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Using Script-Fading Procedures to Teach Children with Autism to Initiate During Free Play

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USING SCRIPT-FADING PROCEDURES TO TEACH CHILDREN WITH AUTISM TO INITIATE DURING FREE PLAY

by

Kara A. Reagon

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ABSTRACT

Using Script-Fading Procedures to Teach Children with Autism to Initiate During Free Play

by

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Four preschool children diagnosed with autism who did not initiate play participated in the study. The use of scripts and script-fading procedures with manual guidance was examined using a nonconcurrrent multiple-baseline design across participants. After the introduction and fading of scripts, participants' initiations increased, generalized across games and peers, and maintained during follow-up probes.

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PUBLIC ABSTRACT

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Children with autism often display deficits in social interaction, communication, and play. Unlike typical peers during free play with a variety of games and toys, they often do not initiate to others or engage in interactive game play for sustained periods of time. Previous research has demonstrated the effectiveness of script-fading procedures in increasing initiations and conversational repertoires for children with autism. However, these procedures were examined in arranged environments using an activity schedule or in structured settings. In addition, the role of the conversation partner has not been studied. The use of activity schedules has also been effective in increasing independence and decreasing adult prompts. In particular, the use of a joint activity schedule increased independent game play between preschoolers with autism. Therefore, the current study investigated (a) the use of script-fading procedures and the use of manual guidance to teach four preschool children to initiate game play during free play without the aide of an activity schedule. Second, the study examined the effects of scripts and script-fading procedures on (b) the frequency of interactions, (c) the conversation partner's interactions on participants' interactions, (d) generalization across stimuli and people, (e)

maintenance, and (f) independent free play. Results demonstrated participants' play initiations, engagement, number of games played, and frequency of interactions increased, skills generalized across games and peers, and maintained. Furthermore, the number of prompts decreased, indicating script-fading procedures with manual guidance alone may be effective in increasing independent free play and initiations.

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Kara A. Reagon

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CHAPTER I

INTRODUCTION

Autism is a pervasive developmental disorder that affects an estimated 3.4 children per 1000 births (Yeargin-Allsopp et al., 2003). Autism is more prevalent in males than females and is often diagnosed via behavioral observation (Schreibman, Koegel, Charlop, & Egel, 1990). Autism is characterized by "qualitative impairments in social interaction, communication" and the presence of "restricted repetitive and stereotyped patterns of behavior, interests, and activities" (American Psychiatric Association, 2000, p. 70). Behavioral excesses such as stereotypy (e.g., hand flapping), echolalia (e.g., perseveration, repetitive use words or phrases), self injury (e.g., head banging) and aggression are often present for learners with autism. Behavioral deficits are also apparent in the area of social skills (e.g., eye contact, joint attention, facial expressions, emotions, sharing, and gesturing), and play (e.g., lack of varied play, spontaneous play, parallel play, make-believe play, social imitative play, constructive play, and game play). A delay in language development is also a defining characteristic of the disorder (National Research Council, 2001). Applied behavior analysis is the most effective means of addressing these core deficits and behavioral excesses (Fenske, Zalenski, Krantz, & McClannahan, 1985; Lovaas, 1987; Smith, 1999).

Through intensive behavioral intervention, children with autism may develop more extensive verbal repertoires, including labeling objects, requesting preferred items, greeting others, and answering questions (Maurice, Green, &

Luce, 1996). One such behavioral intervention is discrete-trial teaching (DTT). DTT is an effective teaching strategy in establishing early behavioral repertoires such as imitation, receptive discrimination, vocal imitation, and labeling (Lovaas, 1987, 2003; Maurice et al., 1996; Maurice, Green, & Foxx, 2001). Although DTT may be useful in shaping higher rates of some verbal responses, it may inhibit initiations because passive waiting is continuously paired with the delivery of rewards (MacDuff, Krantz, & McClannahan, 2001; McClannahan & Krantz, 2005). Often, youngsters exposed to intensive DTT do not initiate or display acquired skills unless directly asked to demonstrate said skills (Fenske, Krantz, & McClannahan, 2001; MacDuff et al., 2001; McClannahan & Krantz, 2005; Sundberg & Partington, 1999).

Other behavioral strategies used to promote the acquisition of receptive and expressive language skills include incidental teaching, video modeling, pivotal response training, and natural-environment training. Each of these procedures is empirically supported and is used to teach an array of target responses. “Incidental teaching is used to get elaborated language by waiting for another person to initiate conversation about a topic and then responding in ways that ask for more language from that person” (Hart & Risley, 1982, p.5). This procedure has been used with economically disadvantaged preschoolers (Hart & Risley, 1968), as well as individuals with autism (McGee, Krantz, Mason, & McClannahan, 1983), and has been shown to be effective for individuals with limited expressive skills. For example, McGee et al. (1983) implemented a modified procedure in which participants acquired receptive language skills and

the skills generalized to other settings. McGee, Krantz, and McClannahan (1985) compared the effectiveness of incidental teaching and DTT to teach prepositions with youths with autism. The participants exhibited more spontaneous use of prepositions taught through incidental teaching and skills generalized to free play. In 1986, the same researchers used this procedure to teach reading to children with autism (McGee, Krantz, & McClannahan, 1986). Incidental teaching has been an effective procedure for lengthening learners' initiations for many different language applications.

Video modeling is when a peer video model, adult video model, or a video from the participant's perspective (videotaped as if the student was looking through the lens) is shown completing a task or sequence of behaviors which the learner is supposed to imitate. The use of the video is then discontinued or faded once the learner mastered the task or sequence of behaviors. Some video models show both motor responses and verbal responses, such as with play sequences or purchasing items. Other video models may just show motor responses because they are teaching tasks such as setting the table which do not require language or social interactions. Skills taught via video modeling include play skills (D'Ateno, Mangiapanello, & Taylor, 2003), conversational skills (Charlop & Milstein, 1989), daily living skills (Shipley-Benamou, Lutzker, & Taubman, 2002), and purchasing skills (Haring, Kennedy, Adams, & Pitts-Conway, 1987). Theimann and Goldstein (2001) used supplemental video feedback with learners to help refine social communication skills. In all of the studies that implemented video modeling, the authors noted that the participants

had certain prerequisite skills including motor imitation, verbal imitation, receptive and expressive language repertoires.

Pivotal response training (PRT) is another behavioral technique used to increase motivation and facilitate generalization of skills. PRT is a set of procedures “conceptualized in terms of establishing operations” (Michael, 1993). It includes providing choice over the interaction and materials, reinforcing responses or attempts to respond (i.e., shaping) and task variation within natural activities (Pierce & Schreibman, 1995). PRT has been used to teach complex social behaviors with children with autism including engagement, interactions, initiations, and joint attention with peers (Pierce & Schreibman, 1995). Pierce and Schreibman (1995) trained typical peers to implement PRT with children with autism. In 1997, the same researchers evaluated the use of PRT with trained and untrained peers on social behaviors of children with autism. Training of peers included didactic instruction, modeling, role playing, and feedback (Pierce & Schreibman, 1997).

Natural-environment training is has also been referred to as the natural language paradigm (NLP) and is similar to PRT in that the child’s motivation is used to direct teaching. Instruction is delivered in the child’s typical environment (e.g., home, playground) and primarily focuses in mand training (Sundberg & Partington, 1999). The consequences are directly related to the teaching stimulus and trials are interspersed throughout the session. Stimuli are rotated and a variety of verbal models of requests are provided throughout the session. All initiations are reinforced with the related stimulus. NLP was initially implemented

in a clinic setting producing more generalized speech in two children with autism rather than traditional discrete trials (Koegel, O'Dell, & Koegel, 1987). Laski, Charlop, and Schreibman (1988) trained parents of children with autism to increase children's speech using NLP in a play setting with a variety of preferred toys. More recently Gillett and LeBlanc (2007) replicated these findings. In addition, establishing operations have been manipulated to promote peer initiations for preferred snacks between children with autism (Taylor et al., 2005).

Unlike other behavioral interventions, script and script-fading procedures are designed to shape conversational skills versus other aspects of language. In addition this procedure can be used without adult verbal prompts, unlike incidental teaching, NLP or PRT. Scripts can be used in-vivo versus having a learner watch a video of the desired performance which relies on the learner recalling both verbal and nonverbal responses to be displayed at a later time. McClannahan and Krantz (2005) defined scripts as "an audiotaped or written word, phrase, or sentence that enables young people with autism to start or continue conversation" (p. 5). The authors recommended that scripts be contextual, match learners' verbal repertoire, and reflect learners' interests. They emphasized that scripts and script-fading procedures are designed to teach individuals to approach, initiate, and respond to others.

Scripts are not intended to teach children with autism to speak (i.e., to verbally imitate, or to tact); but are procedures for teaching them to engage in the social exchange we call conversation (McClannahan & Krantz, 2005). For example, a script for a child who has earned playing with toy trains might cue the

child to engage a peer and say “Let’s play trains”; another youngster’s script may prompt him/her to approach a teacher and say “Look” while showing the teacher a drawing; and a third child might have the script “Watch me jump.” before going to the trampoline. Scripted interactions between two adolescents with autism might include the script “What do you like to eat?” for one individual and the scripted response “I like pizza.” for the other adolescent. Multiple scripts might be used to evoke lengthier interactions. For example when approaching a teacher, a student may say “I went camping.” The teacher responds with a contextual statement (e.g., “I like to roast marshmallows.”) and the student repeats another script that says “I slept in a tent.” This process may continue until several student – teacher interactions have taken place. Thus, the use of several scripts may promote the reciprocity of a typical conversation. In script and script-fading procedures, a conversation partner models appropriate language, instead of asking questions, thus promoting a natural give and take of conversation,. whereas repeated instructor questions or verbal prompts (used in other behavioral teaching methodologies) may become analogous to discrete-trial teaching and result in prompt dependence from instructors (McClannahan & Krantz, 2005).

McClannahan and Krantz (2005) described a process for fading scripts to promote unprompted interactions. Because they are faded, scripts may be viewed as prompts that evoke initiations. Prompts are auxiliary stimuli attached to training stimuli that must be faded (MacDuff et al., 2001). Like other types of prompts, scripts are only effective if they evoke correct responses. Therefore,

selection of the content and format of scripts should be given special consideration. That is to say, the script should contain words that are part of the learner's repertoire, represent a preferred topic, and are presented via a format that is likely to produce an initiation (e.g., text for readers, audiotape for nonreaders). More importantly, scripts should be gradually removed in order to transfer control from scripts to natural environmental stimuli such as the presence of another person (Brown, Krantz, McClannahan, & Poulson, 2008; MacDuff et al., 2001; Skinner, 1957). An array of prompt-fading procedures designed to augment the transfer of stimulus control are described in the literature. One empirically supported method is the use of a most-to-least prompting procedure (MacDuff et al., 2001). McClannahan and Krantz (2005) described a most-to-least prompt fading strategy that systematically fades scripts from back-to-front. When children reliably use scripts, the last written or audiotaped word from the script is removed. For example, the script "I like candy." would be faded to "I like" to "I", then to a blank card. In time, the card is removed so that conversation is controlled by the presence of a recipient or the presence of materials. Evidence of the stimulus control exerted by the presence of people and materials may be found when scripts are faded, and children continue to repeat the faded scripts or combine parts of faded scripts with language modeled by their conversation partner (Krantz & McClannahan, 1993, 1998; MacDuff, Ledo, McClannahan, & Krantz, 2007; Stevenson, Krantz, & McClannahan, 2000).

Script-fading procedures are effective for readers and non-readers (Krantz & McClannahan, 1993, 1998; Stevenson et al., 2000) and are used to teach children and adolescents with autism to emit conversational language, initiate interactions, respond to initiations, and continue interactions with others (McClannahan & Krantz, 2005). Scripts may consist of single words, phrases or sentences and may be presented as written or audiotaped stimuli. For example, audio-taped scripts were used with children with autism who had not developed reading skills to converse with target adults (Stevenson et al., 2000). Learners in this study played a recorded audioscript, and repeated the script to a nearby teacher. In another investigation (Krantz & McClannahan, 1993), textual scripts were used to teach children with autism to make initiations to peers during group activities. In 1998, Krantz and McClannahan used written scripts to teach young children with autism to solicit adult attention during play activities by embedding the scripts “look” and “watch me” in activity schedules and in a 2001 study, Sarokoff, Taylor and Poulson used written scripts to teach children with autism to engage in conversational exchanges about snacks and video games. In each of the studies that used textual scripts, participants were taught to point or look at the script, read the script aloud, and orient towards another person.

McClannahan and Krantz’s (2005) definition of scripts specified textual and audiotaped stimuli. Not all studies used written or audiotaped stimuli, some investigations used in vivo verbal modeling to rehearse scripted responses and initiations. Nor did all investigators fade scripts (Goldstein, Wickstrom, Hoyson, Jamieson, & Odom, 1988; Goldstein & Cisar, 1992; Krantz, Zalenski, Hall,

Fenske, & McClannahan, 1981). Vibrating pagers have also been used to evoke initiations from individuals with autism (Taylor & Levin, 1998). In this study, a 9-year-old boy with autism was taught to initiate with teachers and typical peers about his play activities when the tactile prompting device was activated. Shabani et al. (2002) extended this research and used verbal models paired with a pager to evoke initiations. Later, verbal models were faded so that participants continued to say previously taught scripts during play when paged.

Scripts may be beneficial in promoting initiations in individuals with autism and developmental disabilities without the aid of adult delivered verbal prompts or questions. In addition, these procedures may reduce or eliminate the need for specific reinforcement contingencies such as the use of token economies, teacher delivered praise, behavioral contracts, or edibles. These types of variables are inherent in other behavioral procedures such as discrete trial teaching, incidental teaching, pivotal response training, and/or mand training. The ultimate goal for all language intervention procedures is for individuals to talk without adults cuing them to engage with others. Script-fading procedures enable people with autism to “engage in real conversation” and initiate (McClannahan & Krantz, 2005, p. xiii). These procedures may produce initiations without prompts from instructors such as an expectant look, raised eyebrow, an approach towards the youngster, a light touch, or say “___” (McClannahan & Krantz, 2005). Script-fading procedures may help transfer stimulus control to the “right” environmental cues without embedding additional non-criterion related prompts (Etzel & LeBlanc, 1979). Some examples of the right environmental cues that should

evoke initiations or conversation include: the presence of an available/approachable conversation partner (i.e., familiar person not engaged in activities that would prohibit interaction with another person); stimuli of interest; and past, present, or future events.

CHAPTER II

LITERATURE REVIEW

The purpose of this literature review was to examine the use of scripts and script-fading procedures for individuals with disabilities and to determine "best practice." Studies were included in the review if they were returned in a PsychInfo, Eric, or Google Scholar search using the key words: "script fading and autism," "script(s) and autism," and "scripts and developmental disabilities" and employed a single-subject experimental design. Only studies that employed single-subject research designs were included because of their similarity in design and their implementation of script-fading procedures offered a more direct comparison to the current study. One study was excluded based on this criterion (Loveland & Tunali, 1991) because it used a group design. Internet searches for the *Journal of Applied Behavior Analysis, Journal of Behavioral Education, Research in Autism Spectrum Disorders, Journal of Autism and Developmental Disabilities, Focus on Autism and Other Developmental Disabilities* were also conducted. Lastly, a hand search of references from the articles returned from the periodical search engines and internet journal searches was done. It is important to note that, the literature review search returned four studies that referred to the use of "scripts" however; these scripts were not audiotaped or written. In these studies, scripts were modeled/verbally prompted by an adult. This practice differs distinctly from the definition of "scripts" and script-fading procedures described by McClannahan and Krantz (2005) - "an audiotaped or written word, phrase, or sentence that enables young people with autism to start

or continue conversation" (p. 5). Sixteen studies were returned that used scripts and script-fading procedures as described by McClannahan and Krantz (2005). Twenty-peer-reviewed articles were reviewed.

The literature review involved a methodological analysis of the relevant research and the results are summarized as: (a) participants and settings, (b) conversation partners, (c) script content, (d) script formats and preteaching, (e) procedures that facilitate the use of scripts, (f) prompting strategies, (g) reinforcement, (h) script fading, (i) study outcomes, (j) generalization and maintenance, and (k) procedural limitations.

Participants and Settings

All participants had a primary diagnosis of autism or developmental disabilities. Two participants were diagnosed with a "severe expressive language delay." Fifty-two males and seven females participated in the 20 studies, and the participants ranged in age from 2 years 11 months to 15 years old. The investigations included 23 preschool-aged children (ages 2 years 11 months to 5 years), 23 elementary-aged youngsters (ages 6 – 11 years), and 13 secondary-aged participants (ages 12 – 15).

Descriptions of participants included an array of skills, skill deficits, and test scores. Table 7 (Appendix E) summarizes the characteristics of the participants from each study.

Activity schedules are commonly used to facilitate the use of scripts. "An activity schedule is a set of pictures or words that cues someone to engage in a

sequence of activities" (McClannahan & Krantz, 1999, 2010). For investigations that used scripts with activity schedules, participants were reported to be fluent schedule followers prior to the studies (Krantz & McClannnahan, 1993, 1998; Sarokoff et al., 2001; Stevenson et al., 2000; Woods & Poulson, 2006) and those that employed used textual scripts posited participants to be "readers" or described efforts to preteach children to read targeted scripts prior to the experiment (Argott, Buffington Townsend, Sturmey, & Poulson, 2008; Brown et al., 2008; Charlop-Christy & Kelso, 2003; Ganz, Kaylor, Bourgeois, & Hadden, 2008; Krantz & McClannnahan, 1993, 1998; Sarokoff et al., 2001; Woods & Poulson, 2006). Children who used audiotaped scripts were either pre-taught to imitate non-related audiotaped scripts (i.e., scripts not used in experimental sessions) prior to intervention or had previous experience using auditory scripts (MacDuff et al., 2007; Reagon & Higbee, 2009; Stevenson et al., 2000; Woods & Poulson, 2006).

Individuals who participated in the reviewed studies had acquired skills that ranged from a minimal expressive verbal repertoire (e.g. verbal imitation, making requests, etc.) to more extensive verbal skill sets that included labeling, using simple sentences, and answering questions. However, none of the participants had acquired conversation skills nor did they spontaneously initiate interactions with teachers, parents, or peers.

Twelve studies were conducted in classrooms in center-based schools designed to serve individuals diagnosed with autism (Argott et al., 2008; Brown et al., 2008; Charlop-Christy & Kelso, 2003; Ganz et al., 2008; Krantz et al.,

1981; Krantz & McClannahan, 1993, 1998; MacDuff et al., 2007; Sarokoff et al., 2001; Stevenson et al., 2000; Wichnick, Vener, Keating, & Poulson, 2010a; Wichnick, Vener, Pyrtek, & Poulson, 2010b). Three studies were conducted in integrated public-school classrooms and included general education students and children receiving special education services (Goldstein et al., 1988; Goldstein & Cisar, 1992; Woods & Poulson, 2006), and one study, Shabani et al. (2002) provided intervention in a general education kindergarten for two subjects and at home for a third subject. One component of the Krantz et al. (1981) study was done in the child's home where parents probed rehearsed scripted responses with their children that they received from school. Later they taught different scripted responses that were probed at school the following day. Betz, Higbee, Kelley, Sellers, and Polland (2011) implemented the study in the home for one participant and for the other two participants it was conducted at a university based preschool for children with autism. One additional study was conducted entirely in a home setting (Reagon & Higbee, 2009). Two studies specified the research was conducted in a classroom or the participants' school, however no additional information was provided (Dotto-Fojut, Reeve, Townsend, & Progar, 2011; Howlett, Sidenar, Progar, & Sidenar, 2011).

Conversation Partner

Conversation partners were present during all experimental conditions for all of the studies. In this section, experiments were analyzed to determine if the conversation partner was an adult, a typical peer, a peer with a disability, or a

parent. Variables that may influence the selection of a conversation partner are identified and discussed. In addition, studies were divided to indicate if conversation partners had received instruction with regard to responding to participants' scripted interactions.

A variety of variables may determine who serves as a recipient. The youngsters who participated in the Krantz and McClannahan (1998) and Stevenson et al. (2000) studies displayed severe language deficits (e.g., poor articulation). Because it was unlikely that peers would understand their initiations, instructors were used as recipients. In addition, adults were more likely to provide more appropriate language models that the participants might imitate. Similarly, adults served as recipients for initiations in six other experiments (Argott et al., 2008; Betz et al., 2011, Brown et al., 2008; Charlop-Christy & Kelso, 2003; Dotto-Fojut et al., 2011; Howlett et al., 2011). However, the authors did not stipulate why adults were selected as the conversation partners in these studies. However, one could hypothesize that adult instructors were used in the Dotto-Fojut et al. (2011) study due to the fact the participants were learning to request assistance for mock work tasks.

Participants in the MacDuff et al. (2007) study had minimal expressive language skills, had learned to imitate a few one-syllable words, and used a pointing response to make requests. Because their language skills were minimal and their bids for attention emerging, adults may be more adept at recognizing and responding to those bids for joint attention than other children or peers with

autism. Peers with autism were also unlikely to provide appropriate, contextual elaborations because they displayed similar language deficits.

Woods and Poulson (2006) recruited typically-developed peers from the participants' second grade classroom who served as conversation partners. Typical peers were used in this study because each of the participants was mainstreamed for part of the school day. Likewise, other researchers selected typical peers as recipients for conversation because they were familiar with the participants and had played with the participants prior to the study (Goldstein et al., 1998; Goldstein & Cisar, 1992; Shabani et al., 2002).

In four studies, participants used scripts to initiate conversation with peers diagnosed with autism who also had scripts at their disposal (Krantz & McClannahan, 1993; Sarokoff et al., 2001; Wichnick et al., 2010a, 2010b). These studies used peers as conversation partners because the participants had demonstrated skills in maintaining conversations with adults but did not interact with peers within their classrooms. Peers in the Ganz et al. (2008) study attended the same school as the participants, but the authors did not specify why peers with cognitive disabilities were selected as conversation partners.

Lastly, parents were used as partners for participants in the Krantz et al. (1981) and the Reagon and Higbee (2009) studies. Several studies have documented the effectiveness of parent-implemented behavioral interventions with individuals with autism (Charlop-Christy & Carpenter, 2000; Laski et al., 1988; Krantz, MacDuff, & McClannahan, 1993; McClannahan, Krantz, & McGee,

1982). Parents serving as therapists may maximize the amount of intervention children receive and may promote skill generalization across people and settings.

In summary, the language skills of the recipient and their availability are two possible variables that may influence the selection of conversation partners. The participants' skill level may also affect who is selected as a conversation partner. For example, if a youngster has difficulty with articulation or voice volume, an adult may be a better partner because they may be more adept at understanding verbal approximations and because they are more likely to provide better models (e.g., voice volume, intonation, and gestures) for the learner to imitate. The role the conversation partner will play during sessions (i.e., the degree of difficulty or complexity of responses the conversation partner will model - natural conversation which may include lengthy statements or relevant questions) may also determine the selection of the recipient. Adult recipients could have advanced observational skills for recognizing and rewarding occurrences of the dependent variables and may require less training than other potential recipients. "Adult conversation partners are preferable because they are willing to wait patiently, smile in an encouraging way, visually attend in a manner that invites interaction, and respond enthusiastically with words that they hope the child will understand. These responses are often difficult for siblings and peers" (McClannahan & Krantz, 2005, p. 34). Additionally, siblings or peers may not readily respond in the manner in which teachers, parents, or researcher would like, or to a level specified during their training (e.g., they may ignore, tease, or respond inappropriately). Because of these potential shortcomings, it is

suggested that they are used as conversation partners after the learner has developed “fundamental skills such as approaching and orienting toward adult partners and saying scripts” (McClannahan & Krantz, 2005, p. 91).

Although studies may not directly specify the variables that influenced the selection of recipients perhaps inferences can be made based on the descriptions of the participants and the conversation partners as to why they were selected from the variables previously stated. Table 8 (Appendix E) summarizes the variety of conversation partners used during experimental sessions. The next section describes conversation recipients training.

Pre-Training Recipients

Five studies did not pretrain conversation partners on how to respond to the participants’ initiations or provided limited instructions (Betz et al., 2011; Ganz et al., 2008; Howlett et al., 2011; Shabani et al., 2002; Woods & Poulson, 2006). Conversation partners (i.e., peers) in the Shabani et al. (2002) study did not receive any specific instructions during the experiment. Likewise, peers in the Woods and Poulson (2006) study did not receive specific instructions prior to experimental sessions, but they did receive the same instruction as participants did at the beginning of each session (i.e., “time to play” and “talk a lot”). Ganz et al. (2008) did not specify training of the conversation partner. Betz and colleagues (2011) did not specify how adult recipients’ responded to participants’ mands taught via scripts. Howlett et al. (2011) noted the experimenter responded to childrens’ mands by telling them the location of the object but did not describe any pretraining procedures.

In seven studies, the experimenter provided conversation partners with scripted verbal or nonverbal interactions (Argott et al., 2008; Charlop-Christy & Kelso, 2003; Goldstein et al., 1988; Goldstein & Cisar, 1992; Krantz & McClannahan, 1993, Krantz et al., 1981, Sarokoff et al., 2001). In six studies, peers received script training identical to the instruction received by participants (Goldstein et al., 1988; Goldstein & Cisar, 1992; Krantz & McClannahan, 1993; Sarokoff et al. 2001, Wichnick et al., 2010a, 2010b). Descriptions of peers who served as conversation recipients varied. Typically developed peers who functioned as recipients were reported to be at or above age level on the *McCarthy Scales of Children's Abilities* (McCarthy, 1972) and the *Learning Accomplishment Profile – Diagnostic Edition* (LeMay, Griffin, & Sanford, 1977) in the Goldstein et al. (1988) and Goldstein and Cisar (1992) studies. The children were familiar with participant children and had played with them prior to the study. Peers who served as conversation partners were classmates in the Krantz and McClannahan (1993), Sarokoff et al. (2001), and the two Wichnick et al. (2010a, 2010b) studies. The peers received the same training as the participants in each of these studies. In two studies, adult recipients received either specific scripted responses for each participant's interactions or a nonverbal script (Argott et al., 2008; Charlop-Christy & Kelso, 2003). In the Charlop-Christy and Kelso (2003) study the adult initiated a question to start the conversation and provided scripted responses based on the topic. An example of a question and a response includes "Do you like to watch T.V.?" the participant would respond using the script "Yes. Do you like to watch T.V.?" and the experimenter would respond

“Yes. What’s your favorite show?” On the other hand, in the Argott et al. (2008) study adults were given non-verbal scripts for three categories of affect to display (initiate) and therefore served as recipients of an empathic response given by the participant. For example, when the adult displayed a facial expression and gestures indicating that s/he was happy the participant was taught to respond “Why are you happy?” The authors did not stipulate if the adults provided any contextual verbal response following the participants’ scripted verbal response. The instructor did provide verbal praise for correct responses.

Conversation partners received specific instructions and training in seven studies (Brown et al., 2008; Dotto-Fojut et al., 2011; Krantz & McClannahan, 1998; Krantz et al., 1981; MacDuff et al., 2007; Reagon & Higbee, 2009; Stevenson et al., 2000). Krantz and McClannahan (1998) and Stevenson et al. (2000) instructed adult conversation partners to orient toward the participant when s/he approached and to respond only if the participant made an initiation. They were further instructed to model contextual elaborations following initiations, but were cautioned not to ask questions, give instructions, or deliver prompts or praise. Participants in the MacDuff et al. (2007) study made bids for joint attention to familiar adults. Adults responded by providing a statement that included the label of the item (e.g., “Cars go fast” if the stimulus was a car.). Brown et al. (2008) used an adult conversation partner who responded to all of the participant’s interactions with an appropriate conversational response. The authors with regards to training of the conversation partner provided no further information. Dotto-Fojut et al. (2011) trained adult recipients of mands for

assistance to make a contextual response and provide access to the material needed.

Analogous to the Krantz and McClannahan (1998) and Stevenson et al. (2000) procedures, parents in the Reagon and Higbee (2009) study were instructed to respond contextually to their child's initiations. Parents received didactic training that included written instructions, samples of scripts and responses, modeling, prompting, and feedback during role plays regarding the development of scripts and responses to child's initiations.

Krantz et al. (1981) taught parents to collect data, provide praise, and deliver tokens for correct responses. They were also taught to provide verbal models and to conduct rehearsals following errors. No additional information was provided regarding whether or not the parent received specific instructions on how to model additional language for the child or how to be a conversation partner.

The role of the conversation partner has not been experimentally researched in terms of the effects s/he may have on unscripted language. It has been measured as a dependent variable for procedural fidelity (Reagon & Higbee, 2009). McClannahan and Krantz (2005) outline the role of the conversation partner. The role of the conversation partner is to model appropriate interesting language (i.e., at or slightly above the level of the learner), not to praise, ask questions or give instructions so not create a discrete-trial paradigm that has the potential to create prompt dependence and more importantly does not model typical conversation (McClannahan & Krantz, 2005). In addition, the

authors list several additional tasks for the conversation partner to attend to: (a) invite interaction (i.e., smile and make eye contact), (b) respond enthusiastically, (c) use words that are part of the learner's repertoire, (d) "Make conversation as "natural" as possible", (e) "make interesting comments", (f) use appropriate volume and intonation, (f) gesture, and (g) provide rewards that are related to the conversation (p. 29).

Script Content

Teaching individuals with autism to initiate to others can be a challenging task. However, the limited body of research that exists shows that scripts and script-fading procedures effectively promote a variety of social interactions. The content of the script should be individualized and teaching scripts in context may also be valuable (McClannahan & Krantz, 2005). For the purpose of this review, scripts were divided into six content areas: (a) completed, current, and upcoming events, (b) environmental stimuli, (c) items or topics of interest, (d) garnering attention (e.g., "look," "watch me," or "see"), (e) play and leisure, and (f) empathy.

Events

Three research studies used scripts to teach participants to talk about past, present, or future events. In 1981, Krantz et al. taught a 5-year-old boy and a 9-year-old girl with autism to answer questions regarding temporarily remote events. Instructors verbally modeled of scripted responses (statements) to questions posed at school that were later presented and scored by a parent at home. In addition parents rehearsed additional scripts (statements) at home that

teachers at school asked and scored the following day. Although rehearsing scripted responses successfully demonstrated increases in correctly answering questions about temporally-remote events, participants' responses were still dependent on instructor or parents asking about their day.

In an effort to eliminate adult verbal prompts (i.e., questions or models), Krantz and McClannahan (1993) presented 10 written scripted statements and questions regarding recently completed, current and upcoming activities to participants. They were manually prompted to point to the scripts, orient their face to a peer (who also had a set of different but related scripts) and read aloud the script. Similarly, Woods and Poulson (2006) included 10 to 14 typed or audiotaped scripts in each participant's schedule. These scripts were statements or questions designed to reflect recently completed or future activities, stimuli within the environment or highly preferred activities. Consistent with Krantz and McClannahan (1993), portions of the scripts were completed prior to each session so that the content reflected that day's activities. Three versions of scripts were made and rotated in order to prevent rote conversations.

Environmental Stimuli

Nine studies tailored scripts to stimuli present in the environment. Sarokoff et al. (2001) created six to seven typed contextual statements for each stimulus and attached text to the packaging (a video game and various snacks). A set of scripts was available for each participant related to the stimulus that was currently available. Shabani et al. (2002) taught two scripted statements and one scripted question regarding stimuli available during free play. More recently,

Brown et al. (2008) used written scripted statements affixed to stimuli commonly found in convenience, sporting goods, and video stores that were systematically faded (e.g., “Potato chips are salty”; “I love to play catch”; “Cartoons are funny”). Ganz et al. (2008) used written scripts and visual cues to prompt participants to make appropriate statements and questions during three different sets of activities. Scripts were similar for each of the three activities for the participants but content differed slightly based on the activity (e.g., reading, drawing, puzzles).

In their first study published Wichnick, (2010a) and her colleagues placed voice-recorded buttons inside zip-lock bags with animal toys to teach initiations to peers and in their subsequent study taught responses to peers. More recently, researchers have used script-fading procedures to teach mands (e.g., Betz et al., 2011 mands for snack items and Howlett et al. 2011 mands for locations). Lastly, Dotto-Fojut (2011) taught adolescents to describe missing, broken, or mismatched materials and request assistance when completing simulated office tasks.

Scripts are effective in evoking initiations about stimuli in the environment in the absence of adult questions and models. Researchers systematically replicated and extended the literature by evaluating the effectiveness of script fading when tangible stimuli were not present. Children are taught to initiate about items or topics of interest without gaining access to materials or the presence of these items (Stevenson et al., 2000).

Topics of Interest

Scripts are also used in the absence of tangible stimuli to teach individuals to converse about items or topics of interest. Stevenson et al. (2000) used scripts to teach conversational initiations to four boys with autism (ages ranged from 10-15). Five audiotaped scripts were created for participants that were topics of conversation that the participants understood and could say or approximate. These scripts included two questions and three statements about food, pets, school, and video games. When participants selected a social interaction activity for their schedule, they approached a conversation partner. In previous studies, the conversation partner was in close proximity and the approach was not part of the response chain. The schedule was comprised of 10 blank yellow schedule pages with a Velcro dot that prompted the participant to select 1 of 10 activities, from 5 pictures of Language Master cards for social interactions and 5 photos of nonsocial activities depicting various academic tasks. The conversation partner held the Language Master cards mounted on a clipboard and the card reader was placed next to the conversation partner. This was arranged so that the participants learned to approach a conversation partner. Another major difference from other studies is that the participant used only one of the five scripts for each conversation. When the schedule prompted a social interaction, the participant selected one Language Master card and ran it through the card reader. The conversation partner then responded with an elaboration of the participant's interaction. Participants were required to make approximately four conversational exchanges prior to ending the conversation. After the participant

made four exchanges the conversation partner modeled a closing statement such as “Talk to you later.” If the participant attempted to terminate the conversation prior to a closing statement the conversation partner redirected the conversation with a continuation statement such as “I would like to tell you something else.” After the four exchanges, the participant returned to his schedule, turned the page, and selected another activity from the choice board. This continued until all 10 activities were completed. Thus, scripts were used to teach the initial social initiation but were not used to continue the conversation.

Unlike the previous study, Charlop-Christy and Kelso (2003) taught three boys (ages 8, 9, and 10) conversational responses to an adult using written and visual cue cards. Three different conversations were taught to each participant. Topics of conversations related to school activities, past events, games, food, and television. The adult began the conversation with a question and the experimenter cued participants to respond by presenting written scripts. Scripted responses contained a statement and a question. The conversation partner responded to the participants’ question and asked an additional question. The adult terminated the conversation when three adult-child exchanges were completed.

The previously described studies promoted several conversational exchanges between two people. The next section describes the use of scripts to teach initial interactions. These interactions could be classified as joint attention.

Garnering Attention

All of the aforementioned studies used lengthier scripts to promote conversational exchanges. Two studies used simple scripts (one word and two words) to teach introductory conversations to young children with autism (Krantz & McClannahan, 1998; MacDuff et al., 2007). These studies provided evidence that scripts can be effective in teaching simple, meaningful social exchanges for students between the ages of 3 and 5 who displayed severe language deficits.

Krantz and McClannahan (1998) embedded the textual scripts, “Look.” and “Watch me.” in the activity schedules of three 4- to-5 year-old boys with autism. The activity schedule was comprised of 16 activities represented by photographs, one per page, in a binder. Scripts were typed in bold face 72-point type using upper and lower case letters. The scripts were presented either above or below a photo representing a target activity. Scripts were embedded for 10 of the 16 activities. For example if the activity was coloring the script “Look.” might appear below the photograph. The participant would obtain the coloring materials, color, read the text “Look,” orient toward the conversation partner, and say “Look” as he displayed the colored picture. The conversation partner responded with phrases or short sentences related to the current activity (e.g., “Look. It’s Big Bird.”). The authors reported an increase in children’s elaborations and unscripted responses after the introduction of scripts.

In another experiment (MacDuff et al., 2007) audiotaped scripts and script-fading procedures were employed to promote bids for joint attention by presenting the script “See” on a button-activated recorder. The instructor served

as the conversation partner and prompter during sessions, and she guided the child to a hallway or room and gave the instruction “Let’s walk this way,” or “Let’s go over here.” Two- and three-dimensional stimuli were strategically placed in the hallway or room. These items were selected based on possible interest to the participant and age-appropriateness. Stimuli were randomly rotated across sessions. During training the recorders were affixed to the stimuli. Scripts and manual prompts were effective in teaching the children to orient toward a stimulus, point at the stimulus, look toward an adult, and repeat the script “See.” The conversation partner responded to each bid with a brief comment that included the label of the stimulus. For example, if the participant pointed towards a butterfly, and said “see,” the adult might respond “Pretty butterfly.”

Thus scripts have been effective in generating bids for joint attention. Children have been taught to garner adults’ attention by initiating about items such as toys or play activities such as trampoline. The next group of research examined the use of scripts during play and leisure activities.

Play and Leisure

A handful of studies have used scripts to produce language during play (Goldstein et al., 1988; Goldstein & Cisar, 1992; Reagon & Higbee, 2009). Although free play was used as the setting during the Shabani et al. (2002) study, scripted utterances were prompted in direct relation to a toy or activity using a vibrating pager which was activated from a remote, therefore this study was included in the previously described script content area which focused on stimuli within the environment. Goldstein et al. (1988) explored the use of scripts

and compared prompting procedures for script training to teach verbal and nonverbal sociodramatic play responses during semi-structured free play. In the first experiment, children were taught to enact three characters at a hamburger stand (i.e., cook, salesperson, and customer). In the second experiment, participants learned to play barbershop; the three roles included (i.e., customer, barber, and shoe shiner). In a follow-up study, Goldstein and Cisar (1992) controlled prompting and evaluated the effects of script training on a series of sociodramtic play themes including pet shop, magic show, and carnival. Target responses included both verbal and nonverbal responses.

The most recent study that examined scripted conversation during play was conducted in the participants' home with their mothers serving as recipients. Mothers were trained to create, implement and systematically fade three scripts for one set of toys but scripts were not associated with a particular toy or action during play. Voice-recorded buttons were placed on the table or the floor with the target set of toys (i.e., Thomas the Train® set, Rescue Heroes® action figures, and Fisher-Price® Little People® Ramps Around Garage™). Mothers were instructed to manually prompt their child to press the button if the child failed to do so within 15 s of the onset of the session or if the child did not continue talking for more than 15 s. Parents responded to child initiations with a contextual play response (Reagon & Higbee, 2009).

All of the previous mentioned studies have taught individuals with autism to interact with others about topics that are assumed interest to them. Some of

the core deficits of autism are taking the perspective of another person and or displaying affective responses. The next section addresses this skill area.

Empathy

There is one study that applied scripts and script fading technology to teach empathic statements in response to non-verbal affective stimuli in adolescents with autism (Argott et al., 2008). Three categories of affect were presented, hurt, tired, and happy/excited. Each was presented with scripted non-verbal stimuli consisting of a facial expression and gestures. Two different scripted responses were trained to each of the categories. During training sessions, once the participant made eye contact the non-verbal affective stimulus was presented. Textual scripts were presented to the participant after 1 s with an empathic response such as “Do you feel alright?” in response to a facial grimace and the instructor rubbing the back of his or her neck.

In summary, scripts are effective for teaching a number of diverse verbal initiations and responses. Scripts can facilitate simple (one-to two-word phrases) and more complex (sentences and questions) interactions. In their book on scripts and script-fading procedures, McClannahan and Krantz (2005) discussed several factors regarding selecting script content. Initially, scripts should be of high-interest items (i.e., the child has shown a preference for a toy, activity, drink or food), even if the child has not yet learned that the spoken word or “script” represents something tangible. Repeated pairing of the script with the item or photo of the object and contingent access to the target item after repeating the script may help the child learn the relationship between the spoken word and

gains access to the item, essentially manding or requesting behavior. Second, scripts are selected because the learner can say or approximate the targeted word(s). Third, script content should relate to rewarding activities, “because selecting a reward is typically a high-interest activity, it is an opportune time to build social interaction skills” (p.55). Fourth, typically developing children naturally talk while playing with toys; however, children with autism do not. They may show interest in play materials which can serve as rewards when embedding scripts. Fifth, teaching scripts in context around the child’s home may promote interactions with family members and help youngsters complete daily routines. It may also be rewarding to family members and likely to in turn be rewarded. For example, parents may appreciate their child saying, “I’m home.” when hanging up his coat after school, or “I love you” when being tucked into bed at night. Sixth, people may discuss their daily activities. That is they converse about things that have direct meaning to them (e.g., past events, current activities and future plans). These events, or activities are reinforcing to them and future plans are also likely to serve as a reinforcer. Seventh, when considering teaching peer interactions instructors may want to select topics that are of interest to both parties where one member of the dyad controls access to the item or activity which is contingent on scripted initiations. Eighth, it is recommended that scripts be age-appropriate and attempt to have correct grammar. Ninth, when teaching multiple scripts, each script should begin with a different word so that when parts of the scripts are later faded, the learner is more likely to differentiate scripts. Last, the authors noted, “Scripts are less

effective in building conversation skills if they include many words that children do not understand" (p. 75). Scripts and script-fading procedures may help individuals with autism interact during play, converse during school activities with peers and teachers, talk about their day, garner others attention, and show compassion.

Script Formats

Scripts can be presented in a variety of formats. In the studies reviewed, researchers used five methods of presentation: (a) pre-trained verbal models, (b) in-vivo verbal models, (c) audio-taped, (d) written, and (e) written plus visual cues. The particular format selected by investigators may depend on the skill level of the participant. Each format may present unique advantages and entail several considerations when deciding which presentation method to employ.

Pre-trained Verbal Models

Pre-trained verbal models were used in four studies. The first demonstration of script training with individuals with autism used both in-vivo modeling and rehearsed scripts to teach youths to report about temporarily remote events (Krantz et al., 1981). In 1988, Goldstein et al. pretrained both verbal and nonverbal motor play responses using group and individual training sessions. Later, Goldstein and Cisar (1992) replicated and expanded the previous study teaching sociodramatic play to triads of preschoolers that included two typical children and one child with a disability. Experimenters used a most-to-least prompting hierarchy to teach scripted verbal and nonverbal behaviors.

Shabani et al. (2002) extended Taylor and Levin's (1998) study using a vibrating pager to evoke initiations. Taylor and Levin taught a 9-year-old boy, who attended a regular second grade education class, to initiate when the remote activated pager vibrated. In this study the instructor provided verbal models when the pager signaled during the teaching condition, however the models were not scripted. On the other hand, Shabani et al. pretaught children with autism scripted responses that were evoked by a remote activated pager during play sessions.

In-vivo Verbal Models

No studies used in-vivo modeling of scripts and script-fading procedures alone. Two studies included the use of in-vivo verbal models as part of a script-training package (Charlop-Christy & Kelso, 2003; Krantz et al., 1981). Krantz et al. (1981) rehearsed scripted responses throughout the day and provided in-vivo verbal models when participants did not answer questions about their day. Charlop-Christy and Kelso (2003) used in-vivo verbal models plus written scripts.

Audiotaped Scripts

In a number of studies, researchers used audiotaped scripts with young children who had not developed proficient reading skills (Betz et al., 2011; Dotto-Fojut et al., 2011; Howlett et al., 2011; MacDuff et al., 2007; Reagon & Higbee, 2009; Stevenson et al., 2000; Wichnick et al., 2010a, 2010b; Woods & Poulson, 2006). Instructors pre-record scripts using voice recorder buttons or an audiotape card reader. A Language Master card has a magnetic strip that plays the

recorded information when run through the card reader. The first study to incorporate audiotaped scripts was Stevenson et al. (2000). One participant in the Woods and Poulson (2006) study used Language Master cards that contained prerecorded scripts; written text and a related photo were affixed to each card. Learners are taught to run the cards through the card reader and imitate the scripted model. Five studies have used voice-recorded buttons as a medium for scripts (Betz et al., 2011; MacDuff et al., 2007, Reagon & Higbee, 2009; Wichnick et al., 2010a, 2010b). Voice recorded buttons are prerecorded with the script and children are taught to press the button and imitate the script. Howlett et al. (2011) stated a “digital voice recorder” was used for audio scripts. One participant in the Dotto-Fojut et al. (2011) study used audio scripts, which were recorded on “voice activators.”

Textual Scripts

Textual scripts were employed with individuals who were more fluent readers (Krantz & McClannahan, 1993), or had displayed an early reading repertoire (Charlop-Christy & Kelso, 2003; Woods & Poulson, 2006), and/or participants were pretaught to read the scripts, or words presented in scripts were taught separately using discrete trial instruction (Brown et al., 2008; Krantz & McClannahan, 1993, 1998; Sarokoff et al., 2001,). One study used scripts that contained both written and visual cues (i.e., line drawings) (Ganz et al., 2008). The scripts were pretaught until the learners read all of the scripts without errors or prompts. Three participants in the Dotto-Fojut et al. (2011) study used written scripts.

Preteaching. Seven of the 20 studies reviewed included preteaching in regards to the use of scripts. Three of the studies pretaught written scripts (Argott et al., 2008; Brown et al., 2008; Ganz et al., 2008) and four pretaught to the use of audio scripts (Betz et al., 2011; MacDuff et al., 2007; Reagon & Higbee, 2009; Stevenson et al., 2000). The three demonstrations with textual scripts pretaught the target scripts. Argott et al. (2008) and Ganz et al. (2008) pretaught the entire scripts whereas Brown et al. (2008) pretaught the words in each script separately. Stevenson et al. (2000) and Reagon and Higbee (2009) pretaught unrelated audiotaped scripts that were similar in length to the target scripts used in intervention. Reagon and Higbee (2009) was the only study in which preteaching also included a fading component. MacDuff et al. (2007) pretaught the target script “see” and other nonrelated one-syllable words using the voice-recorded device. Dotto-Fojut et al. (2011) described a preteaching condition in which schedule following and tasks were pretaught; however, the use of scripts was not.

There may be several advantages to preteaching scripts. First, preteaching the use of scripts may decrease the likelihood of having to use verbal prompts during teaching. Second, the absence of verbal prompts may reduce the salience of the instructor and decrease the likelihood that the instructor, not the recipient may become the discriminative stimulus for initiating. A possible disadvantage to preteaching prior to baseline may exist when target scripts are pretaught. The learner may begin to use scripts prior to intervention and diminish if not eliminate any chance of experimental control. However,

MacDuff et al. (2007) successfully pretrained the target script in isolation with other nonrelated one-syllable words. The other two studies that directly trained scripts did so by training in isolation, not in the presence of the stimuli/environmental cues that would ultimately control the verbal behavior.

The decision on whether or not to use written versus audiotaped scripts may be based on the skill level of the learner. However, there may be unique benefits to each format. Audiotaped scripts allow for the learner to hear a verbal prompt. The audiotaped verbal model may model appropriate voice tone, inflection and volume whereas written scripts do not. On the contrary, audiotaped scripts using Language Master cards and Mini-me's are not conducive to all settings. Written scripts may be used subtly and may carryover (i.e., the script is part of a permanent product) to the natural stimulus in the environment (Sarokoff et al., 2001).

Facilitating the Use of Scripts

Regardless of the format selected for scripts, they must strategically be presented within the learner's environment in order to evoke initiations. The current literature revealed several methods that include: (a) an instructor pre-taught a script, (b) a vibrating pager evoked a script, (c) a script was embedded in a schedule, (d) an instructor manipulated a script, or (e) scripts were arranged with stimuli in the environment. The purpose of this section was to categorize how scripts were facilitated.

Pre-teaching

Several studies investigating the use of scripted verbal behavior pretrained the target responses/initiations using verbal models and/or in-vivo modeling (Goldstein et al., 1988; Goldstein & Cisar, 1992; Krantz et al., 1981) as previously discussed.

Vibrating Pager

In a more recent study, Shabani et al., 2002 pretaught scripts using a vibrating pager to prompt the scripted initiations when activated.

Activity Schedule

Five studies employed activity schedules as the catalyst for script use. An activity schedule "is a set of pictures or words that cues someone to engage in a sequence of activities" (McClannahan & Krantz, 1999, p. 3). Beginning schedules often include a set of photos or text depicting target tasks. The goal is to teach children to independently complete the sequence in the absence of adult prompts.

In a study by Krantz and McClannahan (1993), the participants were fluent readers and schedule followers (MacDuff, Krantz, & McClannahan, 1993) who used daily written schedules in a "to-do" list format. During the study, scripts were presented in a similar fashion to a written checklist schedule. Written instructions "Do your art and talk a lot." were presented above 10 scripted statements and questions that were randomly rotated in order to prevent rote conversation.

Krantz and McClannahan (1998) used a similar format to facilitate the use of scripts in a subsequent study. Participants followed a photographic activity schedule in which typed scripts were embedded either above or below photos of the activities. If the script was presented above the photo of the activity, the participant said the script prior to engaging in the activity. If the script was below the photo, the participant said the script after completing the activity.

Stevenson et al. (2000) used photographic activity schedules and activity choice boards to facilitate the use of audiotaped scripts. Audioscripts were recorded on Language Master cards that were played when run through a Language Master machine (Bell & Howell, No. 1732B). The activity schedules included 10 blank yellow pages with Velcro dots that prompted the participants to select from 5 photos and 5 Language Master cards that were mounted on a nearby choice board. Participants retrieved the materials to complete an activity or obtained a Language Master card.

Although, Sarokoff et al. (2001) did not use an activity schedule to facilitate conversation between two children with autism, one could conceivably argue that the format used was comparable to Krantz and McClannahan's (1993) text schedule. Sarokoff et al. used stimuli that had embedded text, such as a package of candy (e.g., Gummi Savers®. The candy was placed on a sheet of paper that had six to seven typed scripted statements about the item. These scripted statements could have functioned as a talk "to-do" list that prompted the participants to say the first script to the peer, wait for a response, and then say the next scripted statement on the list. Woods and Poulsen (2006) employed the

use of both formats (written and audiotaped scripts) in a similar activity schedule design. The remaining studies did not use schedules to facilitate scripted initiations or responses.

Instructor Manipulated

Instead, during five studies, the experimenter/prompter presented scripts on written cues cards or played audio scripts to the participant at the relevant times (Argott et al., 2008; Charlop-Christy & Kelso, 2003; Dotto-Fojut et al., 2011; Ganz et al., 2008; Howlett et al., 2011). For example, in the Howlett et al. (2011) study the experimenter played an audio script from a digital voice recorder if the participant did not mand for the location of the missing toy within 5 s of looking in the container. Similarly, Dotto-Fojut et al. (2011) used a 0-s time delay in the first teaching session, in subsequent teaching sessions a 3-s time delay was used to play audio scripts when the participant approached the instructor to report the problem and request assistance.

Arranged with Stimuli within the Environment

In an effort to shift control to the natural environment, six recent studies presented scripts affixed to discriminative stimuli (Brown et al., 2008; MacDuff et al., 2007; Reagon & Higbee, 2009) or placed scripts strategically within the environment (Betz et al., 2011; Wichnick et al., 2010a, 2010b). MacDuff et al. (2007) placed scripts on photographs and toys to evoke bids for joint attention. Brown et al. (2008) printed written scripts on clear self-adhesive labels and attached to stimuli on unprinted areas and trimmed to fit the package. Reagon

and Higbee (2009) attached audio scripts directly onto toys using Velcro. Wichnick and colleagues (2010a, 2010b) packaged scripts with stimuli in ziplock bags, access to these materials were cued by a written schedule and the instruction “Share toys with friends.” Betz et al. (2011) placed audio scripts in front of the student on a placemat with his name to help evoke initiations for snack items and a sticker remained after fading and removal of scripts.

Prompting Strategies

Defining Prompts

“Prompts are often defined as ‘supplementary’, ‘auxiliary’, ‘extra’, or ‘artificial’ antecedent stimuli that are presented immediately before or after discriminative stimuli to evoke target responses” (MacDuff, 1994, p. 23). A prompt is referred to as an “auxiliary discriminative stimulus because its’ given in addition to whatever natural discriminative stimuli are associated with the behavior” (Foxx, 1982, p. 82). By definition, a prompt may only be considered a prompt if it evokes a correct response and if it does not produce the desired response it should be substituted with a different prompting strategy (Koegel, Russo, Rincover, & Schreibman, 1982). Lastly, prompts must be removed or faded so the learner responds “to the relevant stimulus in the natural environment” (MacDuff et al., 2001, p. 43).

Types of Prompts

In this review, prompts that evoked the use of the scripts (i.e., a prompt(s) was delivered to orient the participant to the script and read or repeat the audio

script) were examined and prompting strategies were grouped into one of four types: (a) gestural, (b) verbal, (c) prompting packages, or (d) manual.

Gestural. In one study, Sarokoff et al. (2001) used gestural prompts to orient participants to textual scripts.

Verbal. In three studies researchers used verbal prompts (Charlop-Christy & Kelso, 2003; Krantz et al., 1981; Shabani et al., 2002). Krantz et al. (1981) and Shabani et al. (2002) rehearsed verbal models of scripted responses with participants prior to probe sessions that were conducted later. In the Krantz et al. (1981) study, children's scripted responses targeted recalling remote events; whereas, in the Shabani et al. (2002) study, participants' scripted initiations were in relation to a toy or play activity. Shabani et al. (2002) paired verbal models with a vibrating pager during training sessions. On the other hand, Charlop-Christy and Kelso (2003) provided verbal directions for participants to respond to scripted cue cards during the cue card/written script conditions. Verbal directions included "read it" and "read it out loud." Additional verbal directions were given if the participant did not read the entire script or maintained eye contact with the conversation partner; however, examples of those verbal prompts were not included in the study. In this study, scripts were designed to promote conversational language about three different topics (e.g., games, school, and t.v.).

Prompting packages. Prompting packages were described in eight studies. Prompting packages consisted of more than one prompting strategy and often included verbal and manual prompts, gestures, and / or models (Argott et

al., 2008; Ganz et al., 2008; Goldstein et al., 1988; Goldstein & Cisar, 1992; Krantz & McClannahan, 1998). Goldstein et al. (1988) used verbal, gestural, and physical prompts to evoke scripted initiations and Goldstein and Cisar (1992) used a most-to-least prompt hierarchy that included a series of verbal prompts and models to occasion the use of scripted responses. Manual prompts were primarily used to prompt the child to point to the textual script in the Krantz and McClannahan (1998) study, except initially verbal models of the script in a "conversational volume" were used if the learner did not read the script. The verbal prompt was later "uttered sotto voce" close to the child's ear. These verbal models were always done when the child was pointing to the textual script. Unlike other studies, in the Ganz et al. (2008) study, teachers manipulated cue cards that contained the written script and corresponding picture to prompt interactions (i.e., presented scripts from behind the conversation partner in view of the participant every 30 s). In addition a "quiet" card (i.e., line drawing) gestural prompts (i.e., pointing to the card and holding it closer to the participant) were used to prompt participants not to repeat interactions and wait their turn. A verbal prompt was used at the start of the session to remind participants to "stop saying the same thing." In Argott and others' (2008) study the instructor waited for 2 s for eye contact prior to presenting the "non-verbal affective stimulus" and provided verbal prompts if the participant did not attend (i.e., said the name of the participant and "look"). The instructor or separate prompter used a 1-s delay after the presentation of a "non-verbal affective stimulus" before presenting the textual

scripts. If the participant did not read the script s/he was manually guided to point to the script until the adolescent made the target initiation.

More recently, Betz et al. (2011) used manual prompts for activating scripted audio frames during teaching. However, during baseline and extinction phases the verbal instruction “pick one” was used. Howlett et al. (2011) used manual prompts and behavioral rehearsals for errors only. In addition, a model lip prompt was used for when participants emitted a mand for location of an item in the presence of the stimulus. Because the experimenter manipulated the audio script no prompts were necessary. Lastly, Dotto-Fojut et al. (2011) used a prompting hierarchy. Initially a 0-s time delay was used in the first teaching session, subsequently a 3-s time delay was used prior to the presentation of scripts that were manipulated by the experimenter. Verbal prompts were used if the participant did not read the written script. One participant used audio scripts; if the learner did not imitate the audio script it was activated again, a verbal prompt was used if the learner did not respond to the two presentations of the audio script. Manual prompts were used to guide the participants to approach the instructor.

Odom and Strain (1986) noted that research should shift to procedures that would lessen the need for instructor delivered prompts. Therefore, the next generation of script research focused on scripts and fading of scripts with procedures that were not facilitated by adult’s verbal or gestural prompts.

Manual. Eight of 20 studies used manual guidance to prompt participants to attend to scripts (i.e., face and look at the textual script), obtain and run

Language Master cards or press voice recorded buttons (Brown et al., 2008; Krantz & McClannahan, 1993; MacDuff et al., 2007; Reagon & Higbee, 2009; Stevenson et al., 2000; Woods & Poulson, 2006; Wichnick et al., 2010a, 2010b).

Based on the current review, the most commonly used prompting procedure to facilitate the use of scripts is manual guidance. Eight studies used manual prompts alone and six studies included manual prompts as part of a prompting package or hierarchy. However, one cannot say that one prompting procedure is superior because to date, no studies have compared prompting strategies' with regard to their effectiveness in producing both scripted and unscripted language. According to MacDuff (1994), "such research may be pointless unless we have identified the variables necessary to implement individual procedures with optimal effectiveness" (p. 62).

Prompt Fading

To this point, this paper has examined prompting strategies with regard to their value in facilitating the use of scripts. In the subsequent section, scripts as prompts will be analyzed. By definition do scripts meet the criteria as prompts? Do they produce the terminal behavior? Do scripts transfer stimulus control to some other environmental cue(s) to more relevant stimuli?

Script Fading

Fourteen of the 20 studies that used scripts faded the scripts. All of these studies faded scripts back-to-front. For example if the script was "I like to play trains," the script was faded by systematically deleting the last word first, "I like to

play.” This process continues until no scripts appeared or only portions of the script remained. The remaining studies did not systematically fade scripts, instead they probed to see if participants displayed the target behavior after teaching sessions with scripts had been conducted.

Researchers used different criteria to systematically fade or remove scripts. Krantz and McClannahan (1993) faded written scripts in five phases until only one pair of quotation marks remained. Fading began when participants no longer required manual prompts to use written scripts. Initiations between peers about recently completed, current or past activities continued in the absence of the written scripts. In another study (Krantz & McClannahan, 1998), written scripts were faded in three steps, by systematically cutting away one third of the script until the script and the card that contained the script were no longer present. The script teaching condition after two consecutive sessions with no prompts, afterwards a new recipient was introduced; fading began when learners’ interaction data stabilized. Participants continued to garner attention from adults when the scripts were faded by saying the previously taught scripts “Look” and “Watch me.” Stevenson et al. (2000) faded audio scripts from end to beginning, in eight steps, by deleting words from the audiotaped recording and systematically cutting away portions of the pictures mounted on the Language Master cards. Fading began after participants’ repeated the Language Master cards with no prompts for three consecutive sessions and one session in which no prompts were required for the nonsocial activities. Only one fading step was introduced per session. Following the last fading step, the environment was

identical to the second baseline condition, in which only the schedule and the display board remained. After systematic fading of scripts, all four boys continued to interact with their teacher. Similarly, Sarokoff et al. (2001) faded written scripts in five steps after participants successfully read scripts in two consecutive sessions; first cutting away 25% of the end of the script, second, 50% of the script, third, only the first letter of each script remained, fourth, only the stimulus package and blank sheet of paper remained, and fifth, only the stimulus package remained. The stimulus package (i.e., the natural environmental cue such as a package of gummi bears) evoked initiations about the present video game or snack.

Unlike the other studies that faded systematically end to beginning with written or audio scripts, Shabani et al. (2002) paired verbal models of scripted initiations with a vibrating pager and “faded using a most-to least prompting hierarchy until the participant made independent initiations when the tactile prompt was activated” (p. 80). The authors did not present data for training sessions or indicate criteria for fading of scripts. After the scripts were trained and faded, the pager successfully cued initiations during play sessions with typical peers. After a second replication phase of the tactile prompt, the vibrating pager was faded for two of the three participants by decreasing the number of times the pager was activated; which was determined from the number of initiations emitted by the typical peers. The tactile prompt was never completely faded.

The MacDuff et al. (2007) study is unique since audio scripts contained only the word “see” to evoke bids for joint attention. Therefore, a two-step fading process was done after participants made bids for joint attention on 11 out of the 12 stimuli. The first fading step removed the model of script to the button-activated recorder; the second step was removing the recorder. After the removal of the recorders, one participant’s bids decreased and therefore additional fading steps were introduced. Blank recorders were reintroduced for all stimuli for one session, half of the recorders were removed for seven sessions, next the blank recorders were rotated across stimuli for one session, blank recorders were present on two stimuli, then one, and after 11 sessions the recorders were removed.

More recently, Wichnick and colleagues (2010 a, b) examined children’s’ initiation (Wichnick et al., 2010a) and responses (Wichnick et al., 2010b) to peers. In their first study, participants’ scripts were faded individually back to front in up to six steps until the voice recorded button was removed. Fading began after seven initiations were made in three sessions. In the follow-up study, fading of scripts was similar to the previous study and began after participants made eight or more scripted responses were made across two consecutive sessions.

Betz et al. (2011) faded scripted frames back to front in four steps until only a colored sticker remained present where the voice recorded button was previously. Fading began when the participant manded 90% of opportunities in one session. Fading occurred regardless of the child independently pushing the voice recorded button. Howlett et al. (2011) faded scripts in three steps (i.e., full,

partial, no script) when learners displayed 100% correct across two consecutive sessions. For example, an initial script was “Where’s (Name of object)?”; partial script was “Where’s” and then no script. Lastly, when participants made no errors for five consecutive sessions the first fading step began in the Dotto-Fojut et al. (2011). The remaining fading steps occurred when participants made no errors for two consecutive sessions. Scripts were faded back to front one word at a time in four steps.

The research on script fading indicates that scripts are effective prompts. They have been either systematically faded or removed. They evoke initiations, responses, and questions. The research suggests scripts may help facilitate transfer of stimulus control to other environmental stimuli.

Reinforcement

A behavior is said to be reinforced when the behavior is strengthened or the probability of the behavior increases under similar circumstances in the future. Reinforcement occurs when a presumably rewarding stimulus is presented after the occurrence of the behavior. For the purpose of this review, the contingencies of reinforcement during script and script-fading procedures were analyzed and grouped into nine categories: (a) did not specify, (b) praise, (c) tokens/points, (d) social, (e) tangible, (f) edible, (g) end of session, (h) access to specified item, and (i) none.

Three studies did not specify contingencies of reinforcement (Ganz et al., 2008; Goldstein et al., 1988; Woods & Poulson, 2006). Three studies provided

praise for correct responses (Charlop-Christy & Kelso, 2003; Krantz et al., 1981; Sarokoff et al., 2001). Eight studies delivered tokens or points for scripted and unscripted responses or initiations (Brown et al., 2008; Dotto-Fojut et al., 2011; Goldstein & Cisar, 1992; MacDuff et al., 2007; Sarokoff et al., 2001; Wichnick et al., 2010a, 2010b). Only one study provided social rewards such as a “high-five” and tangible access to toys as part of a package of rewards that also included praise, and edibles (Charlop-Christy & Kelso, 2003). Three studies delivered edibles for target responses (Charlop-Christy & Kelso, 2003; MacDuff et al., 2007; Shabani et al., 2002). Goldstein and Cisar (1992), Krantz and McClannahan (1998), and Dotto-Fojut et al. (2011) provided access to rewards at the end of the session, whereas, three studies provided immediate access to specified items (Betz et al., 2011; Howlett et al., 2011; Krantz & McClannahan, 1993). Krantz and McClannahan (1993) taught peers to interact with one another and participants controlled access to preferred items. The Betz et al. (2011) and Howlett et al. (2011) studies taught youngsters to mand for snacks or locations of preferred toys. Four studies used more than one type of reinforcement (Charlop-Christy & Kelso, 2003; Dotto-Fojut et al., 2011; Goldstein & Cisar, 1992; Sarokoff et al., 2001). Three studies clearly specified that no programmed rewards were used during sessions (Krantz & McClannahan, 1993; Reagon & Higbee, 2009; Stevenson et al., 2000). As previously mentioned, peers provided the only type of reinforcement and instructors did not deliver feedback in the Krantz and McClannahan (1993) study. Stevenson et al. (2000) provided adult attention for interaction by engaging the participant in

conversation but no systematic delivery of rewards was provided. The content of the conversation was perhaps rewarding and the adult attention may have served as a reinforcer. On the other hand, in the 2009 study conducted by Reagon and Higbee (2009) and implemented by parents provided no reinforcement. It is likely that the toys and mothers' attention functioned as reinforcers.

Study Outcomes

The most common single-subject research design used to demonstrate experimental control of the effectiveness of scripts and script-fading procedures has been the multiple baseline design. Ten studies used a multiple baseline design across participants (Argott et al., 2008; Charlop-Christy & Kelso, 2003; Dotto-Fojut et al., 2011; Krantz & McClannahan, 1993, 1998; MacDuff et al., 2007; Reagon & Higbee, 2009; Wichnick et al., 2010a, 2010b; Woods & Poulson, 2006), three studies across tasks or activities (Ganz et al., 2008; Krantz et al., 1981; Sarokoff et al., 2001), and one study was conducted across settings (Brown et al., 2008). Three studies implemented a multiple probe design. Stevenson et al. (2000) and Howlett et al. (2011) probed across participants and Goldstein and Cisar (1992) probed across scripts that were replicated across three triads. Lastly, three studies used an ABA withdrawal design. Goldstein et al. (1988) conducted two experiments that demonstrated the effectiveness of scripts in four conditions after baseline levels of performance had been established across six participants in each experiment. Shabani et al. (2002)

conducted four to five phases with three participants, ending with the tactile prompt condition for one participant and fading with the other two participants.

Nineteen out of 20 studies collected data on unscripted interactions. The only study that did not collect data on scripted responses was Betz et al. (2011). Instead researchers measured “novel mand frames” within each session. Seventeen out of 20 studies collected data on scripted interactions. The exceptions were the two studies that probed without scripts (Krantz et al., 1981; Shabani et al., 2002) and the Betz et al. (2011) study which measured only “novel mand frames”. Results of the literature suggests that increases in dependent variables occurred as a result of the script-training procedures.

Three studies evaluated additional dependent variables. Brown et al. (2008) measured the number of interactions per minute. Wichnick and colleagues (2010a,b) tracked the cumulative number of novel unscripted interactions and responses to peers. The authors defined novel if the participant had not previously said it in any previous session. Data from these studies suggest the rate of interactions and increases in the cumulative number of initiations and responses to peers occurred as a result of the script-fading procedures.

All studies assessed interobserver agreement of the dependent variables. Six studies evaluated treatment integrity or procedural fidelity of the implementation of the independent variable(s) (Argott et al., 2008; Betz et al., 2011; Dotto-Fojut et al., 2011; Howlett et al., 2011; Reagon & Higbee, 2009; Shabani et al., 2002). Only two studies included measures of social validity

(Dotto-Fojut et al., 2011; Howlett et al., 2011). One study calculated the percentage of non-overlapping data points (PNDs) as a method of determining treatment effects (Ganz et al., 2008).

Generality of behavior is a characteristic of applied behavior analysis. Skill generalization was assessed in 14 out of the 20 studies reviewed. One study assessed skill generalization across affective responses (Argott et al., 2008). Generalization was assessed in conditions identical to baseline conditions in two studies (Betz et al., 2011; Woods & Poulson, 2006). Ten studies evaluated skill generalization across stimuli (Brown et al., 2008; Dotto-Fojut et al., 2011; Howlett et al., 2011; Krantz & McClannahan, 1993, 1998; MacDuff et al., 2007; Reagon & Higbee, 2009; Sarokoff et al., 2001; Wichnick et al., 2010a; Woods & Poulson, 2006). Seven studies examined skills across conversation partners (Argott et al., 2008; Charlop-Christy & Kelso, 2003; Goldstein & Cisar, 1992; Howlett et al., 2011; Krantz & McClannahan, 1993, 1998; Sarokoff et al., 2001). Four studies probed skills in different settings where teaching was never conducted (Charlop-Christy & Kelso, 2003; Krantz & McClannahan, 1993; MacDuff et al., 2007; Woods & Poulson, 2006). Two studies noted generalization probes were conducted at different times of day (Howlett et al., 2011; Krantz & McClannahan, 1993).

Maintenance of treatment effects is a hallmark of applied behavior analysis. However, less than half of the studies reviewed (9 out of 20) measured maintenance of treatment effects. The length of time between treatment and maintenance conditions varied as well as the duration for which data were

collected. Stevenson et al. (2000) assessed maintenance after fading was complete with three consecutive data points in teaching and no prompts. The maintenance condition lasted 10-63 sessions. MacDuff et al. (2007) collected maintenance data for seven sessions after teaching and this phase was identical to baseline conditions. Other studies evaluated maintenance of skills from 1-2 weeks up to 2 months after treatment ended. Argott et al. (2008) assessed maintenance at 6 weeks. Betz et al. (2011) collected data at 1 and 2 weeks; Reagon and Higbee (2009) probed maintenance at 2 weeks. Two studies collected data at 1 month after treatment (Dotto-Fojut et al., 2011; Sarokoff et al., 2001). Howlett et al. (2011) examined maintenance of skills at 3-4 weeks and Krantz and McClannahan (1993) assessed maintenance at 2 months.

Best Practice

Horner et al. (2005) coherently outlined procedures to establish "evidence-based practices" by using single-subject research to help educators create individualized education plans and supports. This review of the literature does not document script and script-fading procedures as an "evidence-based practice." It does not meet the standards set forth by Horner et al. (2005). Of the 20 articles reviewed, 6 studies meet all of the criteria: (a) the practice is operationally defined, (b) the context and outcomes are clearly defined, (c) there is documented fidelity, (d) a functional relationship is established (Argott et. al, 2008; Betz et al., 2011; Dotto-Fojut et al., 2011; Howlett et al., 2011; Reagon & Higbee, 2009; Shabani et al., 2002). Furthermore, Horner et al. (2005) specified

that a minimum of five single-subject studies have demonstrated experimental control. Studies have been executed by three separate groups of researchers, and at least 20 participants were included in the sum of the studies. The six studies that meet the previous criteria were performed by three groups of researchers. However, only 18 subjects participated in the studies and therefore scripts and script-fading procedures do not meet the criteria set forth by Horner et al. (2005).

The review included 20 studies conducted by seven groups of researchers with a total of 59 participants. All 20 studies meet the criteria for operationally defined practice, context and outcomes, and demonstration of a functional relationship. However, few studies have monitored procedural fidelity of the practice. Therefore, it is imperative that more groups of researchers conduct studies that examine the use of scripts and measure treatment integrity.

Summary

In summary, research has shown that scripts and script fading procedures have been effective in increasing initiations and conversational repertoires for individuals with autism and developmental disabilities. Furthermore, participants' unscripted interactions have increased after the introduction, fading or removal of scripts, resulting in spontaneous generative speech in the absence of scripts (Krantz & McClannnahan, 1993, 1998; Sarokoff et al., 2001; Stevenson et al., 2000; Woods & Poulson, 2006). Research has shown that scripted responses maintain across time (Krantz & McClannahan, 1993; Sarokoff et al., 2001;

Stevenson et al., 2000) and that conversation skills across settings, people and stimuli (Krantz & McClannahan, 1993, 1998; Sarokoff et al., 2001; Woods & Poulson, 2006).

A primary deficit displayed by children with autism is a lack of spontaneous interactions with others during play (Schreibman et al., 1990). Script fading procedures have been an under researched technology in behavior analysis that has a small body of experimental research that demonstrates its' potential benefit to facilitating spontaneous language in individuals with autism (Krantz & McClannanan, 1993, 1998). While script fading procedures has been shown to be effective in arranged environments using activity schedules (Krantz & McClannnahan, 1993, 1998; Stevenson et al., 2000; Woods & Poulson, 2006) and in structured settings (Sarokoff et al., 2001), they have not yet been experimentally researched in a free operant environment that lacks the structure provided by activity schedules or other prompting systems, verbal or visual. Furthermore, the effectiveness of scripts and script-fading procedures on spontaneous verbal play initiations has not yet been evaluated. Thus, the primary purpose of the present study was to examine the effects of scripts and script fading procedures in a free play setting with preschoolers with autism on the frequency of verbal play initiations.

Research Questions

The primary research question for the current study is:

1. To what extent would the use of scripts and script-fading procedures with preschoolers with autism increase the total number of play initiations in a free play setting?

Secondary research questions for the current study include:

2. What effect does the use of scripts and script-fading procedures have on the total number of interactions during game play? What effect does the frequency of the conversation partner's interactions have on participants' interactions?

3. Do play initiations generalize across games and people?

4. Do play initiations maintain after the fading and removal of scripts?

5. Does the use of scripts and manual prompts promote independent free play (i.e., percentage of components completed for independent game play increase, generalize, and maintain)?

6. Do the total number of games played increase, generalize, and maintain?

7. Does the percentage of time samples scored for engagement / off task increase or decrease with the systematic introduction and fading of scripts and manual prompts? Does the effect generalize and maintain?

The answers to these research questions were determined by using scripts and script-fading procedures with manual prompts to promote spontaneous verbal play initiations in young children with autism. Both the child's use of scripts and unscripted interactions, engagement with games, obtaining/selecting games, returning games, and prompts were examined using

a nonconcurrent multiple-baseline design across participants. Procedural fidelity of the implementation of the independent variables was evaluated throughout all experimental conditions and social validity was assessed at the completion of the study.

CHAPTER III

METHODS

Participants

Four children with autism spectrum disorders (ASD), diagnosed by an outside agency (ages ranged from 4-5) participated in this study. Informed consent was obtained prior to participation in the study (Appendix A). Children were recruited from preschools designed to serve children with autism. Prior to the study, each child's game play and preference was surveyed by asking supervisors (i.e., professionals or graduate students who worked as teachers, therapists, case managers, data analysts and/or home programmers) were asked to identify and rank game preference for participants. Supervisors also indicated if children correctly labeled games, played without prompts, or initiated play. Finally, they described the types of vocal interactions children usually made during game play. Participants were included in the study if they displayed an echoic repertoire but did not verbally initiate play during free play, as reported by teachers and observed in the initial play observation (described below). All participants played a minimum of 16 age-appropriate games that required two or more players. In addition, participants had received instruction in using activity schedules, playing independently, greeting others, labeling, counting, sight word reading, and requesting preferred items.

Two of the participants were enrolled in a 20-hour-per-week university-based preschool program that provided instructional programs based on applied

behavior analysis. They also attended preschool in their local school districts for 12 hours per week. Ryan was 5 years 4 months and Benjamin was 4 years 10 months old at the beginning of the study. Ryan's T score on the Achenbach Child Behavior Checklist was 72 and is considered significant for pervasive developmental problems. On The Modified Checklist for Autism in Toddlers (M-CHAT) he did not display 9 of the 23 target behaviors suggestive of a strong risk for autism. He had received services for approximately 14 months. Benjamin's T score on the Achenbach Child Behavior Checklist was 82 for pervasive developmental problems and is considered significant. He had a Childhood Autism Rating Scale score of 33 indicative of the mild autism range and had received services for approximately 13 months.

The two other boys attended a private non-profit applied behavior analysis program for individuals with autism for 30 hours per week that based intervention programs on the principles of applied behavior analysis. Stewart was 3 years 6 months old at the beginning of the study and had been receiving treatment for approximately 19 months. His Gilliam Autism Rating Scale (GARS) quotient score was 102 (55 percentile). Harris was 5 years 6 months old and had attended the program for approximately 34 months. He scored a 15 on the Autism Diagnostic Observation Schedule, Module I (ADOS-I).

All of the participants could select a game from an array of choices, would respond to choice questions (e.g. "Do you want to play Memory or Don't Break the Ice?", "Pick one," when there were available choices), followed directions (e.g. "Go play a game," "Let's play Bingo."), answered questions (e.g. "What do

you want to play?"), and would play independently, as reported by the initial survey by practitioners who worked with the child. However clinicians also noted none of the children verbally initiated game play with others in the absence of directions or inquiries from others; the absence of spontaneous play initiations was also observed during the initial play observation.

Interview/Survey

A child preference survey was conducted with each participant's case supervisor (a doctoral student who manages the child's curriculum binder or home programmer) in order to identify possible toy sets for the stimulus preference assessment (Appendix B). Supervisors were asked to identify and rank games that the child played with at school but did not spontaneously request to play with another person. These games were assessed in a stimulus preference assessment. All games presented in the preference assessment were familiar to the child.

Initial play observation

Prior to baseline, an initial play observation was conducted to determine if the child met criteria for inclusion (does not verbally initiate play with others during free play). During the observation, all play materials were available and an adult who served as an available recipient of a play initiation was seated at the table. The observation lasted 10 min. The adult did not interact with the child unless the child vocally initiated play. Vocally initiating play included saying the adult's name plus labeling the game, asking the adult to play in the form of a

question (“Do you want to play?”) or direction (“Play with me”). Saying only the adult’s name or only saying the name of a game was not considered a play initiation. However, if the child said the adult’s name and the name of the game, it was considered a play initiation. Requests for assistance such as “help” were not included because it was not a specific invitation to play the game. During the observation, the researcher recorded verbatim what the child said and what games the child interacted with. The definition and measurement for initiates play were the same as described in the baseline condition.

Setting

The study was conducted in a group area of a preschool classroom (approximately 4m x 3m) for children with autism or a room designed to simulate the play area. Each setting contained a table and chairs along with a shelf on which the games, Mini-Me™ Voice Recorders, and a bell were displayed.

Materials

Mini-Me™ Voice Recorders were used to record the audio scripted initiations. A Canon Optura 60 digital video camcorder and tripod was used to videotape and a Nady Systems, Inc. 351 VR wireless microphone system with a WLT body pack transmitter was used to record audio input during sessions. Sixteen games that each of the participants had previously demonstrated the ability to play were used: 8 were used during teaching and 8 games were used to

assess generalization. All games required turn-taking and interaction with a partner (see Table 9, Appendix E).

Procedures

Stimulus Preference Assessment (SPA)

During baseline, intervention, generalization, and maintenance a daily brief SPA of the eight games selected for the condition was conducted prior to each session in order to determine a ranking of games for that session (Appendix B). The ranking was used to determine the prompting sequence for that session in case a participant did not make a game selection. If a participant did not make a game selection within the specified time limit (i.e., 10 s), s/he was prompted to select the highest ranked game remaining, according to the daily brief SPA. The SPA procedures were similar to those outlined by Carr, Nicolson, and Higbee (2000). All 8 games were available to the child to sample prior to the brief multiple stimulus without replacement SPA. The child was given the opportunity to choose between the eight games. If the child did not approach any of the games within 5 s, the instructor physically prompted the child to interact with one game for one turn until all five games had been presampled. During the SPA, all eight games were placed in front of the child on the table in a linear array with equal distance between them. The child was seated in front of the table with easy access to all of the items. The instructor said, "Pick the one you want," to the child, and allowed him/her to choose one item. If the child attempted to grab more than one item, access to the other games was blocked. The order in which

the child selects the games was recorded. Once the child had selected a game, s/he had access to the game for one turn or 10 s whichever came first. After this period of time, the game was removed from the child's hands and put out of sight. The remaining games were rearranged on the table moving the game that was on the far right to the far left and moving the remaining games to the right so that they were no longer in the same position for the next presentation. This procedure was repeated until all items had been selected and no items remained, or until the child did not select an item for 10 s. If the child failed to select an item within 10 s, all of the remaining items were scored as “8.”

Measurement Procedures

Measurement Procedures

The primary dependent measure was independent play initiations which was measured using a per opportunity measure (Appendix B). There were five opportunities per session to initiate play and data were graphed as the total number of play initiations per session, and the total number of unscripted interactions per session. Secondary dependent measures included the, frequency of prompts per session; engagement, measured as the percentage of intervals engaged per session using a 10-s momentary time sampling procedure; independent game selection and transitions between games, measured using a per opportunity measure which was graphed as the percentage of selection and transition components completed independently and finally, the conversation

partner's number of interactions (Appendix B). All measures were the same across all experimental sessions.

Response Definitions

Initiations

Uses voice recorded button. A participant was scored a + if he independently pushed the voice recorded button or a P for prompted if he needed assistance to do so, or NA for not applicable when the voice recorded buttons were not present.

Scripted play initiations. Scripted play initiations were verbal productions that matched the most recently played audio script on the voice recorded button or the previous scripted initiation on the voice recorded button (if the voice recorded button was completely faded it was considered an unscripted play initiation since no part of the script was present). A script was an audiotaped word, phrase, or sentence on a voice recorded button that prompted participants to initiate play by repeating the script. Scripts varied for each participant depending on the individual's vocal imitation ability. An example of a script was "Do you want to play?" A participant was scored a + if he repeated the script on the voice recorded button or a P for prompted if he needed assistance to do so, or NA for not applicable when the voice recorded buttons were not present.

Unscripted play initiations. Unscripted play initiations were verbal productions that differed from the audio scripts by more than conjunctions, articles, prepositions, pronouns, singular or plural endings, changes in verb tense, or the addition of the recipient's name. Unscripted initiations were scored if

the interaction was contextually related to the games available. For example, if a participant said “I want to play Thomas next.” this was scored an unscripted play initiation because no script was provided and it differed from the script for the initial play initiation which was “Do you want to play?”, and was contextually relevant to the games that were available during free play.

Initiates play. The number of play initiations for each game per session was measured, during which observers recorded verbatim all of the vocal play initiations that occurred during the session. Sessions were approximately 20 min in duration. Vocally initiating play included saying the adults name plus labeling the game, asking the adult to play in the form of a question (“Do you want to play?”) or direction (“Play with me”). Saying only the adult’s name, or only saying the name of a game was not considered a play initiation since these skills were already part of the participants’ repertoires and were not a specific invitation to play. However, if the child said the adults name and the name of the game, this was considered a play initiation. Requests for assistance such as “help” were not considered a play initiation because it was not a specific invitation to play the game. Initiating play for games, activities or toys that were not on the designated shelf were not included in the data.

Interactions. All of the participants’ and conversation partners’ interactions were recorded throughout the session. Interactions were scored verbatim from videotaped sessions. Interactions included repetitions, echolalia, single words, phrases, and statements. These were counted, summed, and graphed as the total number of interactions per session. However, repeating an

interaction that was not separated by another interaction or play action (i.e., taking a turn, gesturing, or manipulating game materials) from the adult or child; for example if the participant said “My turn,” then paused, and then repeated “My turn” without saying something different or the adult saying something, then the second occurrence of “My turn” would be counted as a non interaction; on the other hand, if the participant said “My turn” and then the adult interaction partner said “You’ve got a match,” took a turn, or the child said “I did it.” and the child said “My turn,” then the second “My turn” would be counted as a separate interactions. Echolalic responses to the observers’ audiotape or other ambient noise (repeating the initial instruction, or other students interactions nearby were excluded), inaudible statements, and noncontextual statements (statements that do not make sense, delayed echolalia from tv shows or movies not related to the characters in the games available) were considered non-interactions.

Engagement. An observation interval (10-s momentary interval) was used to score engagement. Participants were scored as engaged if they were engaged in one of the following behaviors without prompts: standing in front of the shelf, scanning, playing a game with an adult or peer (scored as E), playing a game alone (scored as A), selecting, obtaining, cleaning up or returning or carrying a game to or from the table, (scored as C). Each behavior was scored separately. No two behaviors were scored in one interval. Engagement was recorded if the participant was actively listening, talking to, walking to obtain materials or return materials to the shelf, waiting for a turn, or playing appropriately with a game from the bookshelf.

Off-task. Participants were recorded as off-task (scored as O) if they were unengaged, meaning if the previous criteria for engagement were not met or if they were engaged in any of the following behaviors: playing or attempting to play with other toys not used in the play area, attempting to leave the designated free play area, standing or sitting while not engaged in any activity, inappropriately playing with any of the objects or games, playing the game in a manner it was not intended, watching others that are not engaged in the game, attempting to interact with anyone besides the available adult for interaction, crying, or sleeping. During all sessions, independent observers used a 10-s momentary time-sampling procedure to score off-task.

Table 1

Interobserver Agreement

Participant Mean Range	SPA	Initiates Play	Components Completed	Prompts	Engagement	Interactions	Conversation Partner
Ryan	100% --	100% --	100% --	100% --	91% 83 – 100%	92% 85 – 98%	96% 85 – 100%
Benjamin	100% --	99% 80 – 100%	97% 80 – 100%	87% 50 – 100%	87% 76 – 100%	90% 63 – 99%	81% 65 – 100%
Stewart	100% --	100% --	94% 60 – 100%	94% 50 - 100%	83% 60 – 97%	89% 64 – 100%	96% 87 – 100%
Harris	100% --	100% --	99% 90 – 100%	96% 67 – 100%	93% 78 – 100%	92% 62 – 100%	93% 79 – 100%

Game selection and transitions – Components completed independently. A per opportunity measure was used to measure whether or not participants independently selected a game, obtained a game (carried it to the table) and returned the game to the shelf after completion and cleaned up the materials. There were five opportunities to engage in each of these component behaviors during each session. Data was graphed as the percentage of components completed independently per session.

Prompts. The frequency of prompts was recorded. A prompt was the moment the prompter touched the child until the moment the prompter removed his or her physical assistance was tallied as one prompt.

Interobserver agreement. A second trained observer independently scored a minimum of 30% of all sessions from videotape. Interobserver agreement (IOA) data were calculated for each session by dividing the total number of agreements by the total number of agreements plus disagreements and multiplying by 100 in order to get a percentage for sessions scored for reliability for stimulus preference assessment data, initiates play (i.e., pushes button and repeats script if present), components completed, and engagement. Reliability for the number of prompts and the number of participants' interactions and conversation partner's interactions were calculated using a frequency ratio in which the smaller frequency count was divided by the larger frequency total and multiplied by 100 in order to get a percentage. Overall mean percentages of agreement and ranges are displayed in the table below.

Mean percentages of interobserver agreement obtained were higher than 80% indicating sound operational definitions for all of the dependent variables. IOA for prompts, engagement, interactions, and conversation partner's interactions results were more variable. Instances when low IOA was obtained were likely due to several factors. Engagement was scored using a momentary time sample and disagreements were found in the interval scored not differences in the behavior. Disagreements regarding interactions (both participants and conversation partners) were likely due to poor volume, articulation, speed, or poor video quality.

Training of Data Collectors, Prompters and Conversation Partners

Undergraduate and graduate research assistants were trained as data collectors, prompters and conversation partners. Training of research assistants consisted of didactic instruction, modeling, role playing and feedback. Data collectors were trained on how to score each dependent measure from videotape. A videotape of a mock session conducted was used for data collection practice. Data collectors were required to code the videotape with 100% accuracy prior to coding experimental sessions. Research assistants who served as prompters received didactic and written instructions on the prompting procedures (described below), and participated in a role play prior to the start of intervention. Research assistants who served as conversation partners received didactic and written instructions on the types of interactions, and participated in a role play prior to the start of intervention. Conversation partners were given guidelines on how to respond to the child's interactions. The guidelines included:

invite interaction by looking and smiling at the child, respond enthusiastically, respond with statements that include words that are of the child's language level, make interesting comments, make elaborations of the child's statements (especially when the child says one word), model appropriate voice volume and intonation, make conversation as "natural" as possible – should not sound stilted and should be similar to the things other people/children would say, and model gestures and play actions (McClannahan & Krantz, 2005).

Social Validity

Teachers were asked to complete a questionnaire (see Appendix D) at the completion of the study in order to assess teachers' perceptions about the participants' initiations by watching pre and post intervention video clips.

Experimental Conditions

General procedures. Following the daily SPA and prior to all sessions, the participants stood in front of a bookcase where all of the games were located. For all sessions, a familiar adult was seated at the common table, available to be a recipient of initiations. The adult was oriented towards the child but did not initiate or prompt interactions. If the child vocally initiated play (with one of the available games) with the adult, the adult interacted with the child by modeling appropriate turn taking and contextual statements such as "My turn," "Your turn," "That was fun," or "I won!" The adult was instructed to model appropriate interactions during game play such as "My turn," "Your turn," "I won!" and so forth. The adult did not ask the child questions, or verbally prompt the child to

interact by giving the instruction “Say ___.” In addition, she did not give directions or deliver manual prompts to select a game, clean up a game or return a game to the shelf. Tacting the games, or saying the adults name were not considered a play initiation, since these skills were already part of the participants’ repertoires. Initiating play with games, activities or toys that were not on the designated shelf was ignored. Inappropriate behavior or attempts to interact with anyone other than the designated adult were ignored unless the participant attempted to leave the common area. If this occurred, he was manually redirected back to the area.

During intervention, scripted play initiations (recorded on a voice recorded button) were attached to the games with Velcro. During baseline, maintenance, and generalization, the scripts for play initiations were not present. Each session began when the primary data collector rang a bell (approximately 3 s) and gave the instructions, “It’s free choice time. These are your choices. Go find something to do.” No other instructions or rewards were delivered by the instructors or data collectors. No tangible rewards were delivered during any condition in this study. Adults who served as prompters during teaching were present in the room during all experimental conditions. Sessions were run once per day and lasted approximately 20 min (depending on how long it took to complete five games during script fading, generalization and maintenance). All baseline sessions lasted 20 min.

Baseline. During the initial baseline phase, the scripts for play initiations were not present. The participants were given the standard instruction and no additional manual or verbal prompts were delivered. The adult who served as

prompter during teaching remained on the periphery of the room. The 8 games selected for intervention via the initial paired stimulus preference assessment were available.

Pre-teaching. Non-related audio scripts and manual guidance were used to teach the child to use the voice recorded buttons. Audioscripts used in pre-teaching were three statements with corresponding stimuli that was not used during the study. Examples of non-related scripts are “Puzzles are fun” (with puzzles) and “I like to color” (with crayons and paper). Pre-teaching was conducted prior to intervention and after baseline. Sessions were conducted by doctoral-level graduate students who served as the researchers. The stimuli and voice recorded buttons were arranged on the table or floor and the researcher manually guided the participant to push the button. If the participant did not imitate the audio script, the researcher instructed the child to “Say” and then prompted the participant to push the button again. If the child did not respond to the “Say” prompt, then the researcher provided a verbal model of the script prior to manually prompting the participant to push the button. The researcher praised the participant when he imitated the script and then interacted with the child and the item. The participant did not start intervention until he had successfully repeated scripts on the voice recorded buttons three consecutive times for each of the three scripted statements when the last word of the script had been faded.

Prior to intervention, participant’s labeling skills were probed to see whether they correctly tacted games selected for each condition and the names of the conversation partners. If the child did not correctly tact the games and

conversation partners, than preteaching occurred. Preteaching consisted of presenting the game or a picture of the person with a verbal model until the child correctly identified the games and people (e.g., “Rebecca” or “Pop-up Pirates”).

Teaching

Scripts, script fading, and manual guidance. During intervention, voice recorded buttons (i.e. Mini-Mes ^{TM}) containing the play initiation scripts were attached with Velcro to each of the games. After the standard instruction was given, the prompter used manual prompts from behind the learner to guide the participant to the shelf and waited 10 s for the child to make a game selection (reach, touch, or pick up a game). If the child did not select a game within the specified time, manual prompts were used to prompt the child to select the game ranked highest during the SPA. The prompter then guided the child to the table and waited 5 s for the child to press the voice recorded button, if the learner did not activate the recorder he was manually prompted to do so. The prompter always stood behind the learner and provided assistance as needed during game play to redirect stereotypy or off task behavior that occurred for more than 5 s. Manual prompts were also used to cue participants to clean up if they did not do so within 5 s of completing the game or if a child did not put the game away within 5 s of cleaning up the game. Participants were prompted not to access a game more than once per session. This prompting sequence continued (following the SPA ranking for game selection order) until all of the games were played.

During intervention, no verbal prompts, instructions, praise or rewards were delivered after the initial standard instruction at the beginning of the session. Scripts were faded when the participant independently pushed and imitated (i.e., repeated the recorded script) the voice recorded button for two consecutive sessions. Scripts were systematically faded back-to-front by re-recording the scripts omitting the last word, until no scripts remained on the voice recorded buttons. When scripts had been completely faded, the voice recorded buttons were attached to the games without scripts for two consecutive sessions; if students initiated game play under these conditions, then the buttons were removed. Participants had to initiate game play for two consecutive sessions in the absence of the buttons before the next condition was introduced. If the child did not use the script or another appropriate contextual unscripted response, the previous script-fading step was reinstated.

Behavioral rehearsals. If script fading had not been introduced by session 15, behavioral rehearsals were used when the participant did not independently push the voice recorded button. The learner was prompted to push the button, after the learner repeated the script, the prompter placed the game back on the shelf and learner began the response chain again until he performed the initiation without prompts. This procedure was used with Benjamin and Stewart.

Blocked access. If script fading had not begun after 10 sessions with behavioral rehearsals, blocked access to the games was used. The conversation partner blocked access to the games until the learner initiated game play using

the script that was now placed on the table. This procedure remained in place for the remainder of script fading, generalization and maintenance conditions. However, after maintenance probes were conducted a probe without blocked access to the games was conducted and was identical to the baseline condition. This condition was only used for Benjamin.

Generalization probes. Generalization probes occurred when the scripts were completely faded and play initiations remained stable for two consecutive sessions. The prompter remained on the perimeter of the room. During the generalization condition, five new games were presented without scripts. Prior to generalization, participants labeling skills were probed to ensure they correctly tacted all five games. If the child did not identify all of the games then preteaching, identical to the procedures described in pre-intervention was provided. Generalization across people was assessed with a familiar typical peer but was not a classmate of the participants. The typical peer was trained to act as the recipient of the play initiation and game play partner. Games used in this session were the same as those used in teaching.

Maintenance probes. Approximately 2 and 4 weeks after completion of the generalization phase, maintenance probes were conducted. During maintenance probes, the prompter was present, but remained at least 5 feet away from the participants. Five games from the original 10 (at least two from generalization and two from teaching) were randomly selected for evaluation during maintenance. A randomly selected but familiar adult was available for interaction.

Procedural Fidelity

Procedural fidelity data was collected on approximately 30% of all sessions from videotape separate from the primary coder, prompter, and conversation partner (Appendix C). Data were collected for 32%, 33%, and 30% of all sessions for Ryan, Benjamin, and Stewart, respectively. Treatment integrity data for Harris was collected on 36% of all SPA sessions and 68% of all sessions for the fidelity of the prompter and conversation partner. The instructors' implementation of stimulus preference assessments procedures was assessed. Procedural fidelity of the initial paired stimulus preference assessment included observing components of each trial; whether or not the instructor allowed the child to presample all of the games, if the correct games were presented for the specified trial, if games were in the correct position, and if access was provided to the selected game. Procedural fidelity of the daily brief multiple stimulus without replacement preference assessment included observing components of each trial; whether or not the instructor allowed the child to presample each game, if the instructor aligned the games in front of the child equidistant apart, if access to the game was allowed after selection of a game, if the remaining games were removed after selection, and if the item selected was then removed from the array and the remaining games were rearranged by taking the game on the right and putting it on the left and moving the other games to the right. Procedural fidelity data of the SPA is reported as the percentage of components completed correctly per session.

The prompter's use of prompting procedures during intervention, generalization and maintenance was assessed for procedural fidelity. Procedural fidelity for prompters included whether or not the prompter provided a manual prompt for game selection within 10 s (+ or – 2s) of an opportunity to select a game, if the prompter used manual prompts to prompt the participant to push the voice recorded button, the frequency in which the prompter used the designated prompting procedure within 5 s of the participant failing to obtain, clean up or put away a game, or redirect stereotypy or off task behavior. The adult interaction partners' interactions during all sessions were also assessed. Procedural fidelity for the adult interaction partner assessed whether or not the adult waited for the participant to initiate before interacting, if the adult modeled appropriate play interactions during game play. These measures are reported separately as a percentage of components implemented correctly per session. The number of questions, instructions, and prompts the adult provided are also reported. Means and ranges for the fidelity of the prompter and conversation partner are displayed in Tables 2 and 3.

Table 2

Procedural Fidelity of Prompter

Participant Mean Range	SPA	Game selection	Voice recorded button	Prompts	Obtaining, cleaning up, & putting away	Redirect
Ryan	100% --	100% --	100% --	100% --	100% --	100% --
Benjamin	100% 96 – 100%	100% --	100% --	87% 50 – 100%	100% --	100% --
Stewart	99% 91 – 100%	100% --	100% --	100% --	100% --	92% 0 – 100%
Harris	100% --	100% --	100% --	100% --	100% --	100% --

Table 3

Procedural Fidelity of Conversation Partner

Participant Mean Range	Waited for the participant to initiate interaction	Modeled appropriate interactions	Asked questions	Provided instructions	Prompted the participant
Ryan	100% --	100% --	< 1 .33 0 - 2	1.33 0 - 4	<1 .16 0 - 1
Benjamin	100% --	100% --	<1 .07 0 - 1	0 --	0 --
Stewart	100% --	100% --	0 --	<1 .25 0 – 2	<1 .42 0 – 3
Harris	100% --	100% --	<1 .06 0 - 1	0 --	<1 .06 0 - 1

CHAPTER IV

RESULTS

Figure 1 shows the total number of play initiations for the four participants across all conditions. During baseline, none of the boys made initiations to the available conversation partner. During the generalization probe with games never taught, the boys did not initiate game play. No prompts were provided during baseline conditions. The level of play initiations was low for all participants with no variability.

With each introduction of scripts, initiations for all four learners increased to five (the maximum number possible during one session). After each learner reliably pressed the voice-recorded button (without prompts) five out of five times for two consecutive sessions, scripts were systematically faded back-to-front. Ryan's scripts were completely faded after 8 sessions and showed no variability. Benjamin's data for prompts to sue the scripts were variable and therefore behavioral rehearsals were introduced and then blocked access to the materials in order to meet the criteria for fading; scripts were completely faded after 29 sessions. Like Benjamin, Stewart's data were variable and behavioral rehearsals were introduced and scripts were completely faded after 26 sessions. The trend for Harris's data for prompted responses was one prompt during the initial teaching session, and after two consecutive days without prompts he required one prompt during the first session with a faded script, this process continued to the next fading step. Afterwards, he no longer required prompts and his data

remained stable at zero prompts for the remainder of the study. His scripts were faded and removed in11 sessions.

During generalization probes, verbal play initiations generalized across games after fading of scripts for all participants. Play initiations with a typical peer increased from baseline for all learners; Ryan and Benjamin made five play initiations, Stewart made 4, and Harris made 3. Maintenance probes were conducted approximately two and four weeks after generalization probes were conducted. Verbal play initiations maintained after the introduction and fading of scripts for all of the boys. Since Benjamin required blocked access to reliably initiate play, after the generalization and maintenance probes a no block probe was conducted. During this probe he reliably initiated play 5 out of 5 opportunities without prompts.

Prompts

Figure 1 (Appendix F) displays the total number of prompts used for pushing the Mini-me. Ryan received 2 prompts for pushing the Mini-me to initiate game play; Benjamin 34; Stewart 19; and Harris 3 during the script fading condition. The total number of prompts provided (not for initiating) during all play sessions was 9, 126, 73, and 27, respectively for Ryan, Benjamin, Stewart, and Harris (Figure 2, Appendix F). No prompts were provided for Ryan, Benjamin, and Harris during generalization and maintenance probes. Stewart received one prompt during the generalization probe with new games and five prompts during the probe with a peer. He received no prompts during maintenance probes.

Game Components

The percentage of components completed independently and the total number of games played are displayed in Figure 3 (Appendix F). During baseline conditions, the percentage of components completed for obtaining, playing, and returning materials was lower and or more variable for three of the participants when compared to the introduction of scripts and manual prompts. The exception was Harris who did not complete any of the components during baseline; he merely sat in the chair at the table and did not interact with the available conversation partner. Ryan completed a mean of 13% of components (Range 10% - 20%); Benjamin completed a mean of 49% (Range 30% - 100%); and Stewart completed a mean of 26% (Range 20% - 50%).

After the introduction of scripts and manual prompts, participants' percentage of components completed independently increased. Ryan showed no variability in his performance and completed a mean of 99% (Range 90% to 100%), Benjamin showed variability throughout intervention but the overall trend was high 92% (Range 70% - 100%), Stewart displayed an increasing trend in the first three teaching sessions and then a stable performance throughout the remainder of the study 95% (Range 40% - 100%), and Harris performed similar to Stewart with an increasing trend at the start of intervention and a high level performance for the remainder of the study 94% (Range 60% - 100%) of components independently. In all subsequent conditions, the boys completed 100% of components independently.

Number of Games Played

During the free play baseline conditions, the number of games participants played varied. Ryan sampled one to two games per session, Benjamin sampled two to five games per session, Stewart consistently played two games per session until the last baseline session when he sampled all five games, and Harris did not play any of the games during baseline. During the generalization probe across games prior to intervention, Ryan played one game, Benjamin played two, Stewart played three, and Harris did not play with any of the games available. With the introduction of scripts and manual prompts, all four boys obtained and played five games per session for all remaining phases of the study.

Number of Interactions

The number of interactions participants and conversation partners made per session is displayed in Figure 4. The number of interactions participants made during baseline varied. Ryan made a total of 71 interactions in the 4 sessions (mean 18, range 13-23); Benjamin made a total of 78 interactions in 7 sessions (mean 11, range 3-21); Stewart made 168 interactions in 10 sessions (mean 17, range 1-90); and Harris made zero interactions during 5 baseline sessions. Conversation partners made no statements toward participants during the baseline condition. Ryan, Benjamin, and Harris's data were low and stable. Stewart's data during baseline was initially high but a decreasing trend after the second baseline session; the level then remained low and stable.

During the script fading condition participants' number of interactions increased. Ryan made a total of 705 interactions 10 sessions (mean 71, range 26-91) his conversation partner made 699 (mean 70, range 31-116); Benjamin made a total of 1,395 interactions in 27 sessions (mean 52, range 24-105) his conversation partner made 1,819 (mean 67, range 36-117); Stewart made 1,888 interactions in 25 sessions (mean 73, range 25-127) his conversation partner made 2,650 (mean 102, range 59-162); and Harris made 523 interactions during 13 sessions (mean 40, range 18-61) his conversation partner made 1,032 (mean 79, range 57-115). Throughout intervention, all participants' interactions were variable and higher than baseline. Each participant's level of interactions mirrored the trend of the conversation partners.

The number of interactions participants and conversation partners made during the generalization probe across games were as follows: 61 and 65, 64 and 113, 47 and 103, and 20 and 56 for Ryan, Benjamin, Stewart, and Harris, respectively. The number of interactions participants and a peer made during the second generalization probe were as follows: 59 and 100, 56 and 37, 91 and 61, and 21 and 1 for Ryan, Benjamin, Stewart, and Harris, respectively.

Interactions maintained during the two follow-up probes. The number of interactions participants and conversation partners made were: 70 and 72, 37 and 36 for Ryan; 48 and 68, 25 and 61 for Benjamin; 87 and 88, 56 and 69 for Stewart; and 39 and 65, 47 and 69 for Harris. During the no block condition for Benjamin he made 29 interactions and the conversation partner made 62.

Engagement

Figure 5 (Appendix F) displays participants' levels of engagement. During baseline, participants were scored as engaged if they were standing in front of the shelf, scanning, or playing a game with an adult or peer. Table 4 displays engagement means and ranges for each of the participants. Ryan was scored a mean of 1 interval, range 0-2. Benjamin was scored a mean of 1 interval, range 0-3. Stewart and Harris were scored a mean of zero intervals. Stewart's range was 0-2 and Harris did not display a range. Participants were scored engaged in playing a game alone a mean of 97 (range 88-100), 86 (range 56-96), 83 (range 57-92), and zero (no range), respectively, for Ryan, Benjamin, Stewart, and Harris. The mean percentage of intervals scored for selecting, obtaining, cleaning up or returning or carrying a game to or from the table for Ryan, Benjamin, Stewart and Harris were 1 (range 0-5), 13 (range 2-41), 11 (range 7-19), and zero (no range). The mean percentages of intervals scored for off task were 1 (range 0-5) for Ryan, 1 (range 0-3) for Benjamin, 5 (range 0-24) for Stewart, and 100 (no range) for Harris. The trend during baseline for three of the participants was high and slightly variable for engaged alone or scored as engaged on selecting, obtaining, cleaning up materials or returning games to the shelf. Few data points were scored for off task behavior. For Harris he showed no variability in his performance and was scored off task.

Table 4

Engagement Means and Ranges

Participant	Engaged with conversation partner	Engaged alone	Engaged in selecting, obtaining, cleaning-up or returning games	Off-Task
Ryan	76 (range 69-83)	1 (range 0-8)	23 (range 17-31)	0 (no range)
Benjamin	70 (range 59-78)	1 (range 0-9)	28 (range 17-41)	0 (range 0-1)
Stewart	75 (range 58-83)	0 (range 0-4)	25 (range 16-42)	0 (range 0-2)
Harris	78 (range 75-83)	0 (no range)	22 (range 17-25)	0 (no range)

After the introduction and systematic fading of scripts the mean percentages of engagement shifted to engaged with the conversation partner and selecting, obtaining, cleaning-up or returning materials, decreases in off task behavior occurred. Data are represented below.

Learners' engagement during the generalization probe across games did not vary from treatment in terms of level. Data for engagement with the conversation partner was: 77%, 63%, 74%, and 76% for Ryan, Benjamin, Stewart, and Harris. Benjamin, Stewart, and Harris had no intervals scored for engaged alone; Ryan was scored as engaged alone during six intervals. Learners were scored for selecting, obtaining, cleaning-up or returning games

during 17, 37, 26, and 24 intervals for Ryan, Benjamin, Stewart, and Harris. None of the learners were scored as off task during the probe.

The number of intervals participants were scored as engaged differed slightly during the generalization probe with a peer. Ryan, Stewart, and Harris's levels of engagement were lower. Ryan and Stewart's levels were within the range of intervention, but, Harris's was lowest during this probe. The percentage of intervals scored as engaged with the peer was as follows: 66%, 71%, 64%, and 57% for Ryan, Benjamin, Stewart, and Harris. Ryan and Harris were scored as engaged alone for 4% and 14% of intervals; Benjamin and Stewart were not scored as engaged alone. Engagement for selecting, obtaining, cleaning-up and returning games were 30%, 28%, 33%, and 28%. Ryan was not scored for off task; Benjamin and Harris were scored for 1% of intervals as off task, and Stewart was scored for 3% of intervals for off task behavior.

The means and ranges for engagement during the two maintenance probes are presented in Table 5. During the no block condition for Benjamin, he was engaged with the conversation partner 51%, engaged alone 0%, engaged in selecting, obtaining, cleaning up or returning materials 45%, and off task 4% of the intervals scored.

The means and ranges of the duration of sessions for each participant are presented in Table 6.

Table 5

Maintenance Engagement Means and Ranges

Participant	Engaged with conversation partner	Engaged alone	Engaged in selecting, obtaining, cleaning-up or returning games	Off-Task
Ryan	69 (range 66-72)	4 (range 0-8)	26 (range 18-34)	1 (range 0-2)
Benjamin	57 (range 47-66)	0 (no range)	44 (range 34-53)	0 (no range)
Stewart	68 (range 62-73)	1 (range 0-3)	31 (range 27-35)	0 (no range)
Harris	75 (range 73-77)	0 (no range)	25 (range 23-27)	0 (no range)

Social Validity

Five teachers completed social validity surveys after watching a DVD with selected video segments of baseline and intervention sessions. All teachers viewed the same videos independently from one another. Video clips from baseline and intervention were randomly selected and sequenced. Teachers volunteered to complete the survey while they worked at a private preschool for children with autism based on the principles

Table 6

Duration of Sessions Mean and Ranges

Participant	Script fading mean range	Generalization games peer	Maintenance probe 1 probe 2	No block
Ryan	13 min 12-17 min	15 min 15 min	10 min 8 min	NA
Benjamin	16 min 11-25 min	17 min 20 min	14 min 14 min	20 min
Stewart	14 min 8-20 min	15 min 23 min	16 min 12 min	NA
Harris	11 min 9-13 min	8 min 23 min	9 min 11 min	NA

of applied behavior analysis. Teaching experience varied from 1 to 6 and a half years, and worked with students with autism or developmental disabilities from early intervention up to age 8. Teachers were asked to watch a video segment and answer the following two questions by circling “yes” or “no” (Appendix D): “Did the child initiate play?” and “Did the child interact with the adult or peer?”

All of the teachers answered “no” for the eight questions posed for baseline sessions, meaning the viewers did not observe the participants initiate play or interact with the adult or peer. Three teachers reliably answered “yes” to both questions after observing intervention sessions for all four participants. One teacher answered “yes” to seven out of the eight questions after observing intervention clips, scoring “no” to the question “Did the child interact with the adult or peer?”. The other teacher answered “yes” to five out of the eight questions regarding intervention segments, scoring “no” to the question “Did the child

interact with the adult or peer?" for three segments but noted that two of the games did not promote turn taking for "Wacka Mole" and "Hungry Hungry Hippos". The teacher noted for the third clip that the child took turns playing the game with the adult but did not say "My turn" or "Your turn". Teachers always answered "no" to the question "Did the child initiate play?" and "Did the child interact with the adult or peer?" for baseline segments. All teachers reported that the children initiated play during treatment sessions. However, two of the teachers felt the children did not interact with the adult or peer during treatment sessions after observing two and three video clips, respectively.

CHAPTER V

DISCUSSION

Scripts and script-fading procedures have been effective in teaching individuals with disabilities an array of initiations. The purpose of the current study was to evaluate the use of scripts and script-fading procedures with preschoolers with autism and their effect on (a) the frequency of play initiations in a free play setting, (b) the frequency of interactions during game play, (c) skill generalization across stimuli and people, and (d) maintenance of play initiations after fading and removal of scripts. Furthermore, the frequency of the conversation partner's interactions effect on (e) participants' interactions was examined. Lastly, the use of scripts and manual prompts were analyzed for its' effects on (f) independent free play.

The answers to these research questions were investigated by using scripts and script-fading procedures with manual prompts to promote spontaneous verbal play initiations in young children with autism in a nonconcurrent multiple-baseline design across participants. Appropriate levels of interobserver agreement and procedural fidelity of the implementation of the independent variables were obtained throughout all experimental conditions. Teachers' reports of social validity indicated children's independent play initiations were observed in all videotaped segments for treatment sessions and the absence of play initiations during baseline.

Experimental control was established by replicating the effect of scripts with each independent leg of the multiple baseline. As noted by Barlow and

Hersen (1984) replications across three to four baselines are more convincing of a functional relationship. During all baseline conditions, participants did not initiate play; upon the introduction of the independent variables (i.e., scripts and manual prompts) with Ryan, an immediate increase in the number of initiations occurred to the total number possible while the remaining three participants baseline initiations remained at zero. With each successive manipulation of the independent variables a predictable change in the number of play initiations occurred demonstrating a functional relationship. Thus suggesting, the study has a high degree of internal validity and that the behavior change observed was likely a function of the systematic manipulation of the independent variables and not the result of confounding variables. One possible threat to internal validity was participants lived in two different states and attended different schools for children with autism. However, this threat was minimized due to the fact children were of similar ages, and had similar histories of behavioral intervention. In particular, their experiences with game playing, activity schedules, and script-fading procedures. Since this potential confound was not a threat to internal validity as demonstrated by the systematic replication of the effect of the independent variables on the dependent measures, it actually increases the degree of external validity for this study, as if it were a direct replication (Sidman, 1960). This indicates the likelihood of the study having generality among similar subjects.

Generalization across stimuli (i.e., games) occurred for all four participants. All participants initiated play for the 5 possible games that were

never taught. Generalization was facilitated through the use of training sufficient exemplars (games, conversation partner), programming common stimuli (general instruction, bell, shelf, conversation partner), and perhaps natural maintaining contingencies existed (access to the games, conversation partner's attention) as described by Stokes and Baer (1977). On the other hand, during a generalization probe with a typical peer, only two of the participants (Ryan and Benjamin) initiated for all five of the games available. The two other participants (Stewart and Harris) made initiations to the peer for four and three games, respectively. This is likely due to the low frequency or lack of interactions the peer made during the probe (see Figure 4 - Total number of interactions), essentially putting the participant on extinction since the raw data indicate the missed opportunities were at the end of the sessions. Both participants made a higher number of interactions throughout the session than the peer. Maintenance of play initiations (when intervention was removed over the specified time period) occurred for all participants. Three of the participants (Ryan, Benjamin, and Harris) reliably initiated 5 out of 5 opportunities during the two follow up probes and Stewart initiated 5 out of 5 opportunities during the first probe and initiated 4 times during the second follow up probe.

Results of this study are consistent with previous script fading research (Krantz & McClannahan, 1993, 1998; Reagon & Higbee, 2009) in that the number of play initiations increased, generalized across games and people, and maintained after the introduction, fading, and removal of scripts in comparison to baseline levels. In addition, the number of interactions increased after the

introduction of scripts (i.e., unscripted interactions). Unlike prior studies, the current study set forth to examine the effect of the frequency of the conversation partners' interactions on the participants' interactions during free play. Results show analogous data paths during all conditions for conversation partners and participants, suggesting the conversation partner may have both antecedent and consequent effects on unscripted language (Hart & Risley, 1995). Furthermore, participants' levels of independence during free play was examined by multiple dependent measures included the number of prompts per session, the number of games played, the percentage of game playing components completed independently (i.e., obtaining, playing, and returning materials), and the percentage of intervals scored for engaged alone, with conversation partner, selecting, obtaining, cleaning up and putting away materials, as well as off-task behavior. Results demonstrate the use of manual prompts as an effective teaching procedure to increase independence during free play. This is evident by participants' increase and stability in the number of games played per session, percentage of game playing components, and engagement. More importantly, decreases in the number of prompts per session and percentages of intervals scored for engaged alone and off-task. It should be noted that these levels of engagement and decreases in the numbers of prompts occurred without the aide of an activity schedule (see Reagon, 2012 for a review).

Limitations

Although results from the current study are promising in regards to play

initiations, interactions, and independence for young children with autism during play, several limitations must be discussed. First, only one generic script was taught to each participant. The same script was attached to each of the five games for a participant. This may have prohibited response variability of initiations. Second, the criteria for fading of scripts may have been too strict, two consecutive sessions without prompts. This potential limitation may have contributed to the lack of variability in play initiations, as previous research has noted that fading of scripts have resulted in new unscripted responses (Krantz & McClannahan, 1993, 1998). In addition, two participants (Benjamin and Stewart) required additional independent manipulations in order to fade scripts; less rigorous criteria may have precluded the additional prompts. For Stewart, behavioral rehearsals were a sufficient consequence to decrease prompts and meet criteria for fading. However, Benjamin required the no block condition in order to meet criteria for fading. It is possible that overshadowing occurred. The presence of a game(s) interfered with the acquisition of stimulus control of the presence of the voice-recorded button. The voice-recorded button was strategically placed on games in order to help facilitate transfer of stimulus control directly to the presence of the game. Motivating operations to play the game may have hindered acquisition of stimulus control of the script. Therefore, rearranging the environment, placing the script on the table, was effective in producing a desired outcome because access to the games was contingent on initiating play prior to obtaining the game.

Third, although independent observers that did not include the prompter or conversation partner scored procedural fidelity data, interobserver agreement for treatment fidelity was not collected. Fourth, social validity data were scored on the presence or absence of initiations and interactions. Information regarding the quality of interactions was not obtained. Fifth, anecdotal reports from videotaped sessions indicate that participants would often imitate verbal and nonverbal play behaviors such as gestures of the conversation partner. Examples from the game “Go Away Monster” include saying “No monster! Phew!” and stroking the forehead; or in the presence of a monster, saying “Oh scary monster!” and covering mouth or eyes. Although verbatim data were collected on interactions, the data did not allow coders to determine the sequence of interactions (i.e., if a child imitated the conversation partner) and there were no dependent measures that accounted for these behavioral changes. The role of the conversation partners’ interactions on participants’ behavior is preliminary; only examining, the number of interactions per session

Sixth, generalization was only probed across games and with a peer. During baseline, a probe was conducted across games but not with a peer because it was hypothesized that if children did not readily initiate with a familiar instructor it would be unlikely they would initiate with a peer. Generalization across settings and people (e.g., home, parents, siblings) would have added to the external validity of the study. Maintenance of treatment effects was assessed but was limited to two follow up probes conducted at 2 and 4 weeks after the

conclusion of treatment. While this may be a limitation, prior to this study less than half of the script fading studies assessed maintenance.

Future Research

The current study sets the framework for additional work in the areas of script and script-fading procedures and independent play. Future research should evaluate the use of multiple scripts to promote variability among play initiations and interactions. An examination of different script fading criteria may be informative in regards to its' affect on unscripted language, variability, prompts, and stimulus control. It may behoove applied researchers to include interobserver agreement of fidelity measures in future research. In addition, applied researchers may want to consider adding measures of social validity that address the quality of initiations or interactions.

The current literature on script and script-fading procedures does not include experimental research concerning the role of the conversation partner on participants' verbal behavior. The role of the conversation partners' interactions and participants' verbal and nonverbal behavior may be operationally defined. Verbal behavior may be analyzed as: unscripted interactions including measures for novel language (i.e., never said in previous sessions) and spontaneous language as defined by Sigafoos and Reichle (1993) "communicative acts … that occur in the absence of some cue, prompt, or imitative model" (p. 193). Furthermore an analysis of prompts may be advantageous. Prompted verbal behavior may be coded and analyzed as responses to an interaction or question

(i.e., intraverbal behavior), prompted interactions (e.g., “say ‘__’” or scripted), echolalia (repeating of spoken words, immediate or delayed – unless contextual), previously scripted, and previously modeled verbal behavior. The complexity of interactions may also be evaluated and categorized as single words, phrases, or multiple sentences per interaction. Additional research on conversation partners’ and participants’ intonation/affect, gestures, proximity to one another, and other play behavior (e.g., set up, turn taking) may be necessary to fully understand the development of verbal behavior during play. A systematic evaluation of the conversation partner’s verbal behavior may be beneficial. Hart and Risley’s (1995, 1999) groundbreaking longitudinal research on children and their families from a wide range of socioeconomic status and the development of language may shed some insight on how to develop coding measures for a conversation partner. Once reliable dependent variables are established additional research on the training of conversation partners and their affect on participants’ language may be done. For example, does scripting parts of the conversation partner’s interactions (e.g., adjective, adverbs, verbs, prepositions, etc.) increase the likelihood of children including those parts of the conversation partner’s model in future interactions?

Future research may want to investigate skill generalization across additional settings and people. For example does play initiations and independent play generalize to home with parents or siblings, or a typical classroom with more than one peer? The lower levels of responding observed during the generalization probe with a typical peer suggests further research

needs to be done on the training of conversation partners and the effect that this has on participant responding. Lastly, researchers are encouraged to examine maintenance of skills for prolonged periods of time (i.e., longer than 1 month). In doing so, analyzing remote contingencies that may facilitate skill maintenance (Dunlap & Plienis, 1988).

Conclusions

The current study adds to the body of scientific literature in several ways. It adds to the growing body of research on scripts and script fading with preschoolers with autism. In particular, it is the fourth study related to play and the only study focusing on game play, while other studies have investigated the use of scripts on sociodramatic play (Goldstein et al., 1988; Goldstein & Cisar, 1992), and toy play (Reagon & Higbee, 2009). However, Goldstein et al. (1988) and Goldstein and Cisar (1992) did include dependent measures of independent performance related to targeted verbal and nonverbal responses for sociodramatic play. The current study is the only study that involved the participant selecting, obtaining, initiating play, playing, cleaning up and putting away materials and included measures of both independence and engagement.

The absence of an activity schedule is an important variable in the current study. First, it may have helped transfer stimulus control to the relevant stimuli. Similar to the three previous studies (Brown et al., 2008; MacDuff et al., 2007; Reagon & Higbee, 2009) that placed scripts directly on stimuli in order to help facilitate transfer of stimulus control to natural stimuli. Second, unlike previous

free play studies with scripts (Goldstein et al., 1988; Goldstein & Cisar, 1992; Reagon & Higbee, 2009) participants were arranged in the environment with the play materials, in the current study participants were taught to select a game from an array and approach the conversation partner. The current study extends previous game playing research done with joint activity schedules (Betz, Higbee, & Reagon, 2008) in that manual prompts alone may be effective in increasing levels of independence and appropriate play without additional visual supports (i.e., schedules).

Eight previous studies have documented manual prompts alone have been effective in cuing the use of scripts (Brown et al., 2008; Krantz & McClannahan, 1993; MacDuff et al., 2007; Reagon & Higbee, 2009; Stevenson et al., 2000; Wichnick et al., 2010a, 2010b; Woods & Poulson, 2006) and three studies have not programmed systematic delivery of reinforcement (Krantz & McClannahan, 1993; Reagon & Higbee, 2009; Stevenson et al., 2000). In addition, the current study used daily SPA in an attempt to maintain motivation for initiations and game play. Unlike the previous study done in the home with parents (Reagon & Higbee, 2009) in which the level of play initiations for one participant did not maintain and new toys needed to be added in order to increase initiations in subsequent sessions. The current study adds to these lines of research in which both antecedent and consequent variables may have been analyzed to minimize the amount of auxiliary manipulations needed in order to obtain a desired behavior change. These procedures may minimize the

possibility of the prompter becoming embedded in the targeted response chain, developing stimulus control for initiations, or prompt dependence.

Although previous researchers have assessed skill generalization, this is the first script fading study that has evaluated skill generalization with a typical peer. It is also important to note that in this review less than half of the studies evaluated maintenance of treatment effects. The current study adds to the body of research assessing maintenance. Furthermore, it is the third study in this line of research to include measures of social validity.

Finally, the current study meets the standards set forth by Horner et al. (2005) for best practice. In particular, with the inclusion of the four participants from this study, the literature would include 22 participants. The experimental research on script fading would now meet the criteria for evidence-based practice since this study included both measures of procedural fidelity and social validity.

Eight studies have examined the use of scripts and script-fading procedures in a free operant setting (Betz et al., 2011; Brown et al., 2008; Ganz et al.; 2008, Goldstein et al., 1988; Krantz & McClannahan, 1993; Reagon & Higbee, 2009; Shabani et al., 2002; Wichnick et al., 2010a). Baer and Fowler (1984) described free operant behavior as “discrete,” and behavior that “can be emitted at nearly any time.” Therefore, studies in which the environment was conducive to these behaviors were classified as a free operant setting.

A discussion of stimulus control and spontaneity may be relevant when examining free operant behavior. Sigafoos and Reichle (1993) described spontaneous verbal behavior in terms of stimulus control, “verbal behavior that

occurs in the absence of some explicit instructional prompt (e.g. imitative models, questions)" (p.195). Spontaneity can be conceived "as issues of stimulus control" (p.195). The authors present a continuum of spontaneity as proposed by Halle (1987). Less spontaneous verbal behavior is evoked by physical guidance, modeling, questions or mands, whereas more spontaneous verbal behavior is evoked or elicited by the presence of objects, events, the presence of a listener, or contextual and interoceptive stimuli. The authors go on to explain spontaneous verbal behavior is likely due to some environmental variables and the goal of intervention and research is to facilitate the "transfer of stimulus control of verbal behavior from explicit instructional prompts to more natural discriminative stimuli" (pp. 195-196).

The current study adds to the 8 previous studies in which scripts were used in a free operant setting (i.e., free play). In 4 of these studies an instructor controlled discriminative stimuli. In the Betz et al. (2011) study an arbitrary stimulus (i.e., sticker) remained in place to facilitate mands when scripts were absent. When scripts were present the instructor selected and placed the voice recorded button on the table and controlled access to snacks. During baseline and extinction phases, the verbal cue "Pick one" was used. Similarly, in the Ganz et al. (2008), Goldstein et al. (1988), and Shabani et al. (2002) studies instructors manipulated scripts. Two of the studies did not describe reinforcement procedures (Ganz et al., 2008; Goldstein et al., 1988) and the Shabani et al. (2002) study did not provide reinforcement during sessions. Two studies (Brown et al., 2008; Wichnick et al., 2010a) affixed scripts on stimuli or packaged scripts

with stimuli in order to help transfer stimulus control, however both of these studies provided reinforcement using participants' motivational systems (e.g., token boards or point systems). In the remaining two studies, Krantz and McClannahan (1993) and Reagon and Higbee (2009), instructors did not control scripts and rewards were not delivered. The distinction between the two studies is that the Krantz and McClannahan (1993) study used a "talk" schedule to facilitate written scripts during activities and during the Reagon and Higbee (2009) study, parents arranged the play materials and scripts prior to the start of the session. The current study is different from previous free operant studies in that scripts were affixed to games, participants selected a game, approached a conversation partner, and no programmed rewards were delivered in an effort to transfer stimulus control to natural environmental stimuli (i.e., games) and natural maintaining consequences (i.e., game play and adult/peer attention/participation).

Free playtime is common in typical and special needs preschool classrooms. Incidental teaching and activity schedules are often used during this time to develop language and engagement (Betz et al., 2008; Hart & Risley, 1995). The current study suggests scripts and script-fading procedures and manual prompts without the use of schedules may be effective in increasing initiations and engagement during free play. Morrison, Sainato, Benchaaban and Endo (2002) noted, "Children who are unable to participate in play experiences are at risk for future deficits and have greater difficulty adjusting to preschool environments where individual instruction is limited (Buysse, Wesley, Keyes, &

Bailey, 1996; Gallagher, 1997). For preschoolers with autism, absent or restricted play skills might prevent opportunities for learning and successful participation in inclusive classrooms." (p.58). This is especially important when the child to teacher ratio is increased, and the child with autism may no longer receive or have limited one to one instruction. Discrete trial instruction is common in early intensive behavioral programs to teach basic skills, however this may inhibit spontaneous language, as children are reinforced for responding and waiting appropriately for the next trial (Krantz & McClannahan, 1999). Therefore, it may be essential to include other behavioral teaching procedures to promote the use of spontaneous language such as script fading, incidental teaching or natural environment training (Sundberg & Partington, 1999). Furthermore, researchers have noted several possible benefits from teaching children with autism independence including increases in instructional time, learning, peer interaction and decreases in the amount of supervision, disruptive and stereotypic behavior (Krantz et al., 1993; MacDuff et al., 1993; Morrison et al., 2002; see Reagon 2012 for a review).

In conclusion, teaching young children with autism to independently initiate game play and remain appropriately engaged during free play may be considered a "behavioral cusp." Rosales-Ruiz and Baer (1997) defined a cusp as "a behavior change that has consequences for the organism beyond the change itself, some of which may be considered important" (p.537). Bosch and Fuqua (2001) outlined a model for selecting target behaviors based on behavioral cusps. The authors suggested target behaviors should provide access to new

reinforcers, contingencies, or environments, have social validity, generality, compete with inappropriate behavior, and benefit others.

By teaching youngsters to select, obtain, approach and initiate play, recipients of initiations exposed them to hundreds of language models. Hart and Risley's (1995, 1999) research "revealed that the most important aspect of children's language experience is its amount" (p. xxi). The current study has shown play initiations generalized across games and with a peer, and maintained over a four-week period. High levels of engagement suggest the procedures were effective in increasing play with others and may be effective in competing with inappropriate behavior. Lastly, social validity measures completed by preschool teachers suggest the procedures were effective. These behavioral changes in young children with autism play may expose them to more reinforcers versus punishers in the future and the potential to learn more skills.

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Wichnick, A. M., Vener, S. M., Pyrtek, M., & Poulson, C. L. (2010b). The effect of a script-fading procedure on responses to peer initiations among young children with autism. *Research in Autism Spectrum Disorders, 4,* 290-299.

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APPENDICES

Appendix A

Informed Consent

INFORMED CONSENT

USING SCRIPT FADING PROCEDURES TO TEACH PRESCHOOLERS WITH AUTISM TO INITIATE PLAY IN A FREE OPERANT SETTING

Introduction: Professor Thomas S. Higbee in the Department of Special Education and Rehabilitation at Utah State University is conducting a research study to find out more about the use of scripts and script fading procedures to promote spontaneous play initiations in children with autism. Your child have been asked to take part in this research study because your child is currently enrolled as a student in the ASSERT Preschool Program and meets the criteria to be involved in this study. There will be approximately 3 child participants. This study will last approximately 10 weeks.

Purpose of the Study: This study will investigate the use of scripts and manual guidance on spontaneous play initiations and game play during free play and to what extent does it have an effect on children's interaction during game play.

Procedures: If you agree to allow your child to be in this study, the following will happen to your child. A survey will be conducted in order to obtain the child's current initiations and game play abilities and identify possible games for the preference assessment. A brief assessment will be conducted prior to intervention to identify your child's preferences for games. Baseline sessions will occur prior to intervention in order to assess your child's current level of performance. Prior to intervention, your child will be taught how to use voice recorded buttons with scripts. During intervention your child will be prompted to use voice recorded buttons that have prerecorded scripts that will prompt your child to initiate play. After the completion of intervention generalization with a peer and new games will be assessed. After two weeks, a maintenance probe will be conducted in order to assess whether or not the child has retained the play initiations. Afterwards you will be asked to complete a brief survey. Your child will be videotaped during these times for the researchers to look at later for data collection purposes. The video may be used for presentations about the research, but to ensure confidentiality, your child's names will not be used. Any videotapes created will be kept in a locked file cabinet in a locked room of the researcher. They will be destroyed after a period not to exceed 3 years.

INFORMED CONSENT

USING SCRIPT FADING PROCEDURES TO TEACH PRESCHOOLERS WITH AUTISM TO INITIATE PLAY IN A FREE OPERANT SETTING

New Findings: During the study, you will be informed of any significant new findings (either good or bad), such as changes in the risks or benefits resulting from participation in the research, or new alternatives to participation that might cause you to change your mind about continuing in the study. If new information is obtained that is relevant or useful to you, or if the procedures and/or methods change at any time throughout this study, your consent to continue participating in this study will be obtained again.

Risks: Participation in this study is minimal risk. There are no physical risks involved by project participation.

Unforeseeable Risks: Since this is an experimental treatment, there may be some unknown risks. However, the risks of this experimental treatment are minimal. To minimize the effects of unforeseeable risks, you and your child will be under supervision and in correspondence with the instructor and/or researcher. In addition, you will be present during all of the assessments and implementing all of the procedures.

Benefits: There may or may not be any direct benefit to your child from these procedures. The investigator, however, may learn more about how to design and implement parent trainings for the use of scripts and script fading procedures and how well they help students develop conversational skills. The information gained from this study may benefit parents, students and other teachers and researchers in the future.

Explanation & Offer to answer questions: Dr. Thomas S. Higbee and/or Kara A. Reagon has explained this study to you and answered your questions. If you have other questions or research related problems, you may reach Professor Higbee at 797-1933.

Voluntary nature of participation and right to withdraw without consequence: Participation in research is entirely voluntary, you may refuse to allow your child participate or withdraw at any time without consequence or loss of benefits. Your child may be withdrawn from this study without your or his/her/parental consent by the investigator if you or your child moves from the district, is frequently absent, or chooses not to participate while in sessions.

INFORMED CONSENT

USING SCRIPT FADING PROCEDURES TO TEACH PRESCHOOLERS WITH AUTISM TO INITIATE PLAY IN A FREE OPERANT SETTING

Confidentiality: Research records (including videotapes) will be kept confidential, consistent with federal and state regulations. The video may be used for presentations about the research, but to ensure confidentiality, your name and your child's names will not be used. The data and any videotapes will be kept for a period not to exceed 3 years, and will then be destroyed (shredded). If the results of this study are published or presented, no names will be used that will reveal the identity of the participants.

IRB Approval Statement: The Institutional Review Board (IRB) for the protection of human subjects at Utah State University has reviewed and approved this research project. If you have any questions or concerns about this research, please call the IRB Office at 435-797-1821.

Copy of consent: You have been given two copies of this Informed Consent. Please sign both copies and retain one copy for your files.

Investigator Statement: "I certify that the research study has been explained to the individual, by me or my research staff, and that the individual understands the nature and purpose, the possible risks and benefits associated with taking part in this research study. Any questions that have been raised have been answered."

Signature of Principal Investigator & student:

Dr. Thomas S. Higbee Principal Investigator (435) 797-1933	Kara A. Reagon Student Researcher (435) 797-0227

Signature of Parent(s) Guardian(s):

Parent/guardian	Date
Parent/guardian	Date

Appendix B

Datasheets

Child Preference Survey

Date_____ Completed by: _____

Child_____ B.D._____ Age_____

Game	Proficiency level	Initiates	Vocal Interactions

After completion of the survey, please rank items below.

Ranking 1 being most preferred - 16 being less preferred.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____

Date: _____ Observer: _____
Circle one: Primary or IOA
Condition: _____Session #: _____Participant_____
Time started: _____Time ended: _____

Engagement Data: Circle one & write # of game on line
E = Engaged playing game with adult/peer A = Engaged playing a game alone
C = Engaged in selecting, obtaining, cleaning up, returning materials O = Off-task
Prompting Data
P = Prompted - tally mark each prompt during the interval
Results of SPA write in below (used as prompting sequence)
1 = 2 = 3 = 4 = 5 =

10s	A	B	C	D	E	F
1	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:
2	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:
3	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:
4	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:
5	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:
6	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:
7	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:
8	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:
9	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:
10	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:
11	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:
12	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:
13	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:
14	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:
15	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:
16	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:
17	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:
18	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:
19	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:
20	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:	__ E A C O P:

Date: _____Observer: _____Circle one: Primary or IOA
Condition: _____Session #: _____Participant_____
Time started: _____Time ended: _____
COMPONENTS COMPLETED INDEPENDENTLY
+ = Completed independently NA= not applicable P = Prompted

Game Order	**1**	**2**
Selects/obtains game	**Game**_____	**Game**_____
Pushes voice recorded button		
Initiates play (write verbatim unscripted)		
Repeats script "_____"		
Returns game to shelf		

Game Order	**3**	**4**
Selects/obtains game	**Game**_____ _	**Game**_____
Pushes voice recorded button		
Initiates play (write verbatim unscripted)		
Repeats script "_____"		
Returns game to shelf		

Game Order	**5**
Selects/obtains game	**Game**_____ __
Pushes voice recorded button	
Initiates play (write verbatim unscripted)	
Repeats script "_____"	
Returns game to shelf	

Components completed independently: ___/___= ___%
% of scripted responses = ____%
IOA = Total # of Agreements /Divided by the total Number of Agreements + Disagreements

How to run the MSWO SPA:

1. Use the 5 items selected from the child preference survey.
2. Allow the child to briefly sample each item (briefly engage with the items or prompt the child to briefly engage with the items).
3. Place the items on the table with equal distance between them. The child should be seated in front of the table with easy access to all of the items.
4. Say, "Pick the one you want", to the child, and allow him/her to choose one item. If the child attempts to grab more than one item, block access to the other items. (You may have to be very quick in order to assess which item was chosen first and to prevent the child from getting any others). Write the number next to the item on the data sheet according to the order in which it was chosen (e.g., write a "1" next to soda if soda was chosen first).
5. Pull the table away, or otherwise prevent access to other items until the first item the child selected until 10 seconds has passed or the child has had an opportunity to take 1 turn. After this period of time, remove the item from the child's hands and put it out of sight. Arrange the remaining four items as in step 2 and center them in front of the child.
6. Steps 3 and 4 will be repeated until all items have been selected and no items are left, or until the child does not select an item within 10 seconds. If the child fails to select an item within 10 seconds, score all of the remaining items as “8.”

How many times to run the procedure: Run the procedure once.

What do the results of a SPA mean? Use the ranking to determine the sequence of toys you will prompt the student to engage in for the session

Date: _____ Observer: _____Circle one: Primary or IOA
Condition: _____Session #: _____Participant_____
Time started: _____Time ended: _____

Daily Brief Stimulus Preference Assessment Data Sheet MSWO (Carr, Nicolson, & Higbee; 2000)

Assessed by:

Stimulus Items	1

MSWO SPA Procedural Fidelity

1. Did the instructor allow the participant to briefly sample all games prior to conducting the SPA?
   Yes No

Per Trial (+ for Yes or - for No or NA for not applicable)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**
2. Did the instructor align the games in front of the child equidistant apart?								
3. Did the instructor allow the child access to the game after selecting a game?								
4. Did the instructor remove the remaining games from the array after the child selected?								
5. Did the instructor rearrange the games for the next trial by removing the previously selected game and moving the game on the far right to the left and all other games to the right?								

Date: _____Observer: _____ Circle one: Primary or IOA
Condition: _____Session #: _____Participant_____
Time started: _____Time ended: _____
Child-Adult Interactions

Min.	Participant	Adult
2		
4		
6		
8		
10		
12		
14		
16		
18		
20		

Appendix C

Procedural Fidelity Datasheets

Date: _____ Observer: _____
Condition: _____ Session #: _____ Prompt: _____
Participant: _____ Prompter: _____ Recipient: _____

Procedural Fidelity for Prompters

1. Did the prompter provide a manual prompt for game selection within 10 s + or – 2 s of an opportunity to select a game?

Game 1	Yes	No	NA
Game 2	Yes	No	NA
Game 3	Yes	No	NA
Game 4	Yes	No	NA
Game 5	Yes	No	NA

2. Did the prompter use a manual prompt to prompt the participant to push the voice recorded button?

Game 1	Yes	No	NA
Game 2	Yes	No	NA
Game 3	Yes	No	NA
Game 4	Yes	No	NA
Game 5	Yes	No	NA

3. Did the prompter use the designated prompting procedure? (+ or – per opportunity)

4. Did the prompter provide prompts within 5 s + or – 2 s when the participant failed to obtain, clean up or put the game away? (+ or – per opportunity)

5. Did the prompter redirect the participant within 5 s + or – 2 s if the participant was engaged in stereotypy or off task? (+ or – per opportunity)

Procedural Fidelity for Adult/Peer Recipient of Interactions

1. Did the recipient wait for the participant to initiate before interacting?

Game 1	Yes	No	NA
Game 2	Yes	No	NA
Game 3	Yes	No	NA
Game 4	Yes	No	NA
Game 5	Yes	No	NA

2. Did the recipient model appropriate game play interactions?

Game 1	Yes	No	NA
Game 2	Yes	No	NA
Game 3	Yes	No	NA
Game 4	Yes	No	NA
Game 5	Yes	No	NA

3. Did the recipient ask the participant questions? (Tally mark)
4. Did the recipient instruct the participant? (Tally mark)
5. Did the recipient provide prompts to the participant? (Tally mark)

Appendix D

Social Validity Survey

Social Validity

Teaching experience:

You will be shown 6 videotaped segments of participants during free play. You will be asked to read the following questions, watch the segment and then answer the questions.

Segment 1

1. Did the child initiate play? Yes or No

2. Did the child interact with the adult or peer? Yes or No

Segment 2

1. Did the child initiate play? Yes or No

2. Did the child interact with the adult or peer? Yes or No

Segment 3

1. Did the child initiate play? Yes or No

2. Did the child interact with the adult or peer? Yes or No

Segment 4

1. Did the child initiate play? Yes or No

2. Did the child interact with the adult or peer? Yes or No

Segment 5

1. Did the child initiate play? Yes or No

2. Did the child interact with the adult or peer? Yes or No

Segment 6

1. Did the child initiate play? Yes or No

2. Did the child interact with the adult or peer? Yes or No

Segment 7

1. Did the child initiate play?	Yes	or	No
2. Did the child interact with the adult or peer?	Yes	or	No

Segment 8

1. Did the child initiate play?	Yes	or	No
2. Did the child interact with the adult or peer?	Yes	or	No

Appendix E

Tables

Table 7

Participant Characteristics

Author, year	Standard Scores	Current Level of Performance	Stereotypic Behavior	Maladaptive Behavior
Argott et al., 2008		X	X	
Betz et al., 2011		X		
Brown et al., 2008	X	X	X	
Charlop-Christy & Kelso, 2003	X	X		
Dotto-Fojut et. al., 2011		X		
Ganz et al., 2008		X	X	
Goldstein et al., 1988	X		X	X
Goldstein & Cisar, 1992	X		X	X
Howlett et al., 2011		X		
Krantz & McClannahan, 1993	X	X	X	X
Krantz & McClannahan, 1998	X	X	X	X
Krantz et al., 1981	X	X	X	X
MacDuff et al., 2007	X	X	X	X
Reagon & Higbee, 2009	X			
Sarokoff, Taylor & Poulson, 2001	X			

Participant Characteristics continued

Author, year	Standard Scores	Current Level of Performance	Stereotypic Behavior	Maladaptive Behavior
Shabani et al., 2002		X		
Stevenson, Krantz & McClannahan, 2000	X	X	X	X
Wichnick, Vener, Keating, & Poulson, 2010		X		
Wichnick, Vener, Pyrtek, & Poulsen 2010		X		
Woods & Poulson, 2006		X		X

Table 8

Conversation Partner

Author, year	Typical Peer	Peer with Autism	Peer with Cognitive Impairments	Parents	Other Adults
Argott et al., 2008					X
Betz et al., 2011					X
Brown et al., 2008					X
Charlop-Christy & Kelso, 2003					X
Dotto-Fojut et al., 2011					X
Ganz et al., 2008			X		
Goldstein et al., 1988	X		X		
Goldstein & Cisar, 1992	X				
Howlett et al., 2011					X
Krantz & McClannahan, 1993		X			
Krantz & McClannahan, 1998					X
Krantz et al., 1981				X	X
MacDuff et al., 2007					X
Reagon & Higbee, 2009				X	
Sarokoff et al., 2001		X			
Shabani et al., 2002	X				

Conversation Partner continued

Author, year	Typical Peer	Peer with Autism	Peer with Cognitive Impairments	Parents	Other Adults
Stevenson et al., 2000					X
Wichnick, Vener, Keating, & Poulson, 2010		X			
Wichnick, Vener, Pyrtek, & Poulsen, 2010		X			
Woods & Poulson, 2006	X				

Table 9

Games

Ryan	Benjamin	Stewart	Harris
Teaching Games			
Buckaroo	Buckaroo	Memory	Hungry Hippos
Crocodile Dentist	Lucky Ducks	123 Diego	Kerplunk
Captain Bones	Captain Bones	Elmo Color Match	Brown Bear
Let's Go Fishing	Let's Go Fishing	Farm Bingo	Crocodile Dentist
Hungry Hippos	Hungry Hippos	Go Away Monster	Memory
Pop Up Pirates	Pop Up Pirates	Don't Spill the Beans	Farm Bingo
Multicolor Memory	Multicolor Memory	Don't Break the Ice	Go Away Monster
Don't Spill the Beans	Don't Spill the Beans	Penguin Pick Up	Don't Spill the Beans
Generalization Games			
Memory	Crocodile Dentist	Cariboo	Frogs
Oreo Match	Oreo Match	Animal 2x2	Zingo
Lucky Ducks	Colors & Shapes	Crocodile Dentist	Pop Up Pirates
Cariboo	Cariboo	Octopus Dominos	Blues Clues Memory
Squiggley Worm	Squiggley Worm	Pop Up Pirates	Animal 2x2
Wacka Mole	Wacka Mole	Caterpillar Crawl	Elmo Color Match
Thomas	Thomas	Bingo	Don't Break the Ice
Don't Break the Ice	Don't Break the Ice	First 4 Games - Flower	Lucky Ducks

Appendix F

Figures

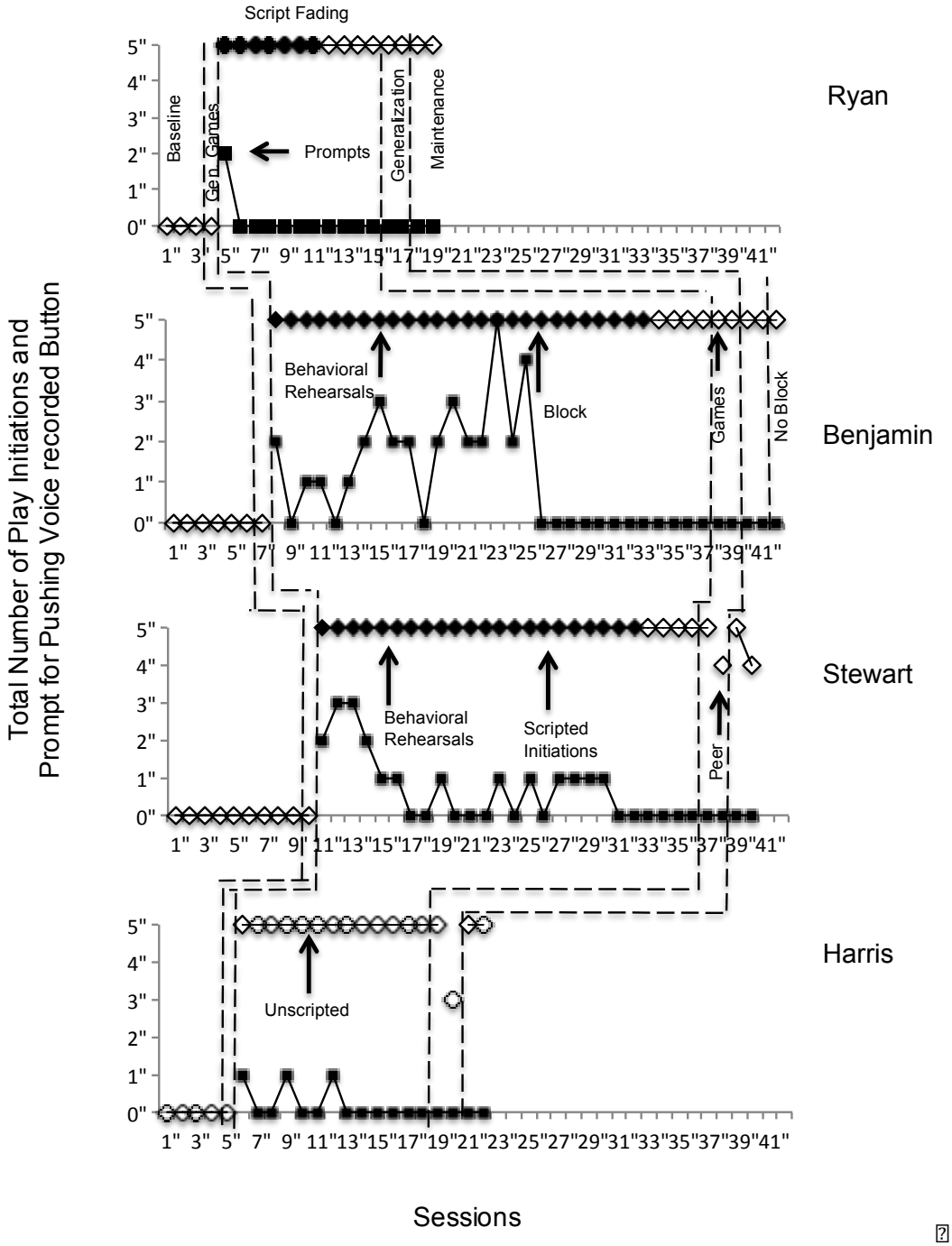

Figure 1. The results of the total number of play initiations and prompts for pushing the voice recorded button.

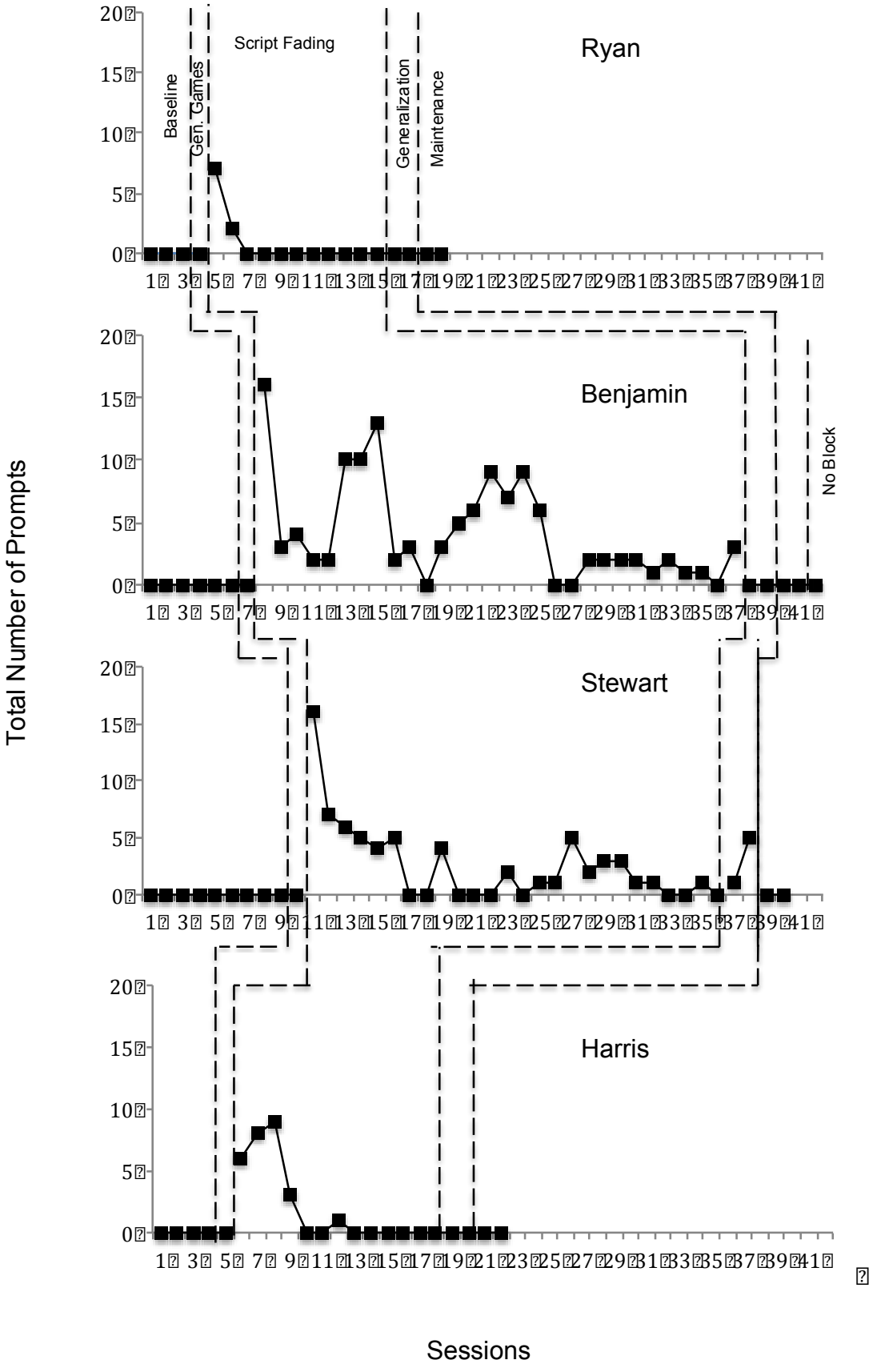

Figure 2. The results of the total number of prompts.

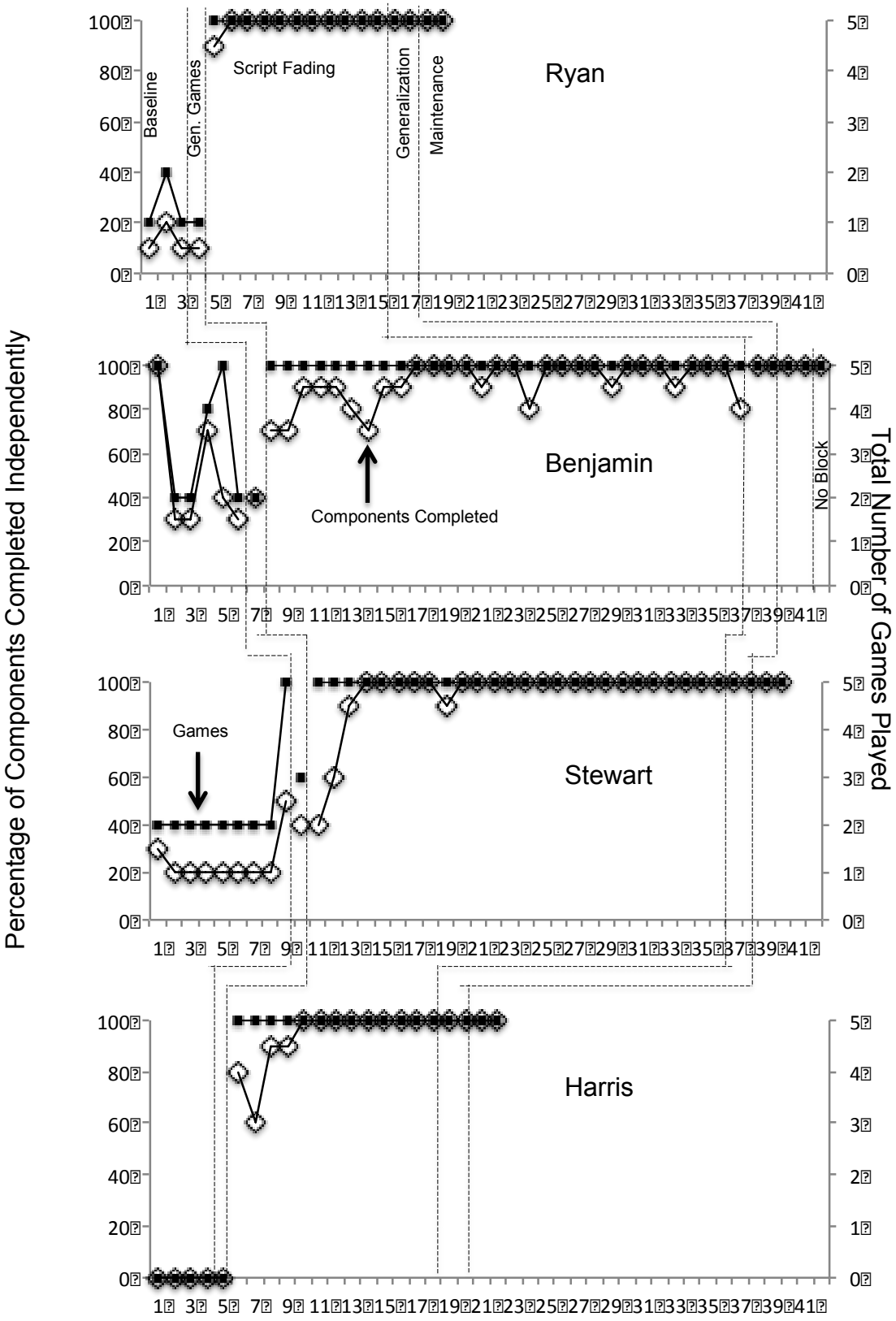

Figure 3. The results of components completed correctly and games played.

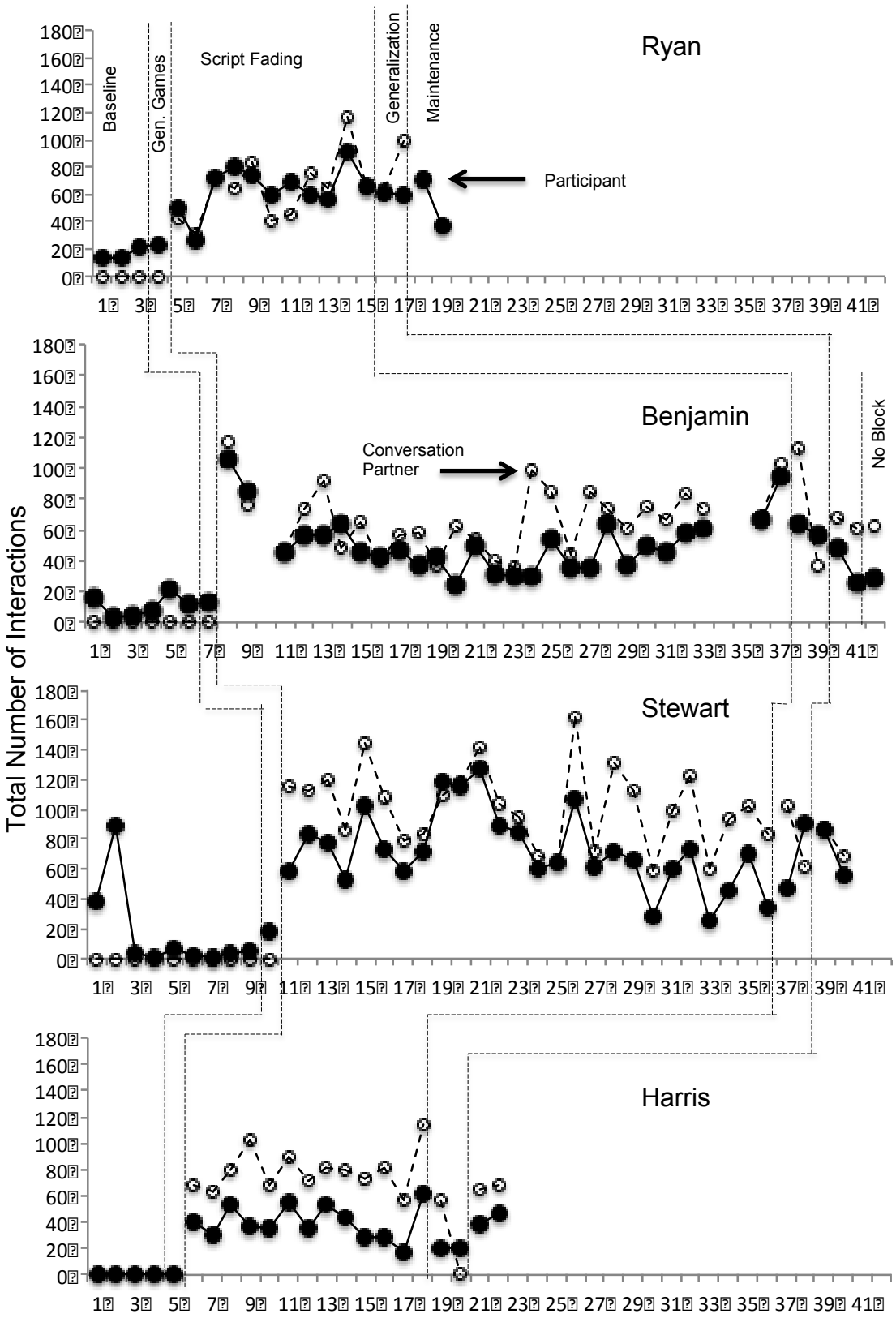

Figure 4. The results of the total number of interactions.

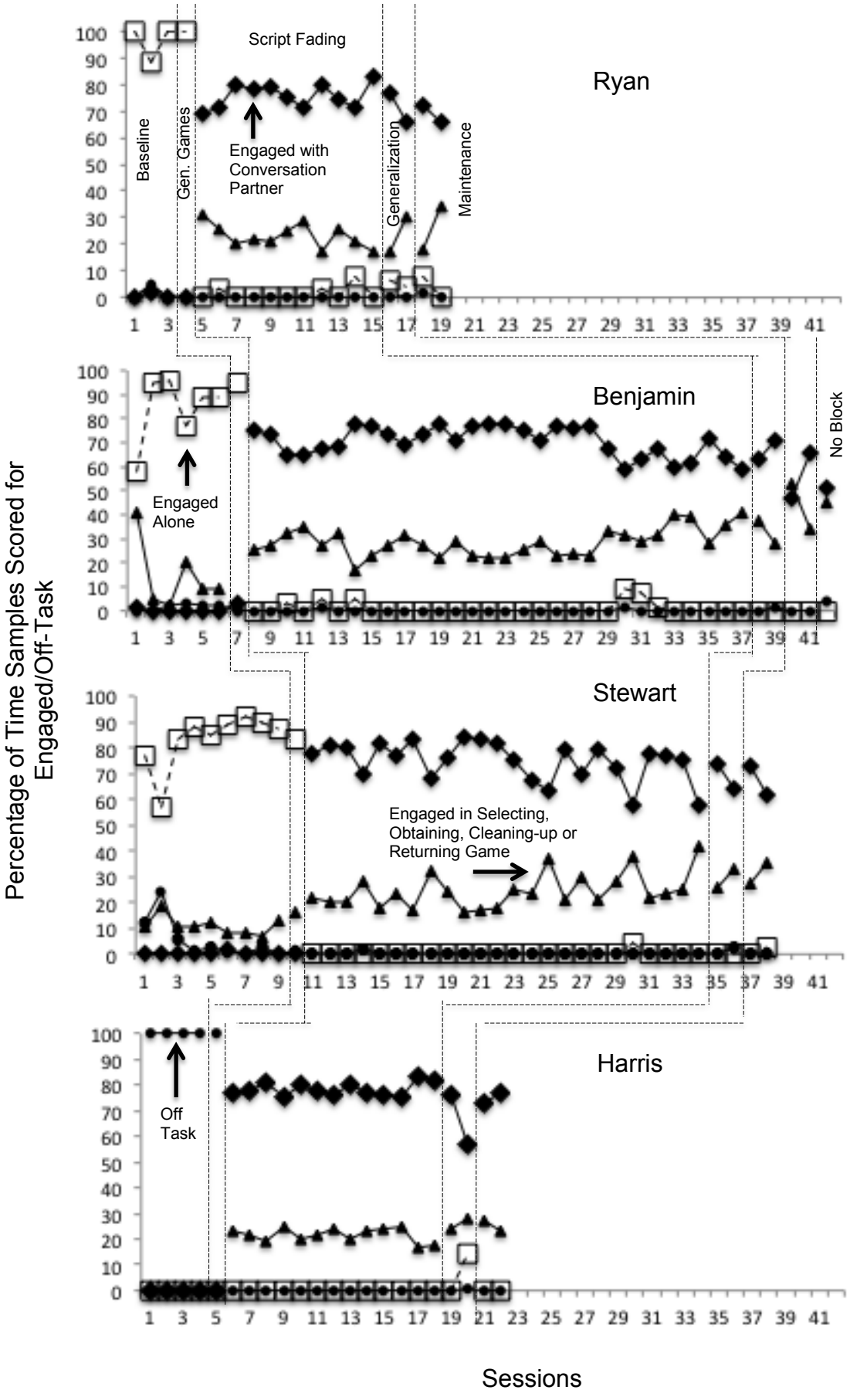

Figure 5. The results of engagement.

CURRICULUM VITAE

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EDUCATIONAL HISTORY

Utah State University
Advisor: Thomas S. Higbee, Ph.D., BCBA-D
Major: Disability Disciplines with an emphasis in Applied Behavior Analysis
Degree: Ph.D. Anticipated 2012
Dissertation: Using Script-Fading Procedures to Teach Children with Autism to Initiate During Free Play

Bowling Green State University
Advisor: Eric Jones, Ph.D.
Major: Special Education
Degree: M.Ed. 2003

Saint Anselm College
Advisor: Paul Finn, Ph.D.
Major: Psychology
Degree: B.A. 1999
Thesis: Cue Effect of Nicotine on College Smokers

ACADEMIC EXPERIENCE

Instructor, Utah State University, Logan, UT. Spring 2006
Graduate Course:
- **SPED 6720-Advanced Behavior Analysis**

Graduate Teaching Assistant, Utah State University, Logan, UT. Fall 2005
Undergraduate Course:
- **SPED 4000-Introduction to Special Education**

PROFESSIONAL EXPERIENCE

- ***Assistant Director, Princeton Child Development Institute,*** Princeton, NJ. January 2007-present

Duties: Supervise and train life-skills coaches, associate therapists, and family teachers in community employment settings, group homes, and supervised apartment programs. Evaluate staff and data notebooks in the Early Intervention, Education, Adult Life-Skills, and Residential Programs. Consult with Dissemination Sites. Coordinate, schedule program staff including transportation, recruit, hire, and train new staff. Conduct weekly module meetings, create and monitor weekly individualized progress reports for staff. Present at staff trainings, PCDI annual conference, state and national conferences. Conduct research, teach staff applied behavior analysis, journal reading group and single subject design classes.
Supervisor: Gregory S. MacDuff, Ph.D., BCBA-D

- ***Assistant Program Director, Autism Support Services: Education, Research, and Training (ASSERT) Program,*** Logan, UT. 2003-2006

Duties: Supervise and train therapists in preschool classroom for young children with autism. Design and maintain program and individual student curricula. Provide workshops and in-home consultation for families in the program.
Supervisor: Thomas S. Higbee, Ph.D., BCBA-D

- ***Consultant:*** Washington County School District, St. George, UT. 2004 - present

Duties: Set up intensive intervention preschool classroom for children with autism.
Provide ongoing training for staff and parents, curriculum support, and behavioral interventions.
Supervisor: Thomas S. Higbee, Ph.D., BCBA-D

- ***Consultant:*** Weber and Ogden City School District, Ogden, UT. August 2004 –August 2005

Duties: Provide behavioral interventions for students ages 3-5 as well as training, and curriculum support for preschool teachers. Funding provided through the Utah Department of Education
Supervisor: Thomas S. Higbee, Ph.D., BCBA-D

- ***Autism Consultant, Wood County Educational Service Center,*** Bowling Green, OH. 2000-2003

Duties: Training administrators, teachers, support staff, and parents, developing curriculum, creating, editing and implementing data based individualized programs for students with autism, grant writing, and presenting on topics that include autism intervention, professionalism, motivational systems, the use of activity schedules, and developing a home component.
Supervisor: Belinda Rhoads, Ed.D.

- ***Residency, Princeton Child Development Institute,*** Princeton, NJ. 1999-2000

Duties: Therapist, Home Programmer, Data Analyst, and Transition aide. Received individualized mentoring in intervention, program development, management, and research with children with autism. The Institute is nationally and internationally known for its applied behavior analysis research in autism intervention. Data based program development activities focus on language acquisition and social initiations, promotion of decision making skills and independence.
Supervisor: Patricia J. Krantz, Ph.D.

- ***Therapist, Peter Woodbury School,*** Bedford, NH. 1997-1999

Duties: Hired as applied behavior analysis (ABA) therapist for home programs, advanced to Senior therapist. Responsibilities included working closely with consulting psychologist on creating, fine tuning, and implementing an ABA program for children with autism, work as school aide, transitioning special needs child to school setting and directing after school play group.
Supervisor: Alan Schnee, Ph.D.

PUBLICATIONS: PEER-REVIEWED JOURNALS

Penrod, B., Wallace, M.D., Reagon, K.A., Betz, A., & Higbee, T.S. (2010). A component analysis of a parent-conducted multi-component treatment for food selectivity. ***Behavioral Interventions, 25, 207-228.***

Najdowski, A. C., Wallace, M.D., Reagon, K.A., Penrod, B., Higbee, T.S., & Tarbox, J. (2010). Utilizing a home-based parent training approach in the treatment of food selectivity. ***Behavioral Interventions, 25, 89-107.***

Reagon, K.A. & Higbee, T.S. (2009). Parent-implemented script fading to promote play-based verbal initiations in children with autism. *Journal of Applied Behavior Analysis, 42,* 659-664.

Betz, A., Higbee, T.S., & Reagon, K.A. (2008). Using joint activity schedules to promote peer engagement in preschoolers with autism. *Journal of Applied Behavior Analysis, 41,* 237-241.

Najdowski, A. C., Wallace, M.D., Penrod, B., Tarbox, J. Reagon, K.A. & Higbee, T.S. (2008). Caregiver-Conducted Experimental Functional Analyses of Inappropriate Mealtime Behavior. ***Journal of Applied Behavior Analysis, 41,* 459-465.**

Reagon, K.A., Higbee, T.S., & Endicott, K. (2007). Using video instruction procedures with and without embedded text to teach object labeling to preschoolers with autism: A preliminary investigation. *Journal of Special Education Technology, 22,* 13-20.

Reagon, K.A., Higbee, T.S., & Endicott, K. (2006). Teaching pretend play skills to a student with autism using video modeling with a sibling as model and play partner. *Education and Treatment of Children, 29,* 1-12.

Wright-Gallo, G.L., Higbee, T.S, Reagon, K.A., & Davey, B.J. (2006). Classroom-based functional analysis and intervention for students with emotional/behavioral disorders. *Education and Treatment of Children, 29,* 421-436.

MANUSCRIPTS IN PREPARATION

Reagon, K.A., Higbee, T.S., & Spencer, T.D. *Using Script-Fading Procedures to Teach Children with Autism to Initiate During Free Play*.

Reagon, K.A. & Higbee, T.S. *Scripts and Script-Fading Procedures: A Review of the Literature.*

Reagon, K.A. & Higbee, T.S. *The Use of Activity Schedules with Individuals with Disabilities: A Review of the Literature.*

PROFESSIONAL PRESENTATIONS (state and national)

Miller, K., Musselman, C. & Reagon, K.A. (2012, May). *Promoting independence with adults with autism using Schedules, motivational systems, and zone supervision in a group home setting.* Discussion group presented at the 10th Annual Princeton Child Development Institute's Conference. Princeton, NJ.

Reagon, K.A. & MacDuff, G.S. (2011, May). *PCDI's Supervised Apartment Program: A sample of adult and community-living programs.* Discussion group presented at the 9th Annual Princeton Child Development Institute's Conference. Princeton, NJ.

Reagon, K.A. & MacDuff, G.S. (2011, April). *Scripts and script-fading procedures: A review.* Paper presented at the 6th Annual New Jersey Association for Behavior Analysis Conference. Edison, NJ.

Buttil, E., Buttil, M., Reagon, K.A. & MacDuff, G.S. (2010, May). *Assessment of choice and maintenance of recreation and leisure*. Discussion group presented at the 8th Annual Princeton Child Development Institute's Conference. Princeton, NJ.

Reagon, K.A. & MacDuff, G.S. (2010, May). *Scripts and script-fading procedures: A review*. Poster presented at the 8th Annual Princeton Child Development Institute's Conference. Princeton, NJ.

McDermott, M.L. & Reagon, K.A. (2009, May). *Skills for adults with autism promoting adult independence: Selecting and teaching key life skills*. Discussion group presented at the 7th Annual Princeton Child Development Institute's Conference. Princeton, NJ.

Reagon, K.A. (2009, July). *Teaching preschoolers with autism to initiate play using script-fading procedures.* Paper presented at the 5th Annual New Jersey Association for Behavior Analysis Conference. Piscataway, NJ.

MacDuff, G.M. & Reagon, K.A. (2009, October). *Using stimulus shaping to teach complex skills to adolescents and adults with autism.* Paper presented at the 27th Annual Autism New Jersey Conference. Atlantic City, NJ.

Reagon, K.A., MacDuff, J., MacDuff, J. & MacDuff, G.S. (2008, May). *Teaching adults with autism independent daily and recreational skills using activity schedules*. Paper presented at the Issues in Autism COSAC 26th Annual Conference, Atlantic City, NJ. (*Awarded Best Presentation on Adults*)

McDermott, M.L., Bateman, A., Reagon, K.A. & MacDuff, G.S. (2008, August). *A stimulus-shaping procedure to teach sight-word reading to an adult*

with autism. Poster presented at the 4th Annual New Jersey Association for Behavior Analysis Conference. Piscataway, NJ.

Reagon, K.A., Spencer, T.D., & Higbee, T.S. (2007, May). *Using script-fading procedures to teach preschoolers with autism to initiate play in a free operant setting.* Paper presented at the 33rd Annual Convention of the Association for Behavior Analysis. San Diego, CA.

Reagon, K.A., Spencer, T.D., & Higbee, T.S. (2007, May). *Using script-fading procedures to teach preschoolers with autism to initiate play in a free operant setting.* Paper presented at the 6th Annual Princeton Child Development Institute's Conference. Princeton, NJ.

McDermott, M.L., Reagon, K.A. & MacDuff, G.S. (2007, May). *Using stimulus shaping to teach sight-word reading to an adult with autism.* Poster presented at the 6th Annual Princeton Child Development Institute's Conference. Princeton, NJ.

Reagon, K.A., Betz, A. & Higbee, T.S. (2007, May). *Using joint activity schedules to promote peer play in preschoolers with autism*. Poster presented at the 6th Annual Princeton Child Development Institute's Conference. Princeton, NJ.

Reagon, K.A. & Higbee, T.S. (2006, May). *Parents' use of script-fading procedures to teach conversation to children with autism.* Paper presented at the 32nd Annual Convention of the Association for Behavior Analysis. Atlanta, GA.

Betz, A., Reagon, K.A., & Higbee, T.S. (2006, May). *Teaching preschool-aged children with autism to engage in peer play using group photographic activity schedules and script-fading procedures.* Paper presented at the 32nd Annual Convention of the Association for Behavior Analysis. Atlanta, GA.

Reagon, K.A. & Higbee, T.S. (2006, February). *Training parents to use scripts and script-fading procedures: Teaching children with autism to engage in conversational language in the home.* Paper presented at the 24th Annual Western Regional Conference on Behavior Analysis of the California Association for Behavior Analysis. San Francisco, CA.

Betz, A., Reagon, K.A., & Higbee, T.S. (2006, February). *Teaching cooperative play to students with autism using a joint activity schedule.* Paper presented at the 24th Annual Western Regional Conference on Behavior Analysis of the California Association for Behavior Analysis. San Francisco, CA.

Higbee, T.S. & Reagon, K.A. (2005, November*). Building school district capacity for educating children with autism through a university partnership.* Paper presented at the annual conference of the Teacher Education Division (TED) and Technology and Media Division (TAM) of the Council for Exceptional Children. Portland, ME.

Najdowski, A. C., Reagon, K.R., Penrod, B.,& Higbee, T.S. (2005, May). *Effects of parents as therapists during functional analyses.* Paper presented at the 31st annual convention of the Association for Behavior Analysis. Chicago, IL.

Penrod, B., Najdowski, A., Reagon, K.R., & Higbee, T.S. (2005, February). *Assessment and treatment of pediatric feeding disorders and the role of parents as change agents.* Paper presented at the 23rd Annual Conference of the California Association for Behavior Analysis, Dana Point, CA.

Higbee, T.S., Reagon, K.A., & Endicott, K. (2005, January). *Technology-mediated instructional strategies for children with autism.* Paper presented at the annual convention of Assistive Technology Industry Association, Orlando, FL.

Higbee, T.S., Reagon, K.A., & Endicott, K. (2004, October). *Recent research in behavioral interventions for young children with autism.* Invited presentation at the Utah Early Childhood Special Education Conference. Provo, UT.

Higbee, T.S., Reagon, K.A., & Endicott, K. (2004, June). *Technology-mediated instructional strategies for children with autism.* Paper presented at the annual Effective Practices in Special Education Conference. Salt Lake City, UT.

Higbee, T.S., Reagon, K.A., & Endicott, K. (2004, May). *The impact of stimulus preference assessment on academic progress in children with autism.* Paper presented at the 30th Annual Convention of the Association for Behavior Analysis. Boston, MA.

Reagon, K.A., Endicott, K. & Higbee, T.S. (2004, May). *Video instruction with and without embedded text to teach tacts to children with autism.* Poster presented at the 30th Annual Convention of the Association for Behavior Analysis. Boston, MA.

Reagon, K.A., Endicott, K. & Higbee, T.S. (2004, May). *Sequential use of video modeling and audio scripts to teach pretend play to preschoolers with autism.* Poster presented at the 30th Annual Convention of the Association for Behavior Analysis. Boston, MA.

Endicott, K., Reagon, K.A., & Higbee, T.S. (2004, May). *An analysis of the effects of response repetition on teaching language to children with autism.* Poster presented at the 30th Annual Convention of the Association for Behavior Analysis. Boston, MA.

Reagon, K.R., Endicott, M.K. & Higbee, T.S. (2004, February). *Video Modeling and Audio Scripts:Teaching Play Components then Contextual Language.* Poster conducted at the 22nd Annual Conference of the California Association for Behavior Analysis, San Francisco, CA.

Reagon, K.A., Endicott, M.K. & Higbee, T.S. (2004, February). *Teaching Tacts to Children with Autism through Video Instruction with Embedded Text.* Poster conducted at the 22nd Annual Conference of the California Association for Behavior Analysis, San Francisco, CA.

Endicott, M.K., Reagon, K.A.& Higbee, T.S. (2004, February). *Response Repetition in Language Instruction for Children with Autism.* Poster conducted at the 22nd Annual Conference of the California Association for Behavior Analysis, San Francisco, CA.

Reagon, K.A. (2003, June). *Shedding Light on the Clouded Misperceptions of Autism and Interventions.* Presentation at the Annual Autism Summit. Bowling Green, OH.

Reagon, K.A. & Billmaier, C. (2002, September). *Autism and A Parent's Perspective.* Panel Presentation at the Wood County Board of MRDD Professional Development Series. Bowling Green, OH.

Reagon, K.A. (2002, June). *Public School Services in the State of Ohio: The Wood County Autism Project.* Panel Presentation at the Annual Autism Summit. Bowling Green, OH.

Reagon, K.A. (2001, March). *Teacher Training for Developing a Home Component for Individuals with Autism.* Presentation presented at Regional Professional Development Center. Toledo, OH.

Reagon, K.A., Goetz, J., & Scott, E. (2001, November). *The Wood County Autism Project: Structuring a School-Age Public School Program for Individuals with Autism.* Poster presented at the Ohio School Board Association Capital Conference Columbus, OH.

Reagon, K.A. (2001, December). *How Educational Service Centers Can Work with the Public Schools to Provide Services for Children with Autism: The Wood County Autism Project.* Presentation at the Association of Educational Service Agencies National Annual Conference on Education. Atlanta, GA

Reagon, K.A. (2000, November). *The Wood County Autism Project.* Panel presentation presented at the Northwestern Ohio Educational Research Council. Toledo, OH.

Reagon, K.A. (2000, April). *Shedding Light on the Clouded Misperceptions of Autism and Interventions.* Invited Presentation for the Psychology Department Saint Anselm College. Manchester, NH.

GRANTS

Rowland, C. & Reagon, K.A. (2006). National Consortium to Broaden Access of Electronically-Mediated Education through Institutional Accreditation. FIPSE Grant requested $797,379. Resubmitted and Funded in 2007.

Rhoads, B. & Reagon, K.A. (2001-2002). Implementing an Extended School Year Program for School-Aged Children with Autism: Providing Hands on Training for Public School Professionals. Grant funded by the Ohio Department of Education Autism Spectrum Grant. $8,000.

Reagon, K.A. (2001). Teacher Training for Developing a Home Component for Individuals with Autism, Grant funded by the Northwest Ohio Regional Professional Development Center. $2,500.

PUBLICATIONS: OTHER

Higbee, T.S., Endicott, M. K., & Reagon, K.A.(2003). Autism Support Services: Education, Research, and Training (ASSERT) Program at Utah State University. Center for Persons with Disabilities Newsletter.

Barnhisel, D., & Reagon, K.A. (2003). Collaborating to Create a Program for Children with Autism. Highlights in Special Education, 24:3, 6.

WORKSHOPS

Higbee, T.S. & Reagon, K.A. (2005, June). *Behavioral interventions for students with autism.* Four-day workshop presented to special education teachers and paraprofessionals of Washington County School District, St. George, UT. Total participants=8.

Reagon, K.A. (2005, June). *Using activity schedules with children with autism to promote independence and choice.* Workshop presented at the annual Effective Practices in Special Education Conference. Logan, UT. Total participants=50

Higbee, T.S. & Reagon, K.A. (2005, April). *Improving independence for students with autism through activity schedules.* Half-day workshop presented to special education teachers and paraprofessionals at the Utah TEACCH Fair, Provo, UT. Total participants=200.

Higbee, T.S. & Reagon, K.A. (2004, July). *Behavioral interventions for students with autism.* Four-day workshop presented to special education teachers and paraprofessionals of Washington County School District, St. George, UT. Total participants=8.

Higbee, T.S., Endicott, M.K. & Reagon, K.A. (2004, June). *Educational and behavioral intervention strategies for students with autism.* Two-week workshop presented to special education teachers and speech pathologists from various Utah school districts, Logan, UT. Total participants=8.

Higbee, T.S., Endicott, M.K. & Reagon, K.A. (2004, May). *Reinforcer identification for students with autism and other disabilities.* Half-day workshop presented at the Association for Behavior Analysis annual conference, Boston, MA. Total participants=5.

EDITORIAL

2004 Guest Reviewer for Education and Treatment for Children
2004 Guest Reviewer for Journal of Early Intervention
2009 Guest Reviewer for Journal of Applied Behavior Analysis

MEMBERSHIP IN PROFESSIONAL ORGANIZATIONS

2000 – 2003 The Northwest Ohio Autism Professional Forum
2000 – 2001 Association for Behavior Analysis
2003 – 2009 Association for Behavior Analysis
2004 – 2006 California Association of Behavior An alysis (Cal-ABA)
2004 – 2005 Nevada Association for Behavior Analysis (NABA)
2005 – 2006 Council for Exceptional Children (CEC)
2009 – present New Jersey Association of Behavior Analysis (NJABA)
Representative at Large (2008-2011) Reelected for a 2-year term
2012 - Association for Behavior Analysis