approval for the use  
of this document  
EXPIRES

GCT 2 0 2012

Protocol # 7722  
George Mason University

**Partner Parent Permission for Participating in Research Study: Informed Consent**

**Project Title: The Effects of Point-of-View Video Modeling on Play and Language Skills in Preschool Children with Autism**

**RESEARCH PROCEDURES**

We want to determine if students with autism will benefit from using videos to learn play and language skills. Play is fundamental to a child's development. However, young children with autism often struggle or do not develop play skills on their own. During the Spring 2011 semester, (for 4-5 weeks), your child will be asked to view a video clip together with a student with autism. After watching the video, a student with autism and/or your child will be asked to play with the toys seen in the video. The activity will take place a special education classroom. Your child will be watching the video and interacting with a student with autism for about 10-15 minutes daily. After 2-3 weeks, there will be a 5-10 minute follow up play session. Sessions will be videotaped so the researcher can take data on the play session and confirm the research procedures were followed. During some sessions another observer will be present to ensure that the researcher is doing everything the right way.

**RISKS**

There are no predicted risks for your child to participate in this research study.

**BENEFITS**

There are not benefits to you or your child from this study. This study may teach us more about the best way of using video with students with autism.

**CONFIDENTIALITY**

The data in this study will be confidential. All data will be coded so that nobody, including students or their families, can be identified. We will use codes when sharing information from this study with others. Video recordings will be locked up or in a password protected file while the study is going on and will be destroyed when the study is over.

**PARTICIPATION**

Your child's participation in this project is voluntary. You may withdraw your child from the study at any time and for any reason. There is no penalty for not participating or withdrawing. There are no costs to you or any other party.

**CONTACT**

Lauren Kravetz Bonnet, a PhD candidate from George Mason University, is conducting this research. If you have any questions you can call her at 703-228-2404 or her supervisor, Dr. Pam Baker, at 703-993-1787. You may also contact the George Mason University Office of Research Subject Protections at 703-993-4121 if you have questions about being a part of this research.

This research has been reviewed according to George Mason University procedures governing your participation in this research. You received two copies of this consent form. If you choose to have your child participate, please sign below. Please keep one copy for your records and return the other.

I have read this form and agree to participate in the study.

\_\_\_\_\_  
(Student's Name)

\_\_\_\_\_  
(Parent Signature)

Date \_\_\_\_\_

Approval for the use  
of this document  
EXPIRES

OCT 20 2012

Protocol # 7732  
George Mason University

**Professionals Permission for Participating in Research Study: Informed Consent**

**Project Title: The Effects of Point-of-View Video Modeling on Play and Language Skills in Preschool Children with Autism**

**RESEARCH PROCEDURES**

We want to determine how children benefit from using videos to learn play and language skills. As you know, one or more of the students with whom you work has been involved in a research project to examine the effects of video modeling on their play and language skills. We would like to know your opinion of the video modeling intervention and the effects you have seen on the student's development in the areas of play and language. You will be asked to complete a brief, 1-page survey about your opinion of the intervention. The survey should take less than 5 minutes to complete.

**RISKS**

There are no predicted risks for you to participate in this research study.

**BENEFITS**

There are no direct benefits to you from this study. This study may teach us more about the best way of using video with students with autism.

**CONFIDENTIALITY**

The data in this study will be confidential. You will complete the questionnaire anonymously. The data from the paper questionnaire will be converted to a computer file that is password protected and then the paper questionnaires will be destroyed. After the study is over the password protected computer files will be deleted.

**PARTICIPATION**

Your participation in this project is voluntary. You may withdraw from the study at any time and for any reason. There is no penalty for not participating or withdrawing. There are no costs to you or any other party.

**CONTACT**

Lauren Kravetz Bonnet, a PhD candidate from George Mason University, is conducting this research. If you have any questions you can call her at 703-228-2404, or her supervisor, Dr. Pam Baker, at 703-993-1787. You may also contact the George Mason University Office of Research Subject Protections at 703-993-4121 if you have questions about being a part of this research.

This research has been reviewed according to George Mason University procedures governing your participation in this research. You received two copies of this consent form. If you choose to have your child participate, please sign below. Please keep one copy for your records and return the other.

I have read this form and agree to participate in the study.

\_\_\_\_\_  
(Signature)

Date \_\_\_\_\_

Approval for the use  
of this document  
EXPIRES

OCT 20 2012

Protocol # 7722  
George Mason University

## Introduction Letter to Parents of Children with Autism

Dear Parents/Guardian,

My name is Lauren Kravetz Bonnet and I am a speech-language pathologist in XXXX Public Schools. I am conducting a research study on increasing language and play actions for preschoolers with autism through video modeling. I invite your child to participate in this study.

If you agree for your child to participate, he/she will be asked to play with a peer without autism. Sometimes he/she will get a chance to watch a video about how to play. More information is included in the attached consent form.

Please let me know if you have any questions.

Sincerely,

Lauren Kravetz Bonnet, M.A., CCC-SLP  
Speech-Language Pathologist

## Introduction Letter to Parents of Play Partners

Dear Parents/Guardian,

My name is Lauren Kravetz Bonnet and I am a speech-language pathologist in XXXX Public Schools. I am conducting a research study on increasing language and play actions for preschoolers with autism through video modeling. I invite your child to participate in this study.

If you agree for your child to participate, he/she will be asked to play with a peer with autism. Sometimes he/she will get a chance to watch a video about how to play. More information is included in the attached consent form.

Please let me know if you have any questions.

Sincerely,

Lauren Kravetz Bonnet, M.A., CCC-SLP  
Speech-Language Pathologist



Appendix E. Participant Materials Used for Baseline, Intervention, and Maintenance



Front View of Play Set (Car Garage) Used in Baseline, Intervention, and Maintenance





Back View of Play Set (Car Garage) Used in Baseline, Intervention, and Maintenance



## Appendix F. Participant Materials in Generalization





## Play Set Used in Generalization



## Appendix G. Point-of-View Video Model Script and Researcher's Script

### Point-of-View Video Model Script

Male Actor (M): Let's play car garage.

Female Actor (F): I want red car.

M: I want yellow car.

F: Vroom. Watch me go up.

M: Wait for the elevator.

F: Look! I go up.

M: Here I come. Weeee.

F: Me first.

M: My turn. Go down.

F: Get more gas.

M: Put the hose in.

F: Fill the car up.

M: It is full.

F: All done.

M: Ready to go.

F: Oh no! Flat tire.

M: I can help you.

F: Get the tow truck.

M: Tow the car.

F: Put the hook under.

M: Take it away.

F: Can you fix it?

M: Yes. I'm a mechanic.

F: It's broken.

M: I can fix it.

F: Thank you. I will wait.

M: Wait 10 minutes.

F: Are you done yet?

M: All done. Pay me.

F: Here is the money.

M: Have fun driving.

F: Bye. Ready, set, go.

## Researcher's Script

### **Baseline**

To start session: It's time to play with cars.

To end session: It's time to cleanup. [Sing clean up song] "Cleanup, cleanup, everybody everywhere. Cleanup, cleanup, everybody do your share."

### **Treatment**

To start session: It's time for a movie. [Then start video model on iPad2™.]

After the video model to start the play portion of the session: Let's get \_\_\_\_ (play partner's name). [Go to get play partner.]

Do and say the things you saw in the movie.

It's time to play with cars.

To end the session: It's time to cleanup. [Sing cleanup song] "Cleanup, cleanup, everybody everywhere. Cleanup, cleanup, everybody do your share."

### **Generalization**

To start session: It's time to play with cars.

To end session: It's time to cleanup. [Sing cleanup song] "Cleanup, cleanup, everybody everywhere. Cleanup, cleanup, everybody do your share."

### **Maintenance**

To start session: It's time to play with cars.

To end session: It's time to cleanup. [Sing clean up song] "Cleanup, cleanup, everybody everywhere. Cleanup, cleanup, everybody do your share."

# Appendix H. Scripted Symbolic Play Actions Data Collection Sheet

**Student** \_\_\_\_\_  
**Partner** \_\_\_\_\_  
**Date** \_\_\_\_\_

**Rater Initials** \_\_\_\_\_  
**Session Type** \_\_\_\_\_  
**Time** \_\_\_\_\_ **am/pm**

Scripted Symbolic Play Actions	Completed	Did not Complete
Puts person in car.		
Takes person out of car.		
Drives car to elevator.		
Moves elevator with car in it up		
Moves elevator down		
Parks car on top of ramp.		
Pushes car down ramp.		
Drives to gas tank.		
Takes gas hose off gas station tank.		
Puts gas hose in tank of car.		
Holds hose in car for 2 or more seconds while filling up.		
Puts gas hose back in gas station tank.		
Walks to tow truck.		
Puts person in tow truck.		
Takes person out of tow truck.		
Drives tow truck to broken car.		
Puts tow hook under car.		
Tows car to garage.		



Takes car off hook.		
Parks tow truck next to garage.		
Turns people so they look at each other when talking.		
Mechanic walks over and looks at tire.		
Person waits for mechanic to be finished.		
Gives mechanic money.		
Drives away.		
<b>TOTALS</b>		

Anecdotal Notes:

---

---

---

---

---

# Appendix I. Scripted Play-Associated Language Utterances Data Collection Sheet

Student \_\_\_\_\_  
 Partner \_\_\_\_\_  
 Date \_\_\_\_\_

Rater Initials \_\_\_\_\_  
 Session Type \_\_\_\_\_  
 Time \_\_\_\_\_ am/pm

Scripted Language	Snds	Word Approx	Word	Phrase	Sent	Transcription of Scripted Play-Associated Language Utterances
Let's play car garage.						
I want red car.						
I want yellow car.						
Vroom.						
Watch me go up.						
Wait for the elevator.						
Look I go up.						
Here I come.						
Weeee.						
Me first.						
My turn.						
Go down.						
Get more gas.						
Put the hose in.						
Fill the car up.						
It is full.						
All done.						
Ready to go.						
Oh no!						

Flat tire.						
I can help you.						
Get the tow truck.						
Tow the car.						
Put the hook under.						
Take it away.						
Can you fix it?						
Yes.						
I'm a mechanic.						
It's broken.						
I can fix it.						
Thank you.						
I will wait.						
Wait ten minutes.						
Are you done yet?						
All done.						
Pay me.						
Here is the money.						
Have fun driving.						
Bye.						
Ready, set, go.						
<b>TOTALS</b>						

Anecdotal Notes:

---



---

Appendix J. Spontaneous Symbolic Play Actions Data Collection Sheet

Student \_\_\_\_\_  
Partner \_\_\_\_\_  
Date \_\_\_\_\_

Rater Initials \_\_\_\_\_  
Session Type \_\_\_\_\_  
Time \_\_\_\_\_ am/pm

Line Number	Description of Spontaneous Symbolic Play Actions
1	
2	
3	
4	
5	
6	
7	
8	
9	

10	
<b>TOTALS</b>	

Anecdotal Notes:

---

---

---

---

---

Appendix K. Spontaneous Play-Associated Language Utterances Data Collection Sheet

Student \_\_\_\_\_  
Partner \_\_\_\_\_  
Date \_\_\_\_\_

Rater Initials \_\_\_\_\_  
Session Type \_\_\_\_\_  
Time \_\_\_\_\_ am/pm

Transcription of Spontaneous Play-associated Language Utterance	Sounds	Word Approx	Word	Phrase	Sent	Notes about the symbolic play action that the Language was associated with


Anecdotal Notes:

---

---

---

---

---

## Appendix L. Inappropriate Play Behaviors Data Collection Sheet

Tracked by 15-second partial intervals

**Student** \_\_\_\_\_

**Rater** \_\_\_\_\_

**Session** \_\_\_\_\_

**Play Partner** \_\_\_\_\_

Interval	Inappropriate Action
1	
2	
3	
4	
5	
6	
7	
8	
9	
10	
11	
12	
13	
14	
15	
16	
17	
18	
19	
20	
21	
22	
23	
24	
25	
26	



27	
28	
TOTAL	

Legend

✓ = Inappropriate play behavior demonstrated at some point during interval

Blank = No inappropriate play behavior demonstrated at all during interval

# Appendix M. Randomly Selected Dyad Matches by Session

Session	Participant With Autism	Play Partner	Session Type
1	Leo	1	Baseline
1	Sarah	4	Baseline
1	Diego	5	Baseline
1	Marcos	6	Baseline
2	Leo	1	Baseline
2	Sarah	4	Baseline
2	Diego	5	Baseline
2	Marcos	6	Baseline
3	Leo	2	Baseline
3	Sarah	3	Baseline
3	Diego	6	Baseline
3	Marcos	5	Baseline
4	Leo	1	Baseline
4	Sarah	3	Baseline
4	Diego	5	Baseline
4	Marcos	6	Baseline
5	Leo	2	Baseline
5	Sarah	3	Baseline
5	Diego	5	Baseline
5	Marcos	6	Baseline
6	Leo	1	Baseline
6	Sarah	4	Baseline
6	Diego	5	Baseline
6	Marcos	6	Baseline
7	Leo	2	Baseline
7	Sarah	3	Baseline
7	Diego	6	Baseline
7	Marcos	5	Treatment
8	Leo	2	Baseline
8	Sarah	3	Treatment
8	Diego	5	Baseline
8	Marcos	5	Treatment
9	Leo	1	Baseline

Session	Participant With Autism	Play Partner	Session Type
9	Sarah	4	Treatment
9	Diego	6	Baseline
9	Marcos	6	Treatment
10	Leo	1	Baseline
10	Sarah	3	Treatment
10	Diego	5	Baseline
10	Marcos	6	Treatment
11	Leo	2	Baseline
11	Sarah	4	Treatment
11	Diego	6	Treatment
11	Marcos	5	Treatment
12	Leo	1	Baseline
12	Sarah	4	Treatment
12g	Sarah	4	Generalization
12	Diego	5	Treatment
12	Marcos	6	Treatment
12g	Marcos	6	Generalization
13	Leo	2	Treatment
13	Sarah	4	Treatment
13	Diego	6	Treatment
13	Marcos	5	Treatment
14	Leo	1	Baseline
14	Sarah	4	Treatment
14	Diego	5	Treatment
14g	Diego	5	Generalization
14	Marcos	6	Treatment
15	Leo	2	Treatment
15	Sarah	4	Treatment
15g	Sarah	3	Generalization
15	Diego	6	Treatment
15	Marcos	5	Treatment
15g	Marcos	6	Generalization
16	Leo	1	Treatment
16	Sarah	4	Treatment
16	Diego	6	Treatment
16	Marcos	6	Treatment
17	Leo	1	Treatment
17	Sarah	4	Treatment
17	Diego	6	Treatment
17	Marcos	5	Treatment
18	Leo	2	Maintenance

Session	Participant With Autism	Play Partner	Session Type
18g	Leo	2	Generalization
18	Sarah	4	Maintenance
18	Diego	5	Maintenance
18	Marcos	6	Maintenance
19	Leo	2	Maintenance
19g	Leo	1	Generalization
19	Sarah	3	Maintenance
19	Diego	5	Maintenance
19g	Diego	5	Generalization
19	Marcos	5	Maintenance

*Note.* Marcos and Diego were colocated at the same school and had the same two play partner participants.

## Appendix N. Procedural Reliability Checklist: Baseline, Generalization, and Maintenance

Observer: \_\_\_\_\_ Condition: \_\_\_\_\_  
 Student: \_\_\_\_\_ Date: \_\_\_\_\_  
 Play Partner: \_\_\_\_\_

Note: Mark each step completed or not completed by the researcher. The procedural reliability will be calculated by dividing the number of steps completed by the number of steps planned.

<u>Baseline and Maintenance Procedures</u>	Yes	No
1. Ensures that there is one participant with autism and one play partner participant in each dyad.	<input type="checkbox"/>	<input type="checkbox"/>
2. Ensures the four video cameras are on and recording the session from start to finish.	<input type="checkbox"/>	<input type="checkbox"/>
3. Provides task directions according to the intervention script.	<input type="checkbox"/>	<input type="checkbox"/>
4. Ensures that both participants have a set of identical materials.	<input type="checkbox"/>	<input type="checkbox"/>
5. Sets the timer for seven minutes.	<input type="checkbox"/>	<input type="checkbox"/>
6. Records the start time on the data collection sheet.	<input type="checkbox"/>	<input type="checkbox"/>
7. Places the play set in front of students.	<input type="checkbox"/>	<input type="checkbox"/>
8. Ensures that the participant with autism has 10 seconds to initiate play sequence before signaling the play partner participant to initiate play.	<input type="checkbox"/>	<input type="checkbox"/>
9. Ends play session after 7 minutes.	<input type="checkbox"/>	<input type="checkbox"/>
10. Sings the "Cleanup Song" only one time during cleanup time.	<input type="checkbox"/>	<input type="checkbox"/>

Notes: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## Appendix O. Procedural Reliability Checklist: Intervention

Observer: \_\_\_\_\_ Condition: \_\_\_\_\_  
 Student: \_\_\_\_\_ Date: \_\_\_\_\_  
 Play Partner: \_\_\_\_\_

Note: Mark each step completed or not completed by the researcher. The procedural reliability will be calculated by dividing the number of steps completed by the number of steps planned.

<u>Treatment Procedures</u>	Yes	No
1. Ensures that there is one participant with autism and one play partner participant in each dyad.	<input type="checkbox"/>	<input type="checkbox"/>
2. Ensures the four video cameras are on and recording the session from start to finish.	<input type="checkbox"/>	<input type="checkbox"/>
3. Provides task directions according to the intervention script.	<input type="checkbox"/>	<input type="checkbox"/>
4. Ensures that participant watches the video model on the iPad2™.	<input type="checkbox"/>	<input type="checkbox"/>
5. Ensures that the video model plays correctly on the iPad2™.	<input type="checkbox"/>	<input type="checkbox"/>
6. Ensures that both participants have a set of identical materials.	<input type="checkbox"/>	<input type="checkbox"/>
7. Sets the timer for seven minutes.	<input type="checkbox"/>	<input type="checkbox"/>
8. Records the start time on the data collection sheet.	<input type="checkbox"/>	<input type="checkbox"/>
9. Places the play set in front of students.	<input type="checkbox"/>	<input type="checkbox"/>
10. Ensures that the participant with autism has 10 seconds to initiate play sequence before signaling the play partner participant to initiate play.	<input type="checkbox"/>	<input type="checkbox"/>
11. Ends play session after 7 minutes.	<input type="checkbox"/>	<input type="checkbox"/>

12. Sings the “Cleanup Song” only one time during clean up time.

☐☐

Notes: \_\_\_\_\_



## Appendix P. Professionals Social Validity Questionnaire

Professional Position (circle one):    Teacher    Instructional Assistant    Therapist

Please indicate the extent to which you agree or disagree with the following statements regarding video modeling by circling the number that most closely represents your opinion.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
5	4	3	2	1

1. I believe that video modeling can fit within the curriculum that I am already using in my classroom.

5	4	3	2	1
---	---	---	---	---

2. I believe there is a noticeable difference in the play skills, including language, my student with autism demonstrates since starting in this study.

5	4	3	2	1
---	---	---	---	---

3. I believe video modeling can help students with autism reach their goals to learn new play actions.

5	4	3	2	1
---	---	---	---	---

4. I believe video modeling can help students with autism reach their goals to learn new language skills.

5	4	3	2	1
---	---	---	---	---

5. I believe video modeling could help students with autism increase the time they are included in the general education curriculum.

5	4	3	2	1
---	---	---	---	---


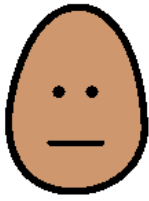

Please write any additional comments below and/or on the back of this sheet.

## Appendix Q. Student Participant Social Validity Questionnaire


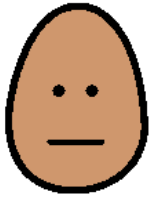

Participant Type (check one): Participant with autism\_\_\_ Play Partner Participant \_\_\_

The researcher will circle the picture corresponding to the one the student pointed to when she verbally asked the following questions.


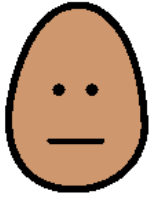

Question 1: Show me how you liked watching the video.

like 	okay 	don't like 
--	--	---


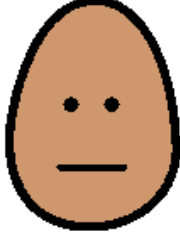

Question 2: Show me how you liked playing with the toys.

like 	okay 	don't like 
---	---	--

Question 3: Show me how you liked playing with a friend.

like 	okay 	don't like 
---	---	--

Student Participant Social Validity Questionnaire Visual Rating Scale

<p>like</p> 	<p>okay</p> 	<p>don't like</p> 
---	---	---

## REFERENCES

## REFERENCES

- Alberto, P. A., & Troutman, A. C. (2009). *Applied behavior analysis for teachers* (8<sup>th</sup> ed.). Upper Saddle River, NJ: Pearson Education.
- Alberto, P. A., Cihak, D. F., & Gama, R. I. (2005). Use of static picture prompts versus video modeling during simulation instruction. *Research in Developmental Disabilities, 26*, 327-339. doi:10.1016/j.ridd.2004.11.002
- American Psychiatric Association. (1987). *Diagnostic and statistical manual of mental disorders* (3rd ed., Rev.). Washington, DC: Author.
- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.
- American Psychiatric Association (2000). *Diagnostic and statistical manual of mental disorders* (4<sup>th</sup> ed., text Rev.). Washington, DC: Author.
- Apple, A. L., Billingsley, F., & Schwartz, I. S. (2005). Effects of video modeling alone and with self-management on compliment-giving behaviors of children with high-functioning ASD. *Journal of Positive Behavior Interventions, 7*(1), 33-46. doi:10.1177/10983007050070010401
- Baer, D. M. (1977). Perhaps it would be better not to know everything. *Journal of Applied Behavior Analysis, 10*, 167-172.
- Baer, D., Wolf, M., & Risley, R. (1968). Some current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis, 1*, 91-97. doi:10.1901/jaba.1968.1-91
- Bandura, A. (1965). Influences of models' reinforcement contingencies on the acquisition of imitative responses. *Journal of Personality and Social Psychology, 1*(6), 589-595. doi:10.1037/h0022070
- Bandura, A. (1977). *Social learning theory*. Englewood Cliffs, NJ: Prentice Hall.
- Bandura, A. (1993). Perceived self-efficacy in cognitive development and functioning. *Educational Psychologist, 28*, 117-148. doi:10.1207/s15326985ep2802\_3

- Bandura, A., & Barab, P. G. (1971). Conditions governing nonreinforced imitation. *Developmental Psychology*, 5, 244-255.
- Barlow, D. H., & Hersen, M. (1984). *Single case experimental designs: Strategies for studying behavior change* (2<sup>nd</sup> ed.). New York, NY: Pergamon Press.
- Baron-Cohen, S. (1987). Autism and symbolic play. *British Journal of Developmental Psychology*, 5, 139-148.
- Barton, E. E. (2010). Development of a taxonomy of pretend play for children with disabilities. *Infants and Young Children*, 23(4), 247-261.  
doi:10.1097/IYC.0b013e3181f22072
- Barton, E. E. (2012). *Rationale, goals, and strategies for promoting play with pretense as a functional goal for young children with autism*. Paper presented at the annual meeting of the Council for Exceptional Children, Denver, CO.
- Barton, E. E., & Pavilanis, R. (2012). Teaching pretend play to young children with autism. *Young Exceptional Children*, 15(1), 5-17.  
doi:10.1177/1096250611424106
- Barton, E. E., & Wolery, M. (2008). Teaching pretend play to children with disabilities: A review of the literature. *Topics in Early Childhood Special Education*, 28, 109-125. doi:10.1177/0271121408318799
- Barton, E. E., & Wolery, M. (2010). Training teachers to promote pretend play in young children with disabilities. *Exceptional Children*, 77(1), 85-106.
- Bellini, S., & Akullian, J. (2007). A meta-analysis of video-modeling and video self-modeling interventions for children and adolescents with autism spectrum disorders. *Exceptional Children*, 73, 264-287.
- Boutot, E. A., Guenther, T., & Crozier, S. (2005). Let's play: Teaching play skills to young children with autism. *Education and Training in Developmental Disabilities*, 40, 285-292.
- Bronson, M. B. (1995). *The right stuff for children birth to 8. Selecting play materials to support development*. Washington, DC: National Association for the Education of Young Children.
- Brown, R. (1973). *A first language: The early stages*. London, UK: George Allen & Unwin.

- Brown, R., & Bellugi, U. (1964). Three processes in the child's acquisition of syntax. *Harvard Education Review*, 34, 133-151.
- Burke, E. B. (2009). Scene video modeling and point of view video modeling: A direct comparison of procedures and an investigation of possible video modeling pre-requisite skills. *Counseling Psychology Master's Theses*. Paper 6. Northeastern University.
- Buggey, T., Toombs, K., Gardener, P., & Cervetti, M. (1999). Training responding behaviors in students with autism: Using videotaped self-modeling. *Journal of Positive Behavior Interventions*, 1(4), 205-214.
- Buyse, V., Wesley, P., Keyes, L., & Bailey, D. B. (1996). Assessing the comfort zone of child care teachers in serving young children with disabilities. *Journal of Early Intervention*, 20(3), 189-203.
- Caplan, F., & Caplan, T. (1974). *The power of play*. New York, NY: Anchor Press/Doubleday.
- Centers for Disease Control and Prevention (2012). *Press release: CDC estimates 1 in 88 children in the United States has been identified as having an autism spectrum disorders*. Retrieved from [http://www.cdc.gov/media/releases/2012/p0329\\_autism\\_disorder.html](http://www.cdc.gov/media/releases/2012/p0329_autism_disorder.html)
- Charlop, M. H., & Milstein, J. P. (1989). Teaching autistic children conversational speech using video modeling. *Journal of Applied Behavior Analysis*, 22(3), 275-285. doi:10.1901/jaba.1989.22-275
- Charlop-Christy, M. H., Le, L., & Freeman, K. A. (2000). A comparison of video modeling with in vivo modeling for teaching children with autism. *Journal of Autism and Developmental Disorders*, 30, 537-552. doi:10.1023/A:1005635326276
- Charlop-Christy, M. H., & Daneshvar, S. (2003). Using video modeling to teach perspective taking to children with autism. *Journal of Positive Behavior Interventions*, 5, 12-21. doi:10.1177/10983007030050010101
- Charman, T., & Baron-Cohen, S. (1997). Brief report: Prompted pretend play in autism. *Journal of Autism and Developmental Disorders*, 27, 325-332. doi:10.1023/A:1025806616149
- Cooper, J. O., Heron, T. E., & Heward, W. L. (1987). *Applied behavior analysis*. Columbus, OH: Merrill.

- Copple, C., & Bredekamp, S. (2009). *Developmentally appropriate practice in early childhood programs: Serving children from birth through age 8*. Washington, DC: National Association for the Education of Young Children (NAEYC).
- Corbett, B. A., & Abdullah, M. (2005). Video modeling: Why does it work for children with autism? *Journal of Early and Intensive Behavior Interventions*, 2(1), 2-6.
- Cotter, C. (2010). *Evaluating the effects of camera perspective in video modeling for children with autism: Point of view versus scene modeling* (Doctoral dissertation). Retrieved from ProQuest Dissertation and Theses. (Accession Order No. AAT 3470401)
- Cox, M. V. (1978). The development of perspective-taking ability in children. *International Journal of Behavioral Development*, 1, 247-254.
- Craig-Unkefer, L. A., & Kaiser, A. P. (2002). Improving the social communication skills of at-risk preschool children in a play context. *Topics in Early Childhood Special Education*, 22, 3-13. doi:10.1177/027112140202200101
- Craig-Unkefer, L. A., & Kaiser, A. P. (2003). Increasing peer-directed social-communication skills of children enrolled in Head Start. *Journal of Early Intervention*, 25, 229-247. doi:10.1177/105381510302500401
- D'Ateno, P., Mangiapanello, K., & Taylor, B. (2003). Using video modeling to teach complex play sequences to a preschooler with autism. *Journal of Positive Behavior Interventions*, 5(1), 5-11. doi:10.1177/10983007030050010801
- Delano, M. E. (2007). Use of strategy instruction to improve the story writing skills of a students with Asperger syndrome. *Focus on Autism and Other Developmental Disabilities*, 22(4), 252-258. doi:10.1177/10883576070220040701
- Denenberg, V. H. (1982). Comparative psychology and single-subject research. In D. W. Fiske, A. E. Kazdin, & A. H. Tuma (Eds.), *New directions for methodology of social and behavioral sciences: Single-case research designs* (Vol. 13, pp. 9-31). San Francisco, CA: Jossey-Bass.
- DiCarlo, C. R., & Reid, D. H. (2004). Increasing pretend toy play of toddlers with disabilities in an inclusive setting. *Journal of Applied Behavior Analysis*, 37, 197-207. doi:10.1901/jaba.2004.37-197
- Eason, L. J., White, M. J., & Newsom, C. D. (1982). Generalized reduction of self-stimulatory behavior: An effect of teaching appropriate play to autistic children. *Analysis and Intervention in Developmental Disabilities*, 2, 157-169. doi:10.1016/0270-4684(82)90016-7



- Egel, A. L., Richman, G. S., & Koegel, R. L. (1981). Normal peer models and autistic children's learning. *Journal of Applied Behavior Analysis*, 14(1), 3-12.
- Elliott, C. D. (1983). *Differential abilities scale*. San Antonio, TX: Psychological Corp.
- Essex, C. (2006). Digital video in the K-12 classroom: A new tool for learning. In T. W. Hin, & R. Subramaniam (Eds.), *Handbook of research on literacy in technology at the K-12 level* (pp. 247-270). Hershey, PA: Idea Group References/IGI Global. doi:10.4018/978-1-59140-494-1.ch014
- Fekonja, U., Umek, L. M., & Kranjc, S. (2005). Free play and other daily preschool activities as a context for children's language development. *Studia Psychologica*, 47, 103-118.
- Fenson, L., & Ramsay, D. S. (1981). Effects of modeling action sequences on the play of twelve-, fifteen-, and nineteen-month-old children. *Child Development*, 52(3), 1028-1036.
- Franklin, R. D., Allison, D. B., & Gorman, B. S. (1996). *Design and analysis of single-case research*. Mahwah, NJ: Lawrence Erlbaum Associates.
- Franzone, E., & Collet-Klingenberg, L. (2008). *Overview of video modeling*. Madison, WI: The National Professional Development Center on Autism Spectrum Disorders, Waisman Center, University of Wisconsin.
- Ganz, J. B., & Flores, M. M. (2010). Supporting the play of preschoolers with autism spectrum disorders: Implementation of visual scripts. *Young Exceptional Children*, 13(2), 58-70. doi:10.1177/1096250609351795
- Garnezy, N. (1982). The case for the single case in research. In D. W. Fiske, A. E. Kazdin, & A. H. Tuma (Eds.), *New directions for methodology of social and behavioral sciences: Single-case research design* (Vol. 13, pp. 5-17). San Francisco, CA: Jossey-Bass.
- Gast, D. L. (2010). *Single subject research methodology in behavioral sciences*. New York, NY: Routledge.
- Gena, A., Couloura, S., & Kymissis, E. (2005). Modifying the affective behavior of preschoolers with autism using in-vivo or video modeling and reinforcement contingencies. *Journal of Autism and Developmental Disorders*, 5, 545-556. doi:10.1007/s10803-005-0014-9
- Ginsburg, K. (2007). The importance of play in promoting healthy child development and maintaining strong parent-child bonds. *Pediatrics*, 119(1), 182-191.

- Goldsmith, T. R., & LeBlanc, L. A. (2004). Use of technology in interventions for children with autism. *Journal of Early and Intensive Behavior Intervention, 1*(2), 166-178.
- Goldstein, H., & Cisar, C. L. (1992). Promoting interaction during sociodramatic play: Teaching scripts to typical preschoolers and classmates with disabilities. *Journal of Applied Behavior Analysis, 25*, 265-280. doi:10.1901/jaba.1992.25-265
- Hay, I., Elias, G., Fielding-Barnsley, R., Homel, R., & Freiburg, K. (2007). Language delays, reading delays, and learning difficulties: Interactive elements requiring multidimensional programming. *Journal of Learning Disabilities, 40*, 400-409. doi:10.1177/00222194070400050301
- Herrera, G., Alcantud, F., Jordan, R., Blanquer, A., Labarjo, G., & DePablo, C. (2008). Development of symbolic play through the use of virtual reality tools in children with autistic spectrum disorders: Two case studies. *Autism, 12*(2), 143-157. doi:10.1177/136236107086657
- Hersen, M., & Barlow, D. H. (1976). *Single-case experimental designs: Strategies for studying behavior change*. New York, NY: Pergamon.
- Hine, J. F., & Wolery, M. (2006). Using point of view video modeling to teach play to preschoolers with autism. *Topics in Early Childhood Special Education, 26*, 83-93. doi:10.1177/02711214060260020301
- Hobson, R. P., Lee, A., & Hobson, J. A. (2009). Qualities of symbolic play among children with autism: A social-developmental perspective. *Journal of Autism and Developmental Disorders, 39*, 12-22. doi:10.1007/s10803-008-0589-z
- Horner, R. H., Carr, E. G., Halle, J., McGee, G., Odom, S., & Wolery, M. (2005). The use of single-subject research to identify evidence-based practice in special education. *Exceptional Children, 71*(2), 165-179.
- Individuals With Disabilities Education Act of 2004, Pub. L. No. 108-446. (2004). Retrieved from <http://idea.ed.gov/explore/view/p/%2Croot%2Cstatute%2C>
- Jahr, E., Eldevik, S., & Eikeseth, S. (2000). Teaching children with autism to initiate and sustain cooperative play. *Research in Developmental Disabilities, 21*(2), 151-169. doi:10.1016/S0891-4222(00)00031-7
- Jamison, K. R., Forston, L. D., & Stanton-Chapman, T. L. (2012). Encouraging social skills development through play in early childhood special education classrooms. *Young Exceptional Children, 15*(2), 3-19. doi:10.1177/1096250611435422

- Jarrold, C., Boucher, J., & Smith, P. (1993). Symbolic play in autism: A review. *Journal of Autism and Developmental Disorders*, 23, 281-307. doi:10.1007/BF01046221
- Jarrold, C., Boucher, J., & Smith, P. (1996). Generativity deficits in pretend play in autism. *Journal of Developmental Psychology*, 14, 275-300. doi:10.1111/j.2044-835X.1996.tb00706.x
- Kam, C., Greenberg, M. T., & Kusche, C. A. (2004). Sustained effects of the PATHS curriculum on the social and psychological adjustment of children in special education. *Journal of Emotional and Behavioral Disorders*, 12, 66-78. doi:10.1177/10634266040120020101
- Kasari, C., Freeman, S., & Parapella, T. (2006). Joint attention and symbolic play in young children with autism: A randomized controlled intervention study. *Journal of Child Psychology and Psychiatry*, 47, 611-620. doi:10.1111/j.1469-7610.2007.01768.x
- Kauffman, J. M. (2005). *Characteristics of emotional and behavioral disorders of children and youth* (8<sup>th</sup> ed.). Upper Saddle River, NJ: Pearson.
- Kazdin, A. E. (1982a). Single-case experimental design in clinical research and practice. In A. E. Kazdin & A. H. Tuma (Eds.), *Single-case research designs: New directions for methodology of social and behavioral science* (pp. 33-49). San Francisco, CA: Jossey-Bass.
- Kazdin, A. E. (1982b). *Single-case research designs: Methods for clinical and applied settings*. New York, NY: Oxford University Press.
- Kazdin, A. E. (1998). *Research design in clinical psychology* (3<sup>rd</sup> ed.). Needham Heights, MA: Allyn and Bacon.
- Kelly-Vance, L., & Ryalls, B. O. (2008). Best practice in play assessment and intervention. In A. Thomas & J. Grimes (Eds.), *Best practices in school psychology V* (p 549-559). Bethesda, MD: NASP Publications.
- Kennedy, C. H. (2005). *Single-case designs for education research*. Boston, MA: Allyn and Bacon.
- Kim, Y. T., Lombardino, L. J., Rothman, H., & Vinson, B. (1989). Effects of symbolic play intervention with children who have mental retardation. *Mental Retardation*, 27, 159-165.

- Koegel, R. L., & Covert, A. (1972). The relationship of self-stimulation to learning in autistic children. *Journal of Applied Behavior Analysis*, 18, 187-200. doi:10.1901/jaba.1972.5-381
- Koehler, M. J., & Levin, J. R. (1998). Regulated randomization: A potential sharper analytical tool for the multiple-baseline design. *Psychological Methods*, 3(2), 206-217.
- Krantz, P. J., MacDuff, G. S., Wadstrom, O., & McClannahan, L. E. (1991). Using video with developmentally disabled learners. In P. W. Dowrick (Ed.), *A practical guide to using video in the behavioral sciences*. NY: John Wiley & Sons.
- Krasny, L., Williams, B., Provencal, S., & Ozonoff, S. (2003). Social skills interventions for the autism spectrum: Essential ingredients and a model curriculum. *Child and Adolescent Psychiatric Clinics*, 12(1), 107-122. doi:10.1016/S1056-4993(02)00051-2
- Kratochwill, T. R., Hitchcock, J., Horner, R. H., Levin, J. R., Odom, S. L., Rindskopf, D. M., & Shadish, W. R. (2010). *Single-case designs technical documentation*. What Works Clearinghouse.
- Kroeger, K. A., Schultz, J. R., & Newsom, C. (2007). A comparison of two group-delivered social skills programs for young children with autism. *Journal of Autism and Developmental Disorders*, 37(5), 808-817. doi:10.1007/s10803-006-0207-x
- Lane, K. L., Webby, J., Menzies, H. M., Doukas, G. L., Munton, S. M., & Gregg, G. M. (2003). Social skills instruction for students at risk for antisocial behavior: The effects of small-group instruction. *Behavioral Disorders*, 28, 229-248.
- Lasater, M. W., & Brady, M. P. (1995). Effects of video self-modeling and feedback on task fluency: A home-based intervention. *Education and Treatment of Children*, 18, 389-408.
- Leaf, R., & McEachin, J. (1999). *A work in progress. Behavior management strategies and a curriculum for intensive behavioral treatment of autism*. New York, NY: DRL Books, LLC.
- LeBlanc, L. A., Coates, A. M., Daneshvar, S., Charlop-Christy, M. H., Morris, C., & Lancaster, B. M. (2003). Using video modeling and reinforcement to teach perspective-taking skills to children with autism. *Journal of Applied Behavior Analysis*, 36(2), 253-257. doi:10.1901/jaba.2003.36-253
- LeCouteur, A., Lord, C., & Rutter, M. (2003). *Autism diagnostic interview - revised*. Los Angeles, CA: Western Psychological Services.

- LeGoff, D. (2004). Use of LEGO as a therapeutic medium for improving social competence. *Journal of Autism and Developmental Disorders*, 34(5), 557-571. doi:10.1007/s10803-004-2550-0
- Levin, J. R., Lall, V. F., & Kratochwill, T. R. (2011). Extensions of a versatile randomization test for assessing single-case intervention effects. *Journal of School Psychology*, 49 (1), 55–79. doi:10.1016/j.jsp.2010.09.002
- Levin, J. R., Evmenova, A. S., & Gafurov, B. S. (in press). The single-case data-analysis ExPRT (Excel Package of Randomization Tests). In T. R. Kratochwill & J. R. Levin (Eds.). *Single-case intervention research: Methodological and data-analysis advances*. Washington, D.C.: American Psychological Association.
- Libby, S., Powell, S., Messer, D., & Jordan, R. (1998). Spontaneous play in children with autism: A reappraisal. *Journal of Autism and Developmental Disorders* 28(6), 487-497. doi:10.1016/j.jsp.2010.09.002
- Lieber, J. (1993). A comparison of social pretend play in young children with and without disabilities. *Early Education and Development*, 4, 148–161.
- Lifter, K., Edwards, G., Avery, D., Anderson, S. R., & Sulzer-Azaroff, B. (1988). *The Developmental Play Assessment (DPA) Instrument*. Mini-seminar presented at the Annual Convention of the American Speech Language Hearing Association, Boston, MA, November 1988. Developmental assessment of young children's play: Implications for intervention. Rev., July 1994.
- Lifter, K., Ellis, J., Cannon, B., & Anderson, S. R. (2005). Developmental specificity in targeting and teaching play activities to children with pervasive developmental disorders. *Journal of Early Intervention*, 27, 247–267. doi:10.1177/105381510502700405
- Lifter, K., Sulzer-Azaroff, B., Anderson, S. R., & Edwards Cowdery, G. (1993). Teaching play activities to preschool children with disabilities: The importance of developmental consideration. *Journal of Early Intervention*, 17(2), 139-159. doi:10.1177/105381519301700206
- Lord, C., Rutter, M., DiLavore, P., & Risi, S. (1999). *Autism diagnostic observation schedule*. Los Angeles, CA: Western Psychological Services.
- Lovaas, O. I., Schaeffer, B., & Simmons, J. G. (1965). Building social behavior in autistic children by use of electric shock. *Journal of Experimental Research Personality*, 1, 99-109.

- Lyytinen, P., Poikkeus, A., & Laakso, M. (1997). Language and symbolic play in toddlers. *International Journal of Behavioral Development*, 21, 289-302. doi:10.1080/016502597384875
- MacDonald, R., Clark, M., Garrigan, E., & Vangala, M. (2005). Increasing play using video modeling. *Behavioral Interventions*, 20, 225-238. doi:10.1002/bin.197
- MacDonald, R., Sacramone, S., Mansfield, R., Wiltz, K., & Ahearn, W. H. (2009). Using video modeling to teach reciprocal pretend play to children with autism. *Journal of Applied Behavior Analysis*, 42, 43-55. doi:10.1901/jaba.2009.42-43
- Maione, L., & Mirenda, P. (2006). Effects of video modeling and video feedback on peer-directed social language skills of children with autism. *Journal of Positive Behavior Interventions*, 8(2), 106-118. doi:10.1177/10983007060080020201
- Mallory, J. M., Kelly-Vance, L., & Ryalls, B. O. (2010). Incorporating divergent thinking training into play interventions for preschool children with developmental risk factors. *The International Journal of Creativity and Problem Solving*, 20(2), 57-71.
- Matson, J. L., & Neal, D. (2009). Diagnosing high incidence autism spectrum disorders in adults. *Research in Autism Spectrum Disorders*, 3(3), 581-589. doi:10.1016/j.rasd.2009.01.001
- McConnell, S. R. (2002). Interventions to facilitate social interaction for young children with autism: Review of available research and recommendations for educational intervention and future research. *Journal of Autism and Developmental Disorders*, 32, 351-372. doi:10.1023/A:1020537805154
- McCoy, K., & Hermansen, E. (2007). Video modeling for individuals with autism: A review of model types and effects. *Education and Treatment of Children*, 4, 183-213. doi:10.1353/etc.2007.0029
- McReynolds, L. V., & Kearns, K. P. (1983). *Single-subject experimental designs in communicative disorders*. Baltimore, MD: University Park Press.
- Mechling, L. C., & Moser, S. V. (2010). Video preference assessment of students with autism for watching self, adults, or peers. *Focus on Autism and Other Developmental Disabilities*, 25(2), 76-84. doi:10.1177/1088357610364392
- Mechling, L. C., Pridgen, L. S., & Cronin, B. A. (2005). Computer-based video instruction to teach students with intellectual disabilities to verbally respond to questions and make purchases in fast food restaurants. *Education and Training in Developmental Disabilities*, 40(1), 47-59.

- Michael, J. L. (1993). *Concepts and principles of behavior analysis*. Kalamazoo, MI: Society for the Advancement of Behavior Analysis.
- Miller, J. F. (1981). *Assessing language production in children: Experimental procedures*. Baltimore, MD: University Park Press.
- Minshew, N., Goldstein, G., Muenz, L., & Payton, J. (1992). Neuropsychological functioning of non-mentally retarded autistic individuals. *Journal of Clinical and Experimental Neuropsychology*, 14, 749-761.
- Morrison, R. S., Sainato, D. M., Benchaaban, D., & Endo, S. (2002). Increasing play skills of children with autism using activity schedules and correspondence training. *Journal of Early Intervention*, 25, 58-72.  
doi:10.1177/105381510202500106
- Murzynski, N. T., & Bourret, J. C. (2007). Combining video modeling and least-to-most prompting for establishing response chains. *Behavioral Interventions*, 22 147-152.  
doi:10.1002/bin.224
- National Research Council (2001). *Educating children with autism*. Washington, DC: National Academy Press.
- Nikopoulos, C. K., & Keenan, M. (2003). Promoting social initiations in children with autism using video modeling. *Behavioral Interventions*, 18, 87-108.
- Nikopoulos, C. K., & Keenan, M. (2004). Effects of video modeling on social initiations by children with autism. *Journal of Applied Behavior Analysis*, 37, 93.  
doi:10.1901/jaba.2004.37-93
- Nikopoulos, C. K., & Keenan, M. (2007). Using video modeling to teach complex social sequences to children with autism. *Journal of Autism and Developmental Disorders*, 36, 678-693.
- No Child Left Behind Act of 2001, Pub. L. 107-110. (2001). Retrieved from <http://www2.ed.gov/policy/elsec/leg/esea02/107-110.pdf>
- Onghena, P., & Edgington, E. S. (1994). Randomization tests for restricted alternating treatment designs. *Behaviour Research and Therapy*, 32(7), 783-786.  
doi:10.1016/0005-7967(94)90036-1
- Palechka, G. (2009). *A comparison of the acquisition of play skills using instructor-created video models and commercially available videos* (Master's thesis). Retrieved from ProQuest Dissertation and Theses. (Accession Order No. AAT 1489236)

- Palechka, G., & MacDonald, R. (2010). A comparison of the acquisition of play skills using instructor-created video models and commercially available videos. *Educational and Treatment of Children, 33*(3), 457-474. doi:10.1353/etc.0.0100
- Park, H., Marascuilo, L., & Gaylord-Ross, R. (1990). Visual inspection and statistical analysis in single-case designs. *Journal of Experimental Education, 58*(4), 311-320.
- Paterson, C. R., & Arco, L. (2007). Using video modeling for generalizing toy play in children with autism. *Behavior Modification, 31*, 660-681. doi:10.1177/0145445507301651
- Peters, K. S. (2008). *Peer play intervention and its effect on the social, communication, and play skills of students with autism ages 3-5* (Doctoral dissertation). Retrieved from ProQuest Dissertation and Theses. (Accession Order No. AAT 3358448)
- Piaget, J. (1962). *Play, dreams and imitation in childhood*. New York, NY: W.W. Norton and Company, Inc.
- Pierce, K., & Schreibman, L. (1997). Multiple peer use of pivotal response training to increase social behaviors of classmates with autism: Results from trained and untrained peers. *Journal of Applied Behavior Analysis, 30*, 157-160. doi:10.1901/jaba.1997.30-157
- Poling, A., Methot, L. L., & LeSage, M. G. (1995). *Fundamentals of behavior analytic research*. New York, NY: Plenum Press.
- Quill, K. A. (1997). Instructional considerations for young children with autism: The rationale for visually cued instruction. *Journal of Autism and Developmental Disorders, 27*, 697-714.
- Rayner, C., Denholm, C., & Sigafos, J. (2009). Video-based intervention for individuals with autism: Key questions that remain unanswered. *Research in Autism Spectrum Disorders, 3*(2), 291-303. doi:10.1016/j.rasd.2008.09.001
- Reagon, K. A., Higbee, T. S., & Endicott, K. (2006). Teaching pretend play skills to a students with autism using video modeling with a sibling as a model and play partner. *Education and Treatment of Children, 29*(3), 517-528.
- Rescorla, L., & Goossens, M. (1992). Symbolic play development in toddlers with expressive specific language impairment. *Journal of Speech and Hearing Research, 35*, 13-21.



- Richards, S., Taylor, R. L., Ramasay, R., & Richards, R. Y. (1999). *Single subject research: Applied in educational and clinical settings*. San Diego, CA: Singular Publishing Group.
- Ricks, D. M., & Wing, L. (1975). Language, communication, and the use of symbols in normal and autistic children. *Journal of Autism and Childhood Schizophrenia*, 5, 191-221.
- Rutherford, M. D., & Rogers, S. J. (2003). Cognitive underpinnings of pretend play in autism. *Journal of Autism and Developmental Disorders*, 33, 289-302. doi:10.1023/A:1024406601334
- Rutherford, M. D., Young, G. S., Hepburn, S., & Rogers, S. J. (2007). A longitudinal study of pretend play in autism. *Journal of Autism and Developmental Disorders*, 37(6), 1024-1039. doi:10.1007/s10803-006-0240-9
- Salkind, N. J. (2002). *Child development*. New York, NY: MacMillan.
- Sandall, S., Hemmeter, M. L., Smith, B. J., & McLean, M. E. (2005). *DEC recommended practices: A comprehensive guide for practical application in early intervention early childhood special education*. Longmont, CO: Sopris West.
- Schopler, E., Reichler, R. J., & Renner, B. R. (1988). *The childhood autism rating scale*. Los Angeles, CA: Western Psychological Services.
- Schreibman, L., Whalen, C., & Stahmer, A. C. (2000). The use of video priming to reduce disruptive transition behavior in children with autism. *Journal of Positive Behavior Interventions*, 2(1), 3-11. doi:10.1177/109830070000200102
- Scruggs, T. E., Mastropieri, M. A., & Casto, G. (1987). The quantitative synthesis of single-subject research: Methodology and validation. *Remedial and Special Education*, 8, 24-33. doi:10.1177/074193258700800206
- Scruggs, T. E., Mastropieri, M. A., Cook, S. B., & Escobar, C. (1986). Early intervention for children with conduct disorders: A quantitative synthesis of single student research. *Behavior Disorders*, 11, 260-271.
- Sherer, M., Pierce, K. L., Paredes, S., Kisacky, K. L., Ingersoll, B., & Schreibman, L. (2001). Enhancing conversation skills in children with autism via video technology. Which is better, "self" or "other" as a model? *Behavior Modification*, 25(1), 140-158. doi:10.1177/0145445501251008
- Sherrat, D. (2002). Developing pretend play in children with autism. *Autism*, 6(2), 169-179.

- Shipley-Benamou, R., Lutzker, J. R., & Taubman, M. (2002). Teaching daily living skills to children with autism through instructional video modeling. *Journal of Positive Behavior Interventions*, 4, 165-175. doi:10.1177/10983007020040030501
- Sidman, M. (1960). *Tactics of scientific research: Evaluating experimental data in psychology*. New York, NY: Basic Books.
- Sigman, M., & Ungerer, J. A. (1984). Cognitive and language skills in autistic, mentally retarded, and normal children. *Developmental Psychology*, 20(2), 293-302. doi:10.1037/0012-1649.20.2.293
- Skinner, B. F. (1938). *The behavior of organisms*. New York, NY: Appleton-Century-Crofts.
- Sparrow, S. S., Balla, D. A., & Cicchetti, D. V. (1984). *Vineland adaptive behavior scales: Interview edition survey form*. Circle Pines, MN: American Guidance Service.
- Spencer, P. E. (1996). The association between language and symbolic play at two years: Evidence from deaf toddlers. *Child Development*, 67, 867-876. doi:10.2307/1131866
- Stahmer, A. C. (1995). Teaching symbolic play skills to children with autism using pivotal response training. *Journal of Autism and Developmental Disorders*, 25(2), 123-141. doi:10.1007/BF02178500
- Stahmer, A., Ingersoll, B., & Carter, C. (2003). Behavioral approaches to promoting play. *Autism*, 7, 401-414. doi:10.1177/1362361303007004006
- Stanley, G. C., & Konstantareas, M. M. (2007). Symbolic play in children with autism spectrum disorders. *Journal of Autism and Developmental Disorders*, 37(7) 1215-1223. doi:10.1007/s10803-006-0263-2
- Strain, P. S. (1985). Social and non-social determinants of acceptability in handicapped preschool children. *Topics in Early Childhood Special Education*, 4, 47-58. doi:10.1177/027112148500400406
- Sualy, A., Yount, S., Kelly-Vance, L., & Ryalls, B. (2011). Using a play intervention to improve the play skills of children with language delay. *International Journal of Psychology: A Biopsychosocial Approach*, 9, 105-122.
- Tamis-LeMonda, C. S., & Bornstein, M. H. (1994). Specificity in mother-toddler language-play relations across the second year. *Developmental Psychology*, 32(2), 283-292. doi:10.1037/0012-1649.30.2.283

- Taylor, B. A. (2001). Teaching peer social skills to children with autism. In C. Maurice, G. Green, & R. Foxx (Eds.), *Making a Difference: Behavioral Intervention for Autism*. Austin, TX: Pro-Ed.
- Taylor, B. A., Levin, L., & Jasper, S. (1999). Increasing play-related statements in children with autism toward their siblings: Effects of video-modeling. *Journal of Developmental and Physical Disabilities, 11*, 253-264. doi:10.1023/A:1021800716392
- Tereshko, L., MacDonald, R., & Ahearn, W. H. (2009). *Strategies for teaching children with autism to imitate response chains using video modeling* (Unpublished master's thesis). Northeastern University, Southborough, Massachusetts.
- Tetreault, A. S., & Lerman, D. C. (2010). Teaching social skills to children with autism using point-of-view video modeling. *Education and Treatment of Children, 33*(3), 395-419. doi:10.1353/etc.0.0105
- Thorp, D., Stahmer, A., & Schreibman, L. (1995). Effects of socio-dramatic play training on children with autism. *Journal of Autism and Developmental Disorders, 25*, 265-282. doi:10.1007/BF02179288
- Toth, K., Munson, J., Meltzoff, A. N., & Dawson, G. (2006). Early predictors of communication development in young children with autism spectrum disorder: Joint attention, imitation, and toy play. *Journal of Autism and Developmental Disorders, 36*(8), 993-1005. doi:10.1007/s10803-006-0137-7
- Ungerer, J., & Sigman, M. (1981). Symbolic play and language comprehension in autistic children. *Journal of the American Academy of Child Psychiatry, 20*, 318-337.
- Van Laarhoven, L., Zurita, L. M., Johnson, J. W., Grider, K. M., & Grider, K. L. (2009). Comparison of self, other, and subjective video models for teaching daily living skills to individuals with developmental disabilities. *Education and Training in Developmental Disabilities, 44*(4), 509-522.
- Vaughn, S., Kim, A., Morris Sloan, C., Hughes, M., Elbaum, B., & Spidhar, D. (2003). Social skills interventions for young children with disabilities. *Remedial and Special Education, 24*, 2-15. doi:10.1177/074193250302400101
- Wampold, B. E., & Worsham, N. L. (1986). Randomization test for multiple-baseline designs. *Behavior Assessment, 8*, 135-143.
- Weiss, M. J., & Harris, S. L. (2001). Teaching social skills to people with autism. *Behavior Modification, 25*(5), 785-802. doi:10.1177/0145445501255007

- Whyte, J., & Owens, A. (1989). Language and symbolic play: Some findings from a study of autistic children. *The Irish Journal of Psychology*, 10, 317-332.
- Williams, E., Reddy, V., & Costall, A. (2001). Taking a closer look at functional play in children with autism. *Journal of Autism and Developmental Disorders*, 31(1), 67-77. doi:10.1023/A:1005665714197
- Wing, L., Gould, J., Yeates, S. R., & Brierley, L. M. (1977). Symbolic play in severely mentally retarded and in autistic children. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, 18, 167-178.

## **CURRICULUM VITAE**

Lauren Kravetz Bonnet was born and raised in Pittsford, New York. She earned her B.S. in Teachers of Speech and Hearing Handicapped from Ithaca College in 2003 and her M.A. in Speech Language Pathology from the George Washington University in 2006. She began her work as a Speech-Language Pathologist at Building Blocks Therapy, a private pediatric speech and language therapy practice in Washington, DC. She currently works for Arlington Public Schools, where she has held various positions including Speech-Language Pathologist, Autism Specialist, and Assistive Technology Specialist.