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AN EVALUATION OF GROUP ACTIVITY SCHEDULES TO TRAIN CHILDREN WITH AUTISM TO PLAY HIDE-AND-SEEK WITH THEIR TYPICALLY DEVELOPING PEERS

by

Jessica S. Akers

A dissertation submitted in partial fulfillment
of the requirements for the degree

of

DOCTOR OF PHILOSOPHY

in

Disability Disciplines

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UTAH STATE UNIVERSITY
Logan, Utah

2015

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ABSTRACT

An Evaluation of Group Activity Schedules to Train Children with Autism to Play Hide-and-Seek with Typically Developing Peers

by

Jessica S. Akers, Doctor of Philosophy

Utah State University, 2015

Major Professor: Dr. Thomas S. Higbee
Department: Special Education and Rehabilitation

Children with autism spectrum disorders often have deficits in the area of social skills. Because of this deficit many children with autism avoid engaging in play activities with typically developing peers. The purpose of this study was to identify the utility of a photographic activity schedule, with embedded scripts, to teach three children with autism to play a complex social game with typically developing peers. In this study we used activity schedules to train children with autism to play hide-and-seek in a group with typically developing peers. All participants were prompted using physical guidance to follow the activity schedules to play hide-and-seek. Two activity schedules were present during teaching sessions, one was the seeker schedule and the other was the hider schedule. Each group member played the role of the seeker once and then the game ended. All of the participants were able to follow the activity schedules to play hide-and-seek. We then systematically faded the activity schedules to the least intrusive version

necessary. We were able to fade all of the scripts and several components of the activity schedules. For two of the three participants with autism we were able to fade the schedule from two binders to a visual cue displaying the order of the seekers. For the third participant we were able to fade one binder and the majority of the components in the second binder. The participants were able to continue to play hide-and-seek with the faded versions of the schedules in a novel environment and 2-weeks after treatment concluded.

(110 pages)

PUBLIC ABSTRACT

An Evaluation of Group Activity Schedules to Train Children with Autism to Play Hide-and-Seek with Typically Developing Peers

Jessica S. Akers

Children with autism spectrum disorder have difficulties with social and play skills. The purpose of this study was to determine if three young children with autism could learn to play a complex social game, hide-and-seek, with three typically developing peers. Participants were taught to play hide-and-seek using photographic activity schedules. Photographic activity schedules are a type of visual schedule that teach children with autism to engage in chains of behavior. Two schedules were present during teaching sessions, a seeker schedule and a hider schedule. Each group member played the role of the seeker once during the game. The three participants, and typically developing peers, were able to play hide-and-seek when the schedules were present. We then introduced a systematic fading procedure to identify if the children would continue to play the game without the schedules. The three participants required some form of the schedule to play the game, however the majority of components were faded. They were still able to play hide-and-seek, with the faded version of the schedule, in a novel environment and 2-weeks after the treatment sessions ended. Our results indicated that young children with autism can play complex games with minimal prompts.

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Jessica Akers

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CHAPTER I

INTRODUCTION

The diagnosis of Autism Spectrum Disorder (ASD) is based on two facets: (a) deficits in the area of social communication including: lack of eye contact, difficulties in understanding social relationships and an apparent lack of interest in peers and (b) excessive engagement in repetitive or restrictive behaviors including: insistence on things remaining the same, limited interests beyond highly specific topics, and engaging in stereotyped behaviors (DSM-5; American Psychiatric Association [APA], 2013). Both aspects of the diagnosis have a clear effect on the social play of children with ASD. Children with ASD often play in a ritualistic fashion, including repeating specific motor movements (e.g., spinning wheels on cars) and statements during play, or engaging with a very limited number of different activities (Tilton & Ottinger, 1964). Children with ASD also engage in restricted and repetitive behaviors at a higher rate than typically developing children (Harrop, McConachie, Emsley, Leadbitter, & Green, 2014). While typically developing children engage in some stereotypic behaviors, it is usually limited to one specific response form (e.g., lining up toys) and the frequency of these behaviors decrease as the child matures. However, children with ASD often engage in several stereotypic response topographies and the frequency of these behaviors remain constant or increases over time.

Play can be difficult to define because it encompasses many different behaviors. It is generally considered to be an activity that is freely chosen for the purpose of enjoyment (Hurd & Anderson, 2010). While it may be considered a less serious activity

than academic activities, this does not diminish its significance for child development. Play is called a child's work because children learn through play (Copple & Bredekamp, 2009). They first explore and contact their environment through play. Play is important for several aspects of child development including physical development, which includes gross motor skills, fine motor skills and coordination, and language development (Garvey, 1990).

The stages of play for typically developing children progress from solitary play, to parallel play, and then to associative play and cooperative play (Hughes, 2010). The majority of stages include other peers as play partners; although parallel play does not include a great deal of peer interactions, it does include playing in the same vicinity as other peers and playing with common items. Children with ASD have difficulties not only with appropriate solitary play but also with peer play. After observing classroom student interactions McGee, Feldman, and Morrier (1997) found that, in comparison to their typically developing classmates, students with ASD spent less time in proximity to other children, received fewer social bids from peers (this included both initiations and reciprocations), made fewer vocalizations, and spent more time engaging in atypical behavior (i.e., stereotypy, self-injurious behavior).

Teaching play, particularly peer play, is of upmost importance for interventionists working with young children with ASD (Terpstra, Higgins, & Pierce, 2002). Behavior analytic therapies have been shown to be effective for teaching a variety of skills to children with ASD including play. Some of the strategies that have been developed for teaching appropriate play skills are systematic prompting, video modeling, and

photographic activity schedules (Bryan and Gast, 2000; Dupere, MacDonald, & Ahearn, 2013; Lang et al., 2014).

Systematic Prompting Procedures

The most basic strategy for teaching play, used by behavior analysts, is prompting correct play responses and providing reinforcement for those correct responses. A recent example of this strategy is a study by Lang et al. (2014). The researchers used systematic prompting procedures to teach play to three young children with ASD. The participants rarely engaged in any appropriate play skills and engaged in high rates of stereotypy with toys. During baseline, the participants were given 5 min to play with toys, but were not provided with any instructions or feedback during this time. During treatment, researchers used least-to-most prompting, which consisted of gestural, model, verbal and physical prompts to teach appropriate play behaviors for the toys. Reinforcement, in the form of praise and small edibles, was provided for appropriate play behavior. Initially, researchers provided reinforcement for every correct play response, but eventually only provided reinforcement for varying play behaviors. Researchers assessed generalization to a new toy set and maintenance 4, 6, and 8 weeks after treatment. After introducing the intervention, the percentage of intervals in which participants engaged in appropriate play increased and the percentage of intervals in which they engaged in stereotypy decreased.

The important finding of this study was that the children continued playing appropriately in the absence of extrinsic reinforcement for up to 2 months. To measure social validity, researchers asked parents to watch four videos (two from baseline and two from treatment presented in a random order) and rate their child's mood, happiness and

interest in play. Two out of the three parents reported an increase in happiness and interest in toys for their children during the intervention sessions. This study provides socially valid support for the use of a behavior analytic intervention to teach play to children with ASD.

Systematic prompting and reinforcement procedures have also been used to teach complex social play. Oppenheim-Leaf, Leaf and Call (2012) taught two boys with ASD, ages 5 to 7, to play common games played by children (i.e., Go Fish, Uno, and Yahtzee Jr.). Participants had difficulties with structured play, following rules, and playing games selected by others. Researchers created task analyses to break down the steps of games and measured the percentage of correctly completed steps. Teaching sessions were conducted in groups, but during probe sessions (i.e., sessions with data collection) only an adult was present. The researchers taught the participants to correctly label each step and used role-play to train participants to complete all the game play steps. Corrective feedback was provided for incorrect responses and tokens were provided for correct responses. During probe sessions, reinforcement, prompting and feedback were not provided. The percentage of correct game play behaviors increased after teaching across all three games for both participants.

The research suggests that these direct prompting strategies are effective for increasing play behaviors for children with ASD. However, they also require a great deal of adult prompting. One alternative teaching strategy that involves less adult prompting is video modeling.

Video Modeling

Video modeling is a teaching technique that presents a model of target behaviors via video recording. An individual is shown the video with actors (e.g., peers, siblings) performing a scenario and is then provided with the materials used in the video. The desired outcome is for the individual to imitate the specific behaviors presented in the video. In a recent example of a video modeling intervention, Dupere, MacDonald, and Ahearn (2013) taught three children with ASD, ages 5 and 6, to play with three toy sets: a boat toy set, a train toy set, and a zoo toy set. Each toy set had three videos to display various characters engaging in actions and vocalizations. A total of seven play characters were used in the study; four were specifically trained and three were untrained. Researchers were interested in the participants' engagement in substitutable loops, which were defined as elements in the play script that were taught but could also be used by other untrained characters. They measured the percentage of substitutable loops performed by summing number of actions and vocalizations made by the participant and dividing that by the total number of actions and vocalizations available for each toy. The boat had 15 actions and 16 vocalizations, the train toy set had 15 actions and 14 vocalizations, and the zoo toy set had 15 actions and 16 vocalizations performed in the video models.

During baseline, researchers gave the direction "It's time to play" and the participants had 3 min to play with the toy. During treatment, participants viewed the video before the 3 min of playing with the toy. During baseline, two of the participants rarely, if ever, engaged in any of the substitutable loops across all three toy sets.

However, their responding increased after training was initiated and remained higher than baseline levels after training ended (this included responding for both trained and untrained characters). The third participant had low levels of responding during baseline, but after treatment only increased responding for the trained characters.

Beyond teaching toy play, video modeling has also been used to teach interactive game play. Kourassanis, Jones, and Fienup (2014) taught two children with ASD, ages 5 and 6, to play Duck, Duck, Goose and the Hokey Pokey using video modeling and chaining. The intervention was implemented during a social skills group. Researchers showed participants video models that were 40 s in length demonstrating Duck, Duck, Goose and the Hokey Pokey being played by typically developing children. Task analyses were created for the games: Duck, Duck, Goose had 12 steps and the Hokey Pokey had 19 steps. Data were collected on the participants' engagement in the play behaviors outlined in the task analyses.

During baseline, the participants were asked to play the target game without viewing the video. During treatment, the participants first watched the video and then were given the direction to play the game. Prompts were provided if the child did not engage in correct response for two consecutive sessions. Both participants engaged in more correct play behaviors after the video modeling intervention was initiated. Researchers assessed generalization with a new game, Ring Around the Rosies, and both participants' correct responding slightly increased after treatment. However, maintenance sessions were not conducted, therefore it is unknown if these skills maintained when the videos were no longer shown.

Video modeling has been shown to be an effective method for teaching play skills. However, more free flowing games, like hide-and-seek, may require a more flexible teaching technique. Teaching a game of this sort using video modeling would require several videos and may not lead to adequate generalization to other settings that are not present in the videos. In contrast, activity schedules are a technology that teach chains of behaviors rather than specific responses. This technology may be useful to teach more general behaviors, such as seeking and hiding.

Photographic Activity Schedules

Photographic activity schedules are visual cueing systems that can be displayed in many forms. The most common and basic form is a three-ring binder. The binders have plain colored background pages inserted in page protectors with photographs displayed on them. The pictures may be paired with text and/or scripts to prompt the child to engage in verbal behavior. There are several steps required for completing the schedule, including (a) engaging in an attending response (e.g., looking at or touching the picture), (b) obtaining the appropriate materials for the activity or transitioning to the correct location, (c) engaging in the activity, (d) cleaning up/returning materials, and (e) turning the page. This process is repeated until all the activities in the binder have been completed (MacDuff, Krantz, & McClannahan, 1993). Because the schedules change each session, the end of each activity serves as a cue for the individual to turn the page and move to the next activity. In this way activity completion in general serves as the discriminative stimulus for the next activity rather than the completion of specific

activities. Activity schedules are most often taught using graduated guidance, which includes physical prompting, shadowing, and spatial fading. Prompts are delivered from behind the child for two primary reasons: (a) because physical prompts can be faded more easily than verbal prompts and (b) because the child is positioned to watch themselves complete the activity and attend to relevant environmental stimuli rather than attending to adult cues (McClannahan & Krantz, 2010). The amount of guidance is systematically faded and the physical proximity between the teacher and child is increased. This promotes responding in the absence of adult supervision. The primary advantage of activity schedules is the way in which they foster independence for individuals with ASD.

Traditionally, the activities included in schedules are those the individual can complete independently but do not engage in without an adult instructing them to do so. The schedule prompts the individual to occupy his/her time constructively. Photographic activity schedules provide visual cues for individuals to follow in order to complete a chain of behaviors without adult prompting or supervision (McClannahan & Krantz, 2010). More advanced activity schedules incorporate choice (e.g., activities, snacks) and social interactions.

Visual Schedules

Photographic activity schedules are a subset of the broader category of visual schedules. The purpose of general visual schedules is to provide a visual representation of a sequence of activities to individuals with limited receptive language skills. Visual schedules can help individuals with ASD better anticipate future events, which can lead

to a reduction in challenging behavior. These schedules can signal when preferred and aversive activities are pending which helps reduce uncertainty. They generally incorporate cues from adults to orient to the schedule in the form of verbal (e.g., "check the schedule") or gestural prompts (e.g., pointing at the picture). In contrast, the purpose of a photographic activity schedule is to promote independent responding and appropriate time management.

Scripts

An intervention to promote social interaction that is commonly used in conjunction with activity schedules is social scripting. Scripts are visual (e.g., typed) or auditory (e.g., Mini-me recorders) cues that provide children with ASD with appropriate words/phrases to fit a specific context. The benefit of using scripts to prompt initiations is to decrease adult verbal prompting, which, as stated earlier, can be difficult to fade. Script fading is an intervention that targets an increase of independent initiations for children with ASD by systematically fading the script until the child can use the phrase/word without the presence of the script. As the child with ASD can reliably use the scripts they are faded one word/part of the word from the end to the beginning. An example is: "Play with me," "Play with ____," "Play ____ ____," ____ ____ ____." The omission of the final word in the script continues until the script is completely removed. Children are required to use the whole phrase even when the script is partially or completely faded. The goal of this intervention is to increase language use while also reducing the child with ASD's dependence on adult prompting.

Krantz and McClannahan (1998) used a script fading procedure embedded within a photographic activity schedule to teach three children with ASD ages 4 and 5 to initiate social interactions. Researchers measured the number of scripted and unscripted interactions made by the participants. During baseline, an activity schedule with 16 activities was present, but the scripts were not embedded. During teaching, the same 16 activities were present, but 10 of the activities had the scripts "look" or "watch me" attached to them. The scripts were systematically faded based on the stability of participants' responding. New activities were introduced into the schedule without scripts to assess if the participants would continue making initiations. The number of scripted and unscripted initiations increased for all three participants once treatment was initiated. Participants continued making initiations with a new conversation partner and new toys when the scripts were completely faded.

Other studies have targeted more advanced verbal skills within the context of activity schedules. Stevenson, Krantz, and McClannahan (2000) used scripts embedded in activity schedules to train four adolescent male students with ASD to initiate interactions with a conversation partner (i.e., teacher). Researchers measured the number of scripted and unscripted interactions initiated by the participants. The researchers conducted two different phases of baseline. During the first baseline phase, neither the schedule nor the scripts were present. The second baseline phase introduced the activity schedule, but the scripts were not embedded within the schedule. During teaching, the activity schedule was present, as were the scripts (i.e., Language Master Cards). The activity schedules had 10 activities, five nonsocial (e.g., worksheets) and five social

activities (i.e., a picture of a language master card was present). For the social activities, the participants were required to take the card to the conversation partner who had the language master. They then initiated a conversation with four exchanges. All four participants engaged in more verbal interactions (both unscripted and scripted) after treatment was initiated. The participants continued engaging in these interactions even after the scripts were faded.

Photographic activity schedules have been effective in promoting independence for individuals with ASD when engaging in a variety of activities, including doing household chores (Krantz, MacDuff, & McClannahan, 1993), completing work tasks and academic tasks (Bryan & Gast, 2000), playing with toys (Morrison, Sainato, Benchaaban, & Endo, 2002), playing on the playground (Machalicek et al., 2009), and playing video games (Blum-Dimaya, Reeve, Reeve, & Hoch, 2010). Independent play is an essential skill for children in order to occupy typical solitary times during the day. However, peer play is also important for children with ASD. With the inclusion of social scripting and choices, photographic activity schedules have the potential to be a useful teaching tool for more advanced play.

CHAPTER II

LITERATURE REVIEW

Given the potential for activity schedules to be an important tool for teaching complex social play, I conducted a formal literature review on this topic. To identify the existing body of literature on activity schedules I conducted a two-step search. First, I used the search engines PsychINFO, Academic Search Premiere and ERIC with the search terms activity schedule* and autis* to locate articles. This search produced 161 possible articles, and 14 met the criteria for inclusion in this literature review. To be included in this literature review, the publication had to (a) implement activity schedules as the primary independent variable, (b) have the primary dependent variable be directly related to the target skills presented in the schedule, (c) have at least one participant diagnosed with ASD, (d) use a single-case research design, and (e) be published in English. This excluded literature reviews and studies that did not provide outcome data for participants measured over time. Second, I did an ancestral search of all 14 articles to ensure we did not overlook any articles, which gave us one new article. This provided a total of 15 articles to analyze.

Individual Activity Schedules

The first study on photographic activity schedules was conducted by MacDuff and colleagues in 1993 and aimed to increase both on-task and on-schedule behaviors. Four boys with ASD ages 9 to 14 participated in this study. The researchers described their inspiration to conduct this study because they noticed that the youth attending their

program relied heavily on adult prompting to remain on-task and several attempts to fade these prompts had been unsuccessful. Participants required prompting for behaviors they were capable of independently engaging in but would not initiate without adult prompting. Participants also engaged in inappropriate behaviors, including aggressive behaviors, elopement, tantrums, and high rates of stereotypy during unstructured periods of time. The researchers intended to specifically assess the impact of using visual cues and graduated guidance on the amount of time participants remained on-task. Using a 60 s momentary time sampling measure, they recorded both on-task and on-schedule behaviors. On-task behaviors included: (a) attending to the schedule, (b) attending to the materials, (c) manipulating appropriate materials, or (d) transitioning from one activity to another. On-schedule behavior entailed engaging in the activity that corresponded with the picture in the activity schedule.

Each activity schedule had six activities including snacks, leisure tasks (e.g., Tinker Toys, Lego blocks) and homework tasks (e.g., handwriting worksheets). Sessions lasted for 60 min. The final activity in each schedule was watching television, which participants engaged in for the remainder of the 60 min. During baseline, the participants' on-task behavior was extremely variable (or nonexistent for one participant). However, once the activity schedules were introduced, all four of the participants remained on-task for 90% or more of the intervals. They engaged in appropriate behaviors without requiring supervision or prompting during the 60 min sessions. Participants remained on-task and on-schedule when the activities in the schedule were resequenced and when new activities were introduced.

Work/Academic Tasks

Several of the studies identified in the search targeted using activity schedules to promote independent work/academic tasks. Bryan and Gast (2000) conducted a study to extend the findings of MacDuff et al. (1993) by targeting younger participants and altering the form of the visual prompt. The participants in this study were four children with ASD, ages 7 and 8. The study was conducted in the participants' resource classroom during a time when students rotated through various literacy centers. These centers included (a) writing, (b) reading, (c) listening, (d) and art. Researchers assessed the effects of the activity schedule using an ABAB withdrawal design. Researchers measured on-schedule and on-task behaviors. On-schedule was defined as (a) returning the task activity card, (b) locating and removing the next task activity, (c) locating and moving to the activity area, and (d) beginning the task within 10 s.

They also recorded if participants were on-task with schedule materials, defined as (a) visually attending to appropriate materials, (b) looking at activity schedule, (c) manipulating appropriate materials, and (d) transitioning from one activity to another. Activity schedules consisted of a small photo album with line drawn pictures, rather than photographs, used for visual cues. Researchers taught participants to use the activity schedules using physical prompts. On-task and on-schedule behaviors increased for all participants after introducing the activity schedule even when all prompts were faded. Participants' responding returned to baseline levels when the activity schedules were removed but immediately increased when they were reintroduced.

Activity schedules can be a useful tool to increase independent self-help skills and other daily living tasks. Pierce and Schreibman (1994) trained three male children with ASD ages 6-9 to follow activity schedules to independently complete daily living skills. Tasks were individualized for each participant based on their needs (e.g., setting the table, getting dressed, etc.). Activity schedules consisted of a photo book with photographs of each task step. Researchers measured on-task behavior, which they defined as any functional interaction with the materials. They also measured inappropriate behavior, which included stereotypy. During baseline, participants were given an instruction to complete the task without any prompts. During teaching, the schedule book was present and participants were prompted to touch the picture and engage in the task step. The percentage of intervals the participants were on-task increased after the schedules were introduced and the percentage of intervals they engaged in inappropriate behavior decreased. This change in responding continued even when the schedules and adult presence were faded and maintained two months after the study was completed.

The activity schedules described to this point have all targeted promoting independent behavior. Building independence is an important behavioral target for many individuals with ASD and related disabilities because, as stated earlier, they often have a difficult time managing their time and transitioning from one activity to another. However, there are instances in which it would be important to promote cooperative work. White, Hoffmann, Hoch, and Taylor (2011) trained three dyads of male participants ages 16-19 to use one activity schedule to complete work tasks. Before

beginning the study, participants could follow independent schedules but could not complete long chains of behavior with another person. The study was conducted at a behaviorally-based school for individuals with ASD. The researchers programmed three work tasks into the schedule: cleaning the kitchen, replenishing kitchen supplies, and cleaning the office. The schedules were laminated and presented in a list format, with text and/or pictures depending on the participants' skill level. Researchers used graduated guidance to teach schedule following. The dependent variables were the total number of tasks completed by the participant and schedule following, defined as percentage of component responses completed correctly by only one of the participants in the pair (it was incorrect if both participants completed the same task). The components measured were: (a) attending to schedule, (b) marking the task in the schedule, (c) completing the task, and (d) returning to the schedule. During baseline, the percentage of correctly completed components was under 20% for two dyads and the percentage for the third dyad was initially at about 60% but dropped under 20%. The percentage of correctly completed components increased to between 80-100% for all three dyads once schedule training was initiated. Before treatment, the number of task steps completed by the participants showed that one member of the team completed the majority of the steps or neither of the participants in the dyad completed many tasks. However, after the activity schedule was introduced the number of tasks completed was fairly even across the dyads.

While this study did teach pairs of individuals to complete schedules together, the purpose of the study was not to increase interaction between the participants; because of this we include it in this section on individual activity schedules.

Training Others to Implement Activity Schedules

Researchers were the primary implementers in the majority of the articles on activity schedules described in this literature review. However, there are some studies that measured client outcomes when nonresearchers (e.g., paraprofessionals, parents) prompted the use of activity schedules. Hall, McClannahan, and Krantz (1995) trained three classroom paraprofessionals to implement activity schedules with their students. Three male students with disabilities, ages 7 to 8, participated with their one-on-one classroom aides. Activity schedules were small photo books with photographs. Researchers measured the behavior of both the children with disabilities and the paraprofessionals. They recorded the number of prompts the paraprofessionals provided using partial interval recording. Child engagement was measured by: (a) attending to people or activity schedule, (b) transitioning, and (c) engaging with materials appropriately. The participants were not scored as engaged if they were engaging in problem behavior, not engaging in the behaviors listed for engaged, or if they had received a prompt during the interval. Researchers also recorded if the participant was on-schedule, defined as engaging in activity depicted in the schedule. The schedules targeted different skills for the participants, based on recommendations from the paraprofessionals. The three different skills targeted were making a necklace during independent time, toilet training, and transitioning from a group activity to independent

seatwork and initiating the target task. During baseline, the paraprofessionals were asked to behave as they usually would to help the student engage in these targeted activities. Before the intervention phase, the researchers trained the paraprofessionals on prompting and teaching techniques and continued to provide performance feedback throughout the intervention. Paraprofessionals were encouraged to use physical prompts rather than verbal and gestural prompts. After the paraprofessionals were trained and the activity schedules were introduced, all three participants spent more time engaged and on-schedule. Also, the paraprofessionals provided fewer prompts after training, which aided in promoting the participants' independence.

Krantz, MacDuff, and McClannahan (1993) taught parents to implement activity schedules with their children with ASD to increase engagement in household activities. Three male children with ASD ages 6-8, who were all trained to use activity schedules in the treatment setting, participated in this study. The dependent variables were engagement and disruptive behavior. Researchers measured engagement, defined as (a) attending to schedule or appropriate materials, (b) manipulating appropriate materials, and (c) moving from one activity to another. Disruptive behaviors were defined as (a) tantrums, (b) aggression, (c) disruptive behavior, (d) self-injurious behavior and (e) stereotypy. During baseline, the activity schedule was present but parents were instructed to use their own strategies to prompt the child to engage in after school activities. Researchers then trained parents to implement activity schedules. During teaching, parents used graduated guidance for training the activity schedules. The percentage of time participants spent engaged increased after parents were trained to implement activity

schedules and disruptive behavior decreased. Responding maintained for up to 10 months for two participants and 2 months for the 3rd.

Leisure Skills

The last main category of target activity schedule skills is promoting leisure and play skills. Morrison et al., (2002) taught four preschool children diagnosed with ASD to use activity schedules during classroom free play. The study was conducted in the participants' preschool classroom with three center areas. Researchers measured on-task and off-task behavior. On-task behavior was recorded if the child was (a) making eye contact with the materials or another child engaged in that activity, (b) interacting with materials, (c) engaging in nonverbal or verbal interactions with another student or experimenter, (d) getting the activity schedule, (e) attending to the activity schedule, or (f) returning the activity schedule. Off-task behavior was recorded if the child was not engaging in the behavior listed for on-task, or if they were engaging self-stimulatory, disruptive or aggressive behaviors. Play correspondence was recorded if the child was engaging in the play activity that corresponded with their activity schedule. Clipboards with Velcro were used for activity schedules. Participants arranged the order of their schedules. Researchers facilitated this by asking "where do you want to play." the participant would pick a picture and put it on the schedule, the researcher then asked "where do you want to play next" and this continued until all three pictures were on the schedule. Researchers used graduated guidance to teach participants to use the activity schedules. During baseline, participants arranged the schedule and it remained present during the session, but they were not prompted to use it. During treatment, the children

were asked to choose the order of their play activity schedule and prompted to follow it. Children were required to play in a specific area for 5 min and then directed to check their schedule. All the participants increased the percentage of time they were on-task and decreased the number of prompts necessary to remain on-task. Play correspondence behaviors also increased after implementing the activity schedule.

Cuhadar and Diken (2011) taught three male children with ASD, ages 4-6 to use activity schedules to increase leisure play. Activity schedules were presented in small books with photographs of three activities: Legos, Potato Head, and bowling pins. Experimenters used graduated guidance and shadowing to train participants to use activity schedules. They also provided verbal praise after participants completed activities. Experimenters measured engaging in schedules and dealing with activities. Engaging in schedules was defined as (a) attending to the picture, (b) turning the page, (c) engaging in the target activity within 5 s, and (d) transitioning to the next activity. Dealing with activities was defined as (a) attending to the activity and responding to questions, (b) using the materials properly, and (c) performing the appropriate behaviors to complete activity. The participants spent more time engaging in schedules and dealing with activities once the prompting was introduced. Researchers also assessed social validity by conducting semi-structured interviews with the mothers and teachers. Before the interview mothers and teachers viewed a video of the initial and final sessions for participants. Overall, the interviews yielded positive feedback, that the participants appeared to be more autonomous and attentive and engaging in less stereotypy during the

final session. Teachers also requested training to implement activity schedules in their classrooms.

Children with ASD often have difficulty managing their time during other free play situations outside of the classroom. Machalicek et al. (2009) taught three elementary students with ASD to use activity schedules while playing on the playground. Activity schedules consisted of a clipboard with Velcro with pictures of playground equipment. Researchers taught the participants to follow the activity schedule using graduated guidance, but also provided verbal reminders. Data were collected on challenging behavior and if the child completed task correspondence steps which included, (a) pointing to the activity, (b) removing the photograph of the activity, (c) taking the photograph to the corresponding play structure, (d) engaging in the play activity, and (e) returning to the activity schedule when prompted by the teacher. During baseline, the activity schedule was present and participants were prompted to attend to it but not prompted to follow it. During intervention, participants were prompted to point to the pictures and move through the activity schedule performing each step defined for the dependent variable. The participants were required to remain on the specific playground equipment for 2 min before moving to the next activity. After implementing the activity schedule, all of the participants challenging behavior reduced and the percentage of intervals in which they were playing according to the activity schedule increased.

Activity schedules have also been used to teach video game play. Blum-Dimaya, Reeve, Reeve, and Hoch (2010) trained four children diagnosed with ASD to play Guitar

Hero II using an activity schedule. Researchers created a detailed task analysis for all the behaviors necessary to play the game. The activity schedule had laminated pictures of each step of the task analysis. On-task behavior was recorded if the students were (a) visually attending to materials or the activity schedule, (b) manipulating materials, or (c) transitioning between activities. Data were also recorded to determine if the participant accurately completed the components of the task analysis. Reinforcement was provided for remaining on-task and responding correctly, but as the study progressed, this reinforcement was faded. During baseline, participants were instructed to play Guitar Hero II but not provided with any prompts. During the intervention phase, participants were provided with an activity schedule that included pictures of various steps to set up and play the video game. Researchers used graduated guidance to prompt participants to use the schedules.

Pages in the schedule were systematically faded when participants met the mastery criteria of 100% correct responding and 80% of time spent on-task for two consecutive sessions. Pages were reintroduced if errors were made. Generalization was tested in the participants' home for two sessions. All participants increased the percentage of intervals in which they were on task and percentage of correctly completed schedule components after the implementation of the activity schedules. The researchers assessed the social validity of the intervention by having psychology undergraduate students rate the participants' behavior in three areas using a Likert-scale. Questions included: is the child engaged in an age-appropriate leisure skill, is the child attending to the materials appropriately, does the child appear to be engaging in the skill as peers of

his/her age would. The students highly agreed with all three of these statements after treatment for all participants.

Technology

As technology becomes more accessible, researchers have included various devices and applications in the development of activity schedules. Carlile, Reeve, Reeve, and DeBar (2013) taught four 8-12 year old boys with ASD to follow an activity schedule using the iPod touch. The only difference between the schedule on the iPod touch and the traditional schedule was the mode in which they were presented. Sessions were conducted in the participants' self-contained classrooms, and generalization sessions were conducted in a general education classroom. They measured both independent schedule completion, which included a task analysis of all components of the response chain and on-task behavior, which included (a) visually attending to components of schedule, (b) looking at the schedule, (c) appropriately manipulating materials, and (d) transitioning from one activity to another. Both independent schedule completion and on-task behavior increased once the schedule was introduced for all four participants.

Another type of technology that is commonly used when working with individuals with ASD is an iPad. Spriggs, Knight, and Sherrow (2014) created an activity schedule on the iPad to train four high school students with ASD to complete several classroom tasks. Researchers used an application *My Pictures Talk*™ on the iPad to allow them to input video models into the activity schedule. The video models depicted individuals completing tasks. The three known tasks used for the teaching sessions were getting the calendar board, wiping down the calendar and putting it away,

and hand washing. The novel tasks used for generalization were data entry, algebraic equations, writing a paragraph and setting the table. Researchers taught the participants to use the schedule using verbal, model and physical prompts. The dependent variable measured was the percentage of independently completed steps. The steps were the following: (a) select the application, (b) select #1 picture, (c) swipe to the left, (d) tap the blue arrow, (e) watch video of task, (f) once task is completed tap arrow to the right with next picture, (g) when completed hit the home icon. The percentage of independently completed steps increased for all three participants once the technology schedule training was introduced. They were also able to complete novel activities that were introduced in the activity schedules.

As technology is introduced into activity schedules, it is important to assess the usefulness of the addition of technology. Cihak (2011) compared the use of picture activity schedules and activity schedules with video models for increasing appropriate transitions for four adolescents with ASD, ages 11-13. The researcher assessed these two treatments using an alternating treatments design. The traditional picture activity schedules were displayed in a central area of the classroom with pictures horizontally displayed. Participants viewed the videos on a touch screen computer in the classroom. The dependent variable was the percentage of independent transitions, which was defined as moving from one task to the other within 5 s of direction and without engaging in target inappropriate behaviors specified for each participant. There were 10 transitions total programed throughout the school day. During baseline, the teachers continued to use their prompting procedures for transitions, which included verbal, gestural and

physical prompts. During treatment, five of the transitions were prompted with the static pictures in schedule and the other five were prompted with a video modeling schedule. During baseline, on average none of the four participants made more than 20% of the transitions independently. After the activity schedules were introduced, all four participants made 100% of the transitions independently. The researcher found that two participants met criterion more quickly with the schedule with the picture schedule and two participants met criterion more quickly with the schedule with video models. These findings do not provide practitioners with a clear answer to the question of the usefulness of technology within activity schedules. While technology-based activity schedules may be useful, the evidence is not conclusive or strong enough yet to prompt the discontinuation of traditional, picture-based activity schedules.

Summary of Individual Activity Schedules

Overall, these studies provide strong evidence for using photographic activity schedules to teach a variety of independent skills to individuals with ASD. The results in the studies overwhelmingly displayed an immediate treatment effect that maintained when novel activities were introduced, activities were resequenced, and/or over time. The range of skills targeted in these studies was not limited to play. However, a large portion of the studies did specifically target play skills. Independent play is extremely important, but peer play is also an important skill many children with ASD are lacking.

Peer Activity Schedules

Recently, researchers have shown that activity schedules can also be used to

promote peer play. Two studies are reviewed in this section, Betz, Higbee and Reagon (2008) and Brodhead, Higbee, Pollard, Akers, and Gerencser (2014). Betz et al. (2008) first examined the use of activity schedules to increase peer play. Three dyads of preschoolers with ASD between the ages of 4 and 5 participated in the study. One activity schedule was shared between the two children which researchers called a joint activity schedule. Dyads were presented with six games they could choose to play. All participants were proficient at playing the games before beginning the study. Researchers used a 20 s momentary time sampling procedure to measure joint engagement. Joint engagement was defined as both children (a) taking turns, (b) using materials, (c) setting up or cleaning up materials, (d) choosing a picture from choice board, (e) initiating play, (f) verbally interacting, or (g) attending to the activity schedule. The six interactive games used in the study were selected because they required two players and had a clear beginning and ending.

At the beginning of each session this instruction was provided: "These are the games you can play with. Go play." Baseline sessions were 20 min. During these sessions, the games were present but the schedule was not available. During the intervention, the dyads of children were instructed to use a joint activity schedule that included two prechosen activities and two choice activities. The participants were prompted using graduated guidance to use the joint activity schedule until the schedule was completed. Each alternating page had a picture of the child who was "in charge" of the page, meaning they initiated play with the selected game or selected their preferred game on choice pages.

Scripts to prompt initiations were programed into the activity schedules. When the child's page was open, the script "let's play_____" was present which prompted the child to initiate the game play. This script was systematically faded until the participants were able to initiate play without the presence of the script.

During maintenance, instructors moved back from the children and stood at least 1.5 m away. Researchers resequenced the activities by placing them in a different order to ensure the order of activities was not controlling responding. Researchers assessed generalization by adding two new games into the schedule.

During baseline, all three dyads had variable levels of engagement at or below 50%. When the schedule was introduced but participants were not prompted to use it, responding remained within baseline levels. However, during the teaching sessions the percentage of time spent engaged immediately increased to 80% or higher for all dyads. As the treatment sessions progressed, the percentage of prompted intervals decreased to 10% or less. Engagement remained high for all dyads when prompts were faded, the schedule was resequenced, and when novel activities were introduced into the schedule. The encouraging results of this study prompted researchers to contemplate the usefulness of activity schedules for teaching more structured interactive games.

A common interactive game played by children is hide-and-seek. Researchers examined the use of linked activity schedules to teach children with ASD to play hide-and-seek (Brodhead et al., 2014). Three dyads of preschool children with ASD participated in the study. The sequence of phases included baseline, a schedule probe (the schedule was present but the participants were not prompted to use the schedules),

teaching, a no schedule probe (the activity schedules were not present), resequencing (the hiding locations were arranged in a different order), and novel activities (new hiding locations were introduced).

At the beginning of each session, dyads were told, "It's time to play hide-and-seek." When the activity schedule was not present, they were also told "[name] you are the hider, [name] you are the seeker." During baseline, the dyads were given 10 min to play, schedules were not present and prompts were not provided. During treatment, each participant in the dyad had his or her own activity schedule book. The schedules both had two colors of paper on every other page. One signaled that it was a hider page and the other a seeker page. On the seeker page was the script "go hide," the numbers 1 to 20 for the seeker to count, two possible locations where the other child may be hiding, and a script "I found you," all sequenced in vertical order. The seeker first said, "go hide" and then counted to 20. Once they finished counting, the seeker would remove the strip with the locations and remove the "I found you" script and place it on a Velcro watch band. They then would go to the first location and if the other child was not there they proceeded to the second location. Once they located the other participant they said, "I found you."

There were two types of hider pages. One type included one prechosen location and the script "oh no." The second type was a choice page with two location pictures from which the participant could select one and the script "oh no." The addition of choice into the activity schedule is important for increased child autonomy and can be helpful for fading the schedule. After the seeker said, "go hide" the hider would point to

the picture of the location that was already on the page or the one that was selected (i.e., selection response was moving one picture from the left page to the right page) and then removed the script and put it on a Velcro watch. The hider then went to the location and remained there until the seeker found them. After the seeker said, "I found you," the hider said "oh no." Then, both participants returned to their activity schedules, turned the page and the roles reversed so that the hider became the seeker and seeker became the hider. Each child played the role of the seeker twice and the role of the hider twice. At the end of the schedule, both participants had a script that said, "Thanks for playing" which they read. The "I found you" and "oh no" scripts were systematically faded until only the watches were present.

The researchers measured discrete game play behaviors and schedule following behaviors using a per opportunity measure. Game play behaviors for the hider included (a) finding a hiding location, (b) waiting at the hiding location, (c) saying "oh no" when the seeker located them, and (d) saying "thanks for playing" at the end of the game. Game play behaviors for the seeker included (a) saying "go hide," (b) looking at peer to signal they should go hide, (c) counting from 1 to 20, (d) searching for peer, (e) saying "I found you" when he/she located the peer, and (f) saying "thanks for playing" at the end of the game. Schedule following behaviors included (a) opening the schedule, (b) turning the page, (c) attending to pictures of locations, (d) going to the corresponding locations, and (e) closing the schedule.

When the activity schedules were not present, none of the dyads engaged in any hide-and-seek behaviors and rarely if ever interacted with one another. Once the activity

schedules and graduated guidance were introduced, all three dyads began engaging in play behaviors and their responding remained elevated even when the graduated guidance was removed, activities were resequenced, and novel locations were introduced.

Fading

When researchers for the two peer activity schedule studies removed the activity schedules for the no schedule probe, the participants' responding returned to baseline levels. This suggests that the activity schedule(s) alone prompted the participants to engage in the target behaviors. This is a common finding in many activity schedule studies because the purpose of many activity schedules is to serve as permanent visual cue (e.g., a calendar). However, there are instances in which it would be preferable for the child to engage in target behaviors without the schedule present. In these cases, it may be important to investigate the possibility of fading the schedule by employing systematic fading steps rather than abruptly removing the schedule.

There is some evidence to support the fading of activity schedules. Blum-Dimaya and colleagues were able to fade the activity schedules by systematically removing entire pages of the schedule. However, the schedules used in this study were very basic and the steps remained constant (setting up the video game does not change). The fading steps may need to be broken down further for teaching more advanced activity schedules. Researchers were also able to systematically fade photographic schedules to text for a young boy with ASD schedules (Birkan, McClannahan, & Krantz, 2007). The fading steps were as follows: (a) 1 cm strips cut from top and bottom of picture, (b) 1 cm strips

cut from top and bottom of picture, (c) pictures were cut so that only the text was visible, (d) sight word cards (without pictures) were present in the schedule. These researchers were able to successfully fade the schedules from pictures to text. There is some evidence to suggest that fading activity schedules is possible. However, this evidence is limited and more research is needed to identify if advanced schedules that incorporate more than one learner can be faded.

Group Activity Schedules

Many social play interventions for children with ASD focus on pairs of peers for the intervention (Rogers, 2000). While tandem peer play is an important dimension of play, many children in school and other community settings play in larger groups of peers. Group play fosters the development of cooperative problem solving, sharing, taking turns, following rules, dealing with disagreements (Anderson-McNamee & Bailey, 2010). All of these skills are important for success later in life. One established treatment aimed to increase group play for children with ASD is *integrated play groups*. This technology uses settings that include large populations of socially competent peers to function as play partners for the children with ASD (Wolfberg, DeWitt, Young, & Nguyen, 2014). The goal of using integrated play groups is to facilitate group play by manipulating various aspects of the environment rather than providing intrusive prompts. This goal is similar to that of using activity schedules to encourage play behaviors. However, activity schedule studies that have taught peer play have included only two

children. It is unknown if activity schedules can be used to teach a group of children to play together.

It is important for children with ASD to learn to play with typically developing peers, especially if the least restrict environment for the child could be the general education classroom. If the goal of our interventions is to teach more typical play skills, our interventions should include typically developing peers as play partners. To date, activity schedule studies aimed to increase peer play have only included peers with ASD. Research is needed to identify the utility of activity schedules for including children with ASD in the play of typically developing children.

Purpose and Research Questions

The purpose of this study was to investigate if we could successfully teach children with ASD engage in complex behaviors such as social play using activity schedule. We taught the children to play hide-and-seek; however, this was really incidental in the study. Our goal was also to extend the research on using activity schedules to teach social skills by using group activity schedules. A secondary purpose of this study is to examine the effects of systematically fading the schedule.

Research questions:

1. To what extent will a photographic activity schedule increase the percentage of independent hide-and-seek behaviors completed by children with ASD?
2. To what extent will a photographic activity schedule maintain/increase the percentage of independent hide-and-seek behaviors completed by peer participants?

3. To what extent will teaching multiple scripts facilitate participants' variable verbal responding during play?
4. To what extent will the children with ASD continue to engage in the hide-and-seek behaviors once the activity schedules have been faded?
5. To what extent will these play skills generalize to a new environment?
6. To what extent will these play skills maintain two weeks after treatment has concluded?

CHAPTER III

METHOD

Participants

We recruited four preschool aged children with ASD who attended a university-based preschool for individuals with ASD. Only three of the participants completed the study. One participant was discontinued because he began engaging in aggressive behaviors towards the typically developing peers. He completed baseline and several teaching sessions before we discontinued treatment. The participants with ASD (hereafter called "target children") played hide-and-seek with a group of three preschool age typically developing children (hereafter called "peer participants"). Target children were fluent activity schedule followers before beginning the study. We defined this as independently following individual activity schedules with 90% accuracy or better in the clinical setting for three consecutive sessions. They all engaged in vocal verbal behavior and engaged in the correct vocal response in the presence of a visual text script as measured by their ability to proceed through pretraining.

We recruited 12 typically developing children (eight females and four males) who attended a university-based preschool to be the peer participants (see Table 1). They all attended the same preschool class three to five days per week. Peer participants were not trained to facilitate teaching; rather they served the role of confederates. They were specifically instructed not to provide any help to the target child during experimental sessions. Researchers used the same teaching procedures with the peer participants as

Table 1

Peer Participant Information

Participant	Sex	Age	Number of Sessions Completed
P1	Male	5	12
P2	Female	5	2
P3	Female	4	11
P4	Female	5	26
P5	Female	4	60
P6	Female	4	35
P7	Male	4	41
P8	Female	4	50
P9	Male	4	21
P10	Female	4	31
P11	Female	4	32
P12	Male	5	28

they did with the target children. Prior to the first session we explained to the peer participants that we are going to play hide-and-seek using books and that we will help them by guiding them from behind. Initially, each target child had a set of three peers that always played with that child. However, this became unpractical due to uncontrollable circumstances (e.g., peer illnesses and absences) so we switched to peer groups that were picked on a daily basis based on which peers were available.

The three target children were Penny, Dexter and Sadie. Penny was a 3-year-old female diagnosed with ASD by an outside agency. Penny engaged in sustained play for at least 10 min without prompts and spontaneously engaged in parallel play with other children for 2 min. She could complete at least 10 fill-in-the-blank phrases and emit five different 2-work utterances per day. During observations, she approached peers; however, she did not engage in appropriate behaviors to initiate play. Dexter was a 5-year-old male diagnosed with ASD by an outside agency. Dexter engaged in sustained

play for at least 5 min without prompts and could intraverbally respond to up to two questions made by peers. He also could engage in 300 different intraverbal responses and emit five different noun phrases with at least four words. Dexter spent part of his therapy time at the university-based preschool in the classroom with the peer participants who participated in the study. Sadie was a 5-year-old female diagnosed with ASD by an outside agency. Sadie engaged in sustained play for at least 10 min without prompts and could engage in up to four verbal exchanges with peers. She also could describe 25 different events and/or stories with eight or more words and could use sentences with combined nouns and verbs with five or more words. Sadie also spent part of her therapy time at the university-based preschool.

Setting

We conducted all sessions in the Dolores Doré Eccles (DDE) Center. Sessions were conducted in the common area outside of the classrooms. The common area consisted of cubbies, tables and chairs, and observation rooms. Generalization sessions were conducted in the outside play area of the DDE Center. The outside play area consisted of a slide, small playhouses, a sandbox, grass, trees, and cement bike trails. We obtained informed consent from the parents of both target children and peer participants. We also obtained informal verbal assent from the peer participants for each session, as they could decline to play. Researchers conducted one to three sessions per day, three to five days per week. When multiple sessions were run in one day, they were separated by at least one hour.

Materials

Two small, three-ring binders were used for the teaching phase of the study. One binder was designated as the "seeker" schedule and the other as the "hider" schedule. All the hiders used the same "hider" schedule during each round of the game (see Figure 1). Each binder contained construction paper inside page protectors with laminated pictures of the players and hiding locations attached on the pages with Velcro. Typed scripts were attached to the pages. The scripts were paired with a specific colored background (see Figure 2). All sessions were recorded using a video camera so that data could be scored following the sessions.

Figure 1. An example of a page in the hider schedule.

Response Definition and Measurement

Trained research assistants collected data via recorded video. This required each target child and peer participant to be individually recorded to obtain all the necessary data (i.e., separate videos were recorded for each participant for each session). We measured game play behaviors and schedule behaviors using a per opportunity measure.

Schedule behaviors were defined as any behaviors that were necessary for completing activity schedules and game play behaviors were defined as behaviors necessary for completing the game (described in full detail below). During baseline, only game play behaviors were measured because the schedule was not present. The asterisk below designates the schedule following behaviors that were only recorded when the schedules were present. For the hider activity schedule, the following behaviors were recorded: (a) removing selected picture*, (b) hiding in an appropriate location (i.e., no

Figure 2. An example of the front and back of a page in the seeker schedule.

one else is hiding there) at appropriate time (i.e., someone is counting), (c) remaining in hiding location until found by the seeker, (d) appropriately responding when found (e.g., "Oh no"), (e) returning to home base, (f) turning the page* and (g) closing the binder after the last page* (see Table2). For the seeker activity schedule, the following behaviors were recorded: (a) using the phrase "my turn" to let the other participants know who the seeker is, (b) using the phrase "go hide," (c) counting to 20, (d) saying "ready or not here I come," (e) turning the page*, (f) removing the seeker strip*, (g) pointing to the picture of the location*, (h) going to location, (i) using an appropriate statement if child is hiding at that location (e.g. "found you"), (j) moving child's picture or ☹*, (k) these steps repeated until all of the other children are located, (l) returning to home base once all the hiders have been found, and (m) closing the binder after the last page*. We calculated a percentage by dividing the number of independently completed components by the total number of components and multiplying this by 100.

It is important to note, we defined accurately playing the role of the seeker as independently counting and locating hiders. When participants played the role of the seeker in pairs, we recorded the components as incorrect because we needed to identify if participants could independently engage in these behaviors. We also established the requirement for each child to play the role of the seeker once during the game during at least one round. Because of this, during sessions without the schedule when the target child and/or peers did not play the role of the seeker, when they should have had they been appropriately taking turns, they received minuses for each of these components. We defined it as incorrect when more than one participant hid in the same location as well.

This was important because if they hid in pairs it would be impossible to identify if participants could independently hide.

We recorded data for the peer participants, as well as the target children. We collapsed the peer data into one data path by averaging the data across the three peers that played hide-and-seek in that particular session. We chose to aggregate peer participant data because all 12 of the peer participants played with each target child and did not participate consistently with the same target child. Thus, it would be difficult and potentially confusing to include all 12 data paths in one graph.

We also recorded data on the different play statements used by the participants once the scripts were introduced. Research assistants transcribed each play statement (e.g., "see you," "found you") made by the participants. Because we taught various

Table 2

Seeker and Hider Behaviors

Seeker	**Hider**
Open schedule	Open schedule
Say "My turn"	Remove picture of hiding location
Say "Go hide"	Move to location
Counts from 1 to 20	Remain in the location until found
Say "Ready or not here I come"	Say appropriate phrase (e.g., "Dang it")
Turn page	Turn page
Remove seekers strip	Close schedule
Point to first hiding location	
Search hiding location	
At location	
– Say appropriate phrase (e.g., "see you")	
– Move picture	
Return seeker strip	
Turn page	
Close schedule	

scripts during the teaching phase, we wanted to see if this would lead to varied statements once the scripts were completely faded.

Research Design

A nonconcurrent multiple baseline design across play groups was used to evaluate the effects of using activity schedules to teach children with ASD to play hide-and-seek with typically developing peers. Each participant started treatment on a different day to reduce the threat of history on internal validity.

Treatment Fidelity and Interobserver Agreement

An independent coder collected data on at least 33% of the sessions across all phases for both target and peer participants to assess interobserver agreement (IOA). Point-to-point IOA was calculated by dividing the agreements by disagreements multiplying by 100. An agreement was recorded if both coders recorded the same component as correct or incorrect. Mean agreement was 97% (range from 92% to 100%) for Penny, 97% (range 91% to 100%) for Dexter, and 95% (range 90% to 100%) for Sadie. Mean agreement was above 90% for all 12 of the peer participants, seven of the 12 had mean agreement above 95%.

Research assistants scored treatment fidelity for at least 33% of sessions across all phases for all participants. We calculated treatment fidelity by dividing correctly implemented components by the total number of components and multiplying by 100. The components that were analyzed for treatment fidelity are: (a) activity schedules are

present (or not present during baseline), (b) the schedules were arranged in the correct sequence (this included the correct scripts, location strips were present and at the correct fading level), (c) sessions were recorded, (d) the researcher began the session with the instruction "play hide-and-seek," (e) praise was not provided throughout the session, (f) physical prompts were provided from behind the participant (g) research assistants followed the prompting procedure for scripts. Mean fidelity was 95% (range from 75% to 100%) for Penny, 100% for Dexter, and 98% (range 81% to 100%) for Sadie. Mean fidelity was above 90% for 11 of the 12 peer participants, nine of these 11 participants had mean fidelity above 95%. One peer participant's mean fidelity was 87%.

Procedures

Research assistants were trained to implement sessions and required to first demonstrate fidelity before conducting sessions with participants. Training consisted of instruction and role-play with feedback. Training concluded when the research assistant was able to correctly implement each component of the intervention with the researcher with 95% accuracy or better.

Pretraining

Before beginning the experimental sessions, we taught both target and peer participants to respond appropriately to scripts by reading each script aloud, (e.g. "my turn," "go hide"). We placed the script in front of the participant and said, "read." If they engaged in the correct response within 5 s, it was marked as correct and we provided brief praise. If they did not read the script correctly, or did not respond within 5 s, we

said, “try again” and it was marked as incorrect. We then presented the script again and provided an immediate verbal prompt. If the participant made another error, we repeated this sequence. If the participant responded correctly, we provided them with an additional opportunity to respond independently. We presented at least five trials, but continued to present trials until the participant independently responded correctly. The mastery criteria for each hiding location were three independent correct responses during the initial session or five independent correct responses out of five trials for subsequent sessions.

We also pretaught picture-location correspondence to ensure all the participants could walk to the correct locations after being shown a picture of the hiding place. We showed the picture to the participant and gave the direction “go here.” If the participant moved to the correct location within 20 s, we provided brief praise. If the participant did not move to the correct location or did not begin to respond within 5 s after the direction, they were physically prompted to move to the correct location. We presented the same location again and provided a physical prompt. If the participant made another error, we repeated this sequence. If the participant responded correctly, we provided them with an additional opportunity to respond independently. We presented at least five trials but continued to present trials until the participant independently responded correctly. The mastery criteria for each hiding location were five independent correct responses out of five trials for one session or three independent correct responses during the initial session.

Participants were taught to count to 20, out loud, while touching numbered dots on a laminated card. We placed the card in front of them and instructed them to count.

Correctly counting to 20 resulted in the delivery of brief praise. If they counted incorrectly or did not begin to respond within 5 s it was marked as incorrect and we verbally prompted the next trial. If the participant made another error, we repeated this sequence. If the participant responded correctly we provided them with an additional opportunity to respond independently. We presented at least five trials, but continued to present trials until the participant independently responded correctly. The mastery criteria for counting were five independent correct responses out of five trials for one session.

We provided the peers the rule to refrain from prompting or teaching the target child to play hide-and-seek. We read this script to the peers before the initial session:

> Today you are going to play hide-and-seek with (insert target child's name). Please do not try and help (insert child's name) play with you. S/he needs to learn how to play all by her/himself. Just play the way you usually do.

If the peers attempted to help another participant play hide-and-seek we provided a reminder, "(insert peer participant's name) remember no helping." While we initially stated the rule specifically regarding the target children, we most often had to remind the peer participants not to help one another. There were very few occurrences of peer participants helping the target child. During baseline, peers never prompted Penny, and peers only prompted Dexter to count one time. Sadie generally shadowed (followed and imitated the peer's actions) a peer while playing during baseline. Other participants gave directions to that specific peer participant, which Sadie imitated. It is possible that those directions functioned as prompts for Sadie. During teaching, participants seldom prompted one another. The only prompt ever provided was when they would vocally

prompt “my turn,” however this rarely occurred and most often was provided to peer participants.

Unstructured Play Probes

We conducted two unstructured play probe sessions for each participant before and after treatment. We recorded the target child playing in the classroom for 10 min with three of the peer participants. These sessions were conducted to assess any possible collateral effects of the intervention on play behavior in general. We used 10 s whole interval recording to measure the number of intervals the target child was in the same play area as the peers and the number of intervals the target child was engaging in the same activity as the peers. The classroom was broken up into different play areas and we defined being in the same area by these predetermined areas. We also measured the number of vocal initiations the target child made to the peers and the number of vocal initiations made by a peer to the target child.

Baseline

During baseline, the participants were taken to the common area and given the direction, “play hide-and-seek, one of you will be the seeker and the others will be the hiders.” Baseline lasted for 10 min. During this time, we did not provide any additional directions or rules for playing the game. Prompts were not provided unless one of the children attempted to leave the area or were engaging in inappropriate behavior (e.g. yelling loudly, climbing on the furniture), in which case we either physically blocked the response or stated the rule (e.g., feet on the ground). The rules were primarily provided

to the peer participants who were instructed by their teacher to follow these rules while playing. The activity schedules were not present during baseline. At the end of 10 min, the children were instructed that the game was over. They were then allowed to select a sticker or small toy for playing.

Baseline Activity Schedule Probe

This session followed the same procedures as baseline. Activity schedules were present, but we did not correct the participants or physically prompt them to engage with the schedule.

Generalization Probe

We assessed generalization to novel hiding locations in the outside play area. We conducted generalization probes during baseline and after treatment. Baseline probes were identical to baseline sessions. During the posttreatment generalization probes, the schedule was present at the last successful fading step, which varied across the target children.

Teaching Activity Schedule

We taught participants to follow the activity schedules using physical guidance. We provided physical prompts to the peers, as well as the target children. When prompting participants to use scripted statements, we first provided a physical prompt to touch the script. If the participant did not respond, we provided a verbal prompt. Two separate binders were present, one contained the seeker activity schedule and the other contained the hider activity schedule.

In the seeker schedule, at the top of each page, there was a picture of one of the participants who played the role of the seeker for that round (see Figure 1). Below the picture was the script, "my turn," which the child said to distinguish the seeker from the hiders. The next script was "go hide" which is the phrase the seeker used to signal to the hiders to go hide. A written cue, *count to 20*, was placed under the "go hide" script which prompted the seeker to count, giving the hiders a chance to hide. Under the written cue were 20 small dots with numbers written from 1-20, which served as an additional visual cue for the seeker to count to 20. The last script read, "ready or not here I come" which was the phrase the seeker used to alert the hiders that s/he was going to search for them. The back of the page included a removable cardboard strip (seeker strip) with two Velcro strips that had pictures of the other hiders and pictures of the possible hiding locations. As the seeker found the other participants, s/he moved a participant's picture from the Velcro strip on the left to the picture of the location where the child was on the right. A script on the bottom of each picture prompted the seeker to say one of the following phrases: "found you," "see you," or "got you." We used multiple scripts to increase the likelihood that the children would vary the phrases that they used (Dotto-Fojut, Reeve, Townsend, & Progar 2011). However, if a participant (target or peer) used an appropriate phrase that was different from the script we accepted this response and did not prompt them to use the script. If a location was searched but no hiders were hiding there, the seeker put a ☹ on the location to designate that they searched there but that none of the other children were found. We randomly rotated four different sequences of hiding locations for the seeker to search. These sequences presented the hiding locations

in different orders. We also randomly selected the seeker position for the target child and the scripts to be used for each session.

The pages in the hiders' schedule contained a pool of seven pictures of potential hiding locations for the hiders to choose from (see Figure 2). Each hider selected a picture and hid in the corresponding location. At the bottom of each picture was a script that prompted the hider to say one of the following phrases: "oh no," "dang it," or "ahh man." Again, if a participant used an appropriate phrase that was different from the script we accepted this response and did not prompt the participant to use the script. Taking the picture, rather than just pointing to it, ensured multiple hiders did not use the same location. Upon returning to the schedule, each participant returned the picture to the hider page, turned the page, and selected a new picture when instructed by the seeker. There was a different hider page for each round of the game so participants made a distinct choice for hiding locations each round. The game ended once all participants had a turn to be the seeker.

Script fading began after one session of 85% or better following the scripts. We faded scripts one word or portion at a time, back to front, across all scripts. The final fading step was removing the colored strip that was paired with the scripts. The only cue that remained in the schedule was the Velcro attached to the scripts. Script fading was based on the target child's performance and independent of the schedule fading (see next session).

Schedule Fading

The terminal goal was for the target participants to play hide-and-seek with peers

with the least intrusive version of the activity schedules. The criteria for initiating schedule fading were the target child independently engaged in both hider and seeker behaviors for three sessions at 90% or better. Before introducing the systematic fading steps we removed the schedule to identify if the participants could play hide-and-seek without proceeding through the fading steps. We then systematically faded the activity schedules using the following steps (the numbers correspond to those on the Figures 4 and 5): (1) remove the numerals in circles for counting to 20, (2) remove the circles for counting to 20, (3) remove the hider binder and removed pictures of locations from the seeker strip (at this point participants could hide in any location not restricted to those that were taught), (4) remove the seeker strip and removed direction count to 20, (5) remove the schedule and instead presented a visual cue displaying the order of the seekers, (see Figure 3), and (6) the schedule was completely removed (see Table 3).

Figure 3. An example of the visual cue displaying seeker order.

Table 3

Schedule Fading Steps

1. Numerals removed
2. Visual cue for counting removed
3. Hider binder removed and seeking location pictures removed
4. Seeker strip removed and instruction to count removed
5. Schedule removed, visual cue displaying seeker order remains
6. No visual cues and no prompts provided

We moved from one fading step to the next after the target child independently engaged in the hide-and-seek behaviors for one session at 90% or better. If at any point the participant made multiple errors, we returned to the previous fading step.

Follow Up

We assessed maintenance of playing hide-and-seek two weeks after the final research session. During the follow up sessions, the schedule was present at the last successful fading step, which varied across groups of participants. For Penny and Sadie only the visual cue displaying the order of the seekers was present and only the seeker binder with seeker strip was present for Dexter. We did not provide any prompts during this session.

CHAPTER IV

RESULTS

Three (Penny, Dexter, and Sadie) of the four participants completed the study. Sheldon completed the preteaching, baseline and 14 treatment sessions. However, during the 13th and 14th teaching sessions Sheldon engaged in inappropriate behavior towards the peer participants. He grabbed the peer's heads, spit on them, placed his bottom against the peers' legs and passed gas. Because of these behaviors he was removed from the study.

Preteaching

We taught participants to use the nine scripts used in the study, to respond appropriately to an unrelated script as it was faded (three fading steps), to identify seven hiding locations, and to count to 20 before we initiated sessions. Penny mastered all nine scripts within six sessions. She proceeded through the script fading steps in five sessions. She accurately located the seven hiding locations in the initial teaching session. It took her nine sessions to master counting to 20. The counting was the most difficult task for her, as it was a novel skill that had not been previously targeted in her programming.

Dexter met the mastery criterion for each of the scripts in between two to nine sessions. He progressed through all three fading steps in 15 sessions. He accurately identified the seven locations within three sessions and he mastered counting to 20 in two sessions.

Sadie met the mastery criterion for each of the scripts in four to 13 sessions. She had a difficult time with the script used for the script fading. It took her 10 sessions to master the initial script but only four sessions to move through all of the fading steps. She identified the seven locations within two sessions. Sadie had a difficult time mastering counting to 20. It took her 21 sessions to master this skill.

Hide-and-seek Behaviors

Penny's data are presented in the upper panel of Figure 4. We conducted the initial baseline condition to assess the participants' ability to play hide-and-seek without assistance. During baseline, Penny did not engage in any hide-and-seek behaviors. She attempted to initiate toy play with the peers, but did not make any attempts to hide or search for the peer participants. Before introducing treatment, we conducted one generalization probe in an unfamiliar environment, which was the outside play area of the preschool. Penny did not engage in any hide-and-seek behaviors during this session.

Next, we conducted a schedule probe in which the activity schedules were present, but prompting was not provided. We conducted this session to assess if the participants would independently use the schedules without additional assistance because they were already fluent activity schedule followers. During this session Penny did not appropriately follow the schedule or engage in hide-and-seek behaviors. Rather, she randomly pulled pictures of locations and peers from the schedule and matched them. For example, she pulled a picture of a peer participant, approached him/her, held up the

picture and said “is it you?” This was not in the context of seeking for children, as the peers were not hiding.

After introducing teaching, Penny quickly acquired the skills and engaged in the majority the hide-and-seek behaviors independently. We initiated fading after nine sessions.

We removed the schedules completely to assess if intermediate fading steps were necessary and her responding decreased to approximately 20%. This was higher than baseline responding; however, it was much lower than that of teaching sessions. We reintroduced the schedules and her responding immediately increased. She progressed through the systematic fading steps and met the criterion for removing the schedule completely. However, when we proceeded to this final fading step her appropriate responding began to decrease. She played the role of the seeker multiple times rather than taking turns with the other participants. We reintroduced the visual cue displaying the order of the seekers and her responding returned to previous levels. At this fading step, she followed the schedule at 100% accuracy for three consecutive sessions.

We conducted a generalization probe in the outside play area. This session included the visual cue displaying the order of the seekers. Penny played hide-and-seek in the novel environment, even with the additional distractions present. She required one prompt to return to home base after she was found because she began playing on the slide. However, she independently completed all of the seeker behaviors without ever being taught how to seek in the new hiding locations. Two weeks after we concluded treatment sessions, we conducted the follow up session with Penny. During this session,

the visual cue displaying the order of the seekers was present, however we did not provide any additional prompts. Penny independently completed all of the steps, except using an appropriate response when found (e.g., "oh no") for one turn.

Dexter's data are presented in the middle panel of Figure 4. During baseline, Dexter rarely engaged in any hide-and-seek behaviors. He spent the majority of the sessions running back and forth in the hallway. Dexter did not engage in any hide-and-seek behaviors during the outside generalization probe or the two schedule probe sessions. We conducted two schedule probe sessions with Dexter because after the first schedule probe we made the decision to use random groups of peers rather than a predetermined group. Rather than implement teaching and this procedural alteration concurrently, we conducted a second schedule probe to assess the effects, if any, this would have on responding.

We then introduced physical prompting to teach Dexter to follow the activity schedules. His responding rapidly increased and he independently engaged in the majority of the seeker behaviors. However, he consistently responded incorrectly when playing the role of the hider, preventing him from meeting our criterion for fading. We conducted a brief practice session for Dexter before session 16, denoted by the asterisk. Due to his difficulty with the hider behaviors we provided him the opportunity to practice this sequence (i.e. select picture, proceed to the location, etc.) with the researcher four times. Immediately following this brief practice, we conducted the teaching session with peer participants. After this session his independent responding increased to above 85% and he met our criterion for fading after 12 teaching sessions.

We then removed the activity schedules to identify if the systematic fading procedure was necessary and Dexter's responding decreased from 94% to 21%. We reintroduced the schedules and initiated the fading steps. We successfully faded the additional cues for counting, the hider binder, and the locations of the seeker strip. When we faded seeker strip and removed the instruction to count Dexter's responding decreased. He failed to locate all three peers when he was the seeker. We reintroduced the seeker strip with only the pictures of hiders present. This was a slight modification from the original 3rd fading step because the "count to 20" instruction was not present, as it was not necessary. He began to engage in more hide-and-seek behaviors independently. He independently engaged in all of the behaviors during two treatment sessions. We then conducted the outside generalization probe and he continued to engage in high levels of hide-and-seek behaviors. He independently engaged in all the behaviors with the exception of using an appropriate phrase when found (e.g., "ahh man") for one turn. Two weeks after treatment, we conducted a follow up session and Dexter's responding maintained at levels observed during treatment. During this session, we did not provide any physical prompts. The only error Dexter made was a schedule error that almost resulted in him not locating all the hiders. He took the wrong seeker strip, so there was a picture of him as a hider, even though he was seeking. However, because the participant whose picture was not present was hiding in close proximity to another peer, he located all three participants.

Sadie's data are presented in the lower panel of Figure 4. During baseline, Sadie engaged in some hide-and-seek behaviors. However, she did not accurately engage in

more than 25% of the behaviors during any session. She often hid at inappropriate times (e.g., no one was counting) and simply followed another peer participant who was seeking, rather than doing so independently. During the outside generalization session, she engaged in some of the hide-and-seek behaviors, but her responding was not drastically higher than that of regular baseline sessions.

Next, we introduced the activity schedules without additional prompting and her responding did not increase above baseline levels. We then introduced physical prompting with the schedule the percentage of independent hide-and-seek behaviors she engaged in rapidly increased. She met our criterion for fading after 13 teaching sessions. We first removed the schedule completely to assess the necessity of the systematic fading procedure. During this session she performed above baseline levels but still much lower than treatment levels. We reintroduced the schedule with the numerals in the circles removed. We continued fading; however, when we removed the hider binder and locations strip her responding decreased to less than 90% for two sessions. We reintroduced the hider binder and locations strip and within two sessions responding was at 90%. We again faded the hider binder and location strip, however we made a slight modification and reintroduced the circles for counting into the schedule. We made this modification based on her consistent need for prompting with counting. We then faded the seeker strip completely but the circles for counting remained. Finally, we removed the schedules and presented the visual cue displaying seeker order and the circles were removed at this time.

We conducted the generalization session in the novel environment with the visual cue displaying the seeker order. Sadie performed the hide-and-seek behavior with the increased distractions. She completed all the behaviors independently, except during one round she needed a physical prompt to return to the schedule. Finally, we conducted a follow up session 2 weeks after treatment sessions and Sadie continued to engage in the hide-and-seek behaviors. The only error she made during this session was she hid in a hiding spot already occupied by another child during one round.

Peer Participants

The peer participants' data are presented in Figure 5. These data are the average percentages across the three participants that played each session. Initially the same three peers played with the target child, however, because of scheduling issues, we then grouped participants based on who was present on any given day. This change occurred before treatment was initiated for all three participants. This decreased the possibility that the alteration impacted responding for the target children. The asterisk on Figure 5 denotes where the groups were no longer consistent across sessions. Because of the random selection of groups, some peer participants experienced treatment sessions with a target child and baseline sessions with another target child in the same day. Also, while the fading was sequential for the target child, this was not necessarily the case for the peer participants, as it depended on which sessions they participated in. Some of the peer participants' played hide-and-seek as many as 60 times, and by the end of the study, their motivation to play had significantly diminished. Peer participants were provided with

stickers or a small prize each time they played.

The results for peer participants who played with Penny are presented in the upper panel of Figure 5. During baseline sessions, the peer participants engaged in more hide-

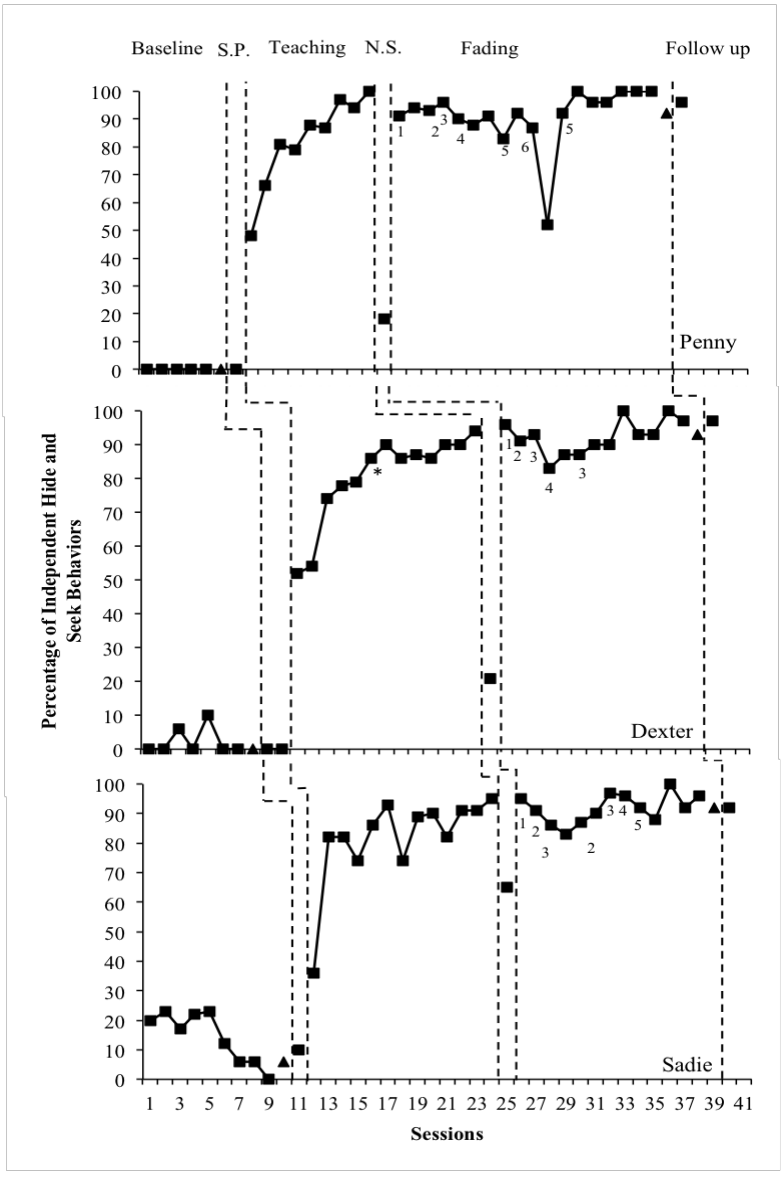

Figure 4. The percentage of independent hide-and-seek behaviors for Penny, Dexter, and Sadie.* denotes the booster session for Dexter. The numbers 1, 2, 3, 4, 5, and 6 depict schedule fading sessions. Numbers correspond to the fading steps (described in the text).

and-seek behaviors than Penny, with the exception of session five in which they did not engage in the majority of the components of the game. During the generalization session, on average, they engaged in about 60% of the behaviors, which was much higher than Penny's responding. When we introduced the schedules without prompting, the average responding did not greatly increase. However, the peer participants quickly began playing hide-and-seek when the activity schedules and prompting were introduced and continued to do so at consistent levels with the exception of the session before the no-schedule probe. This session was the same percentage as the initial teaching session, but was still above baseline levels.

The data path of the peer participants follows a similar pattern to that of Penny's (see Figure 6). When we removed the schedules, the peers' responding decreased, but immediately increased when the schedules were reintroduced. They continued to engage in the majority of the hide-and-seek behaviors throughout the fading steps until the schedule was completely faded. The visual cue displaying seeker order was represented and the peers' responding on average increased. They continued to play hide-and-seek appropriately during the generalization session outside and the 2-week follow up session.

The results for the peer participants who played with Dexter are presented in the middle panel of Figure 5. During baseline sessions, the peers in Dexter's group on average engaged in hide-and-seek behaviors with 50%-80% accuracy. During the generalization probe outside, none of the peers engaged in any hide-and-seek behaviors. We conducted two schedule probe sessions with Dexter. The first included the original established peer group and the second, as displayed on the graph, was with a group

of randomly selected peers. We did this to ensure there was not an increase in baseline when new peers were introduced. Peer participants rarely engaged in hide-and-seek behaviors during either of these sessions.

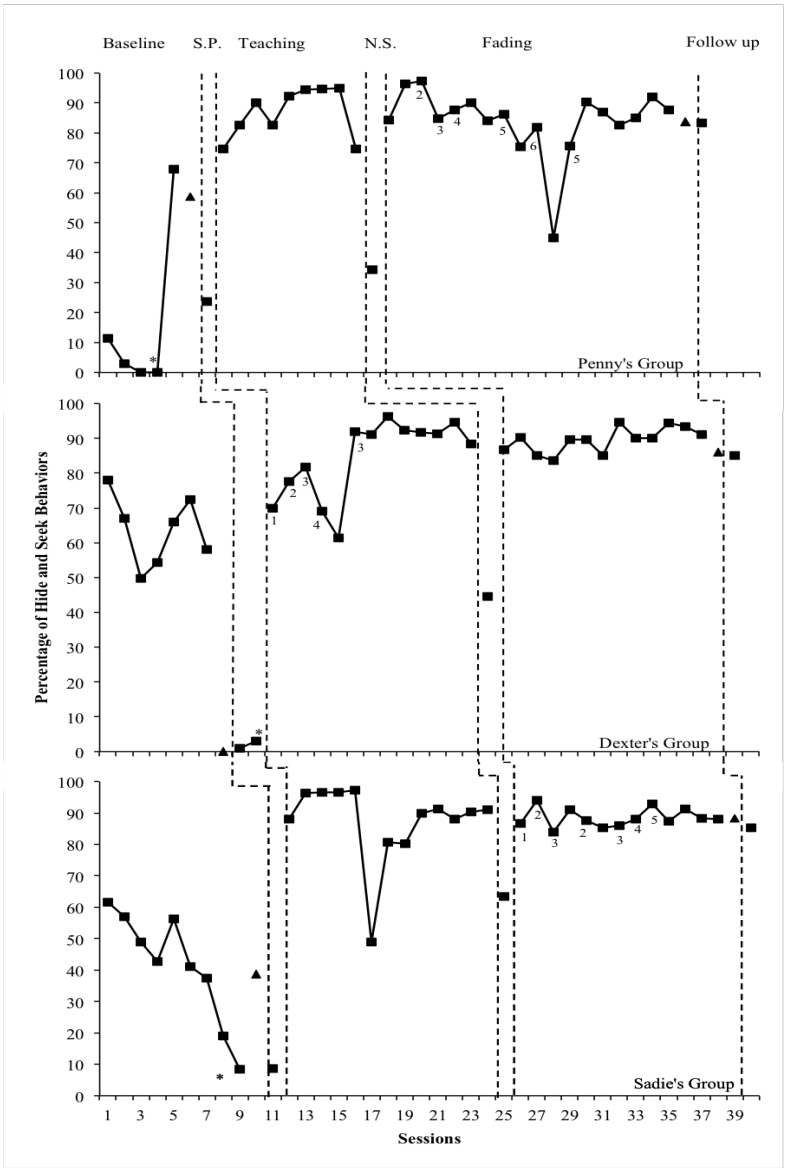

Figure 5. The percentage of independent hide-and-seek behaviors for Penny's group, Dexter's group, and Sadie's group. * denotes the where groups were no longer consistent. The numbers 1, 2, 3, 4, 5, and 6 depict schedule fading sessions. Numbers correspond to the fading steps (described in the text).

Once we introduced treatment, on average, the peer participants engaged in high levels of the hide-and-seek behaviors. During the session when the schedules were removed completely, the peers' responding significantly decreased. When the schedules were reintroduced, peer participants' responding increased and remained stable throughout the fading process. They continued to independently engage in the majority of hide-and-seek behaviors during the generalization probe and the 2-week follow up session.

The results for the participants who played with Sadie are presented in the lower panel of Figure 5. Peer participants' responding during baseline was initially above 50% however, the responding decreased across the sessions, which is a similar pattern to Sadie's responding (see Figure 6). During the outside generalization probe, the peers on average engaged in more hide-and-seek behaviors. This was unique compared to the other groups, as peer responding in the other groups decreased during the generalization probes. When we introduced the activity schedules without prompting, peer responding was consistent with other baseline sessions.

After introducing physical prompts, the peer participants' average responding immediately increased and remained high for the majority of teaching sessions, with the exception of session 17. The responding for this session likely dropped significantly because one peer participant had been out of town for some time and this was the first treatment session in which she participated. She required more prompts than the other two participants and this brought down the overall average for the three participants. However, overall, the average responding remained fairly stable.

When we removed activity schedules prior to fading, the peer participants' responding decreased and was only slightly higher than baseline sessions. The peer participants' responding increased and remained high throughout the systematic fading procedure. Their responding remained constant during the outside generalization session and the 2-week follow up session. Overall, the average responding of peer participants' followed similar patterns of responding as the target children.

Unstructured Play Probes

The unstructured play probes were conducted in the peer participants' classroom, while the other students were playing outside. They had 10 min of free play. We measured the percentage of time target children played in the same area as peers, the percentage of time target children were engaging in the same activity as the peers, the number of vocal initiations the target children made to the peers, and the number of vocal initiations peers made to the target children.

Before treatment, Penny only spent 58% of the time in the same area as the other peers and only 20% of the time engaged in the same activity as the peers. She made three vocal initiations towards the peers and the peers only made five vocal initiations directed towards her. After treatment, she spent 98% of the session in the same area and engaged in the same activity as the peer participants. She made 13 vocal initiations directed at the peers, however, the peers still only made five vocal initiations to Penny.

Before treatment, Dexter spent 0% of the session in the same area as the peers and 0% of the session engaged in the same activity. He made 0 vocal initiations to the peers

andthe peers only directed three vocal initiations towards Dexter. After treatment he spent 32% of the session in same area as the peers and 13% of the session engaged in the same activity. He made four initiations to the peers and the peers engaged in 10 vocal initiations directed to Dexter.

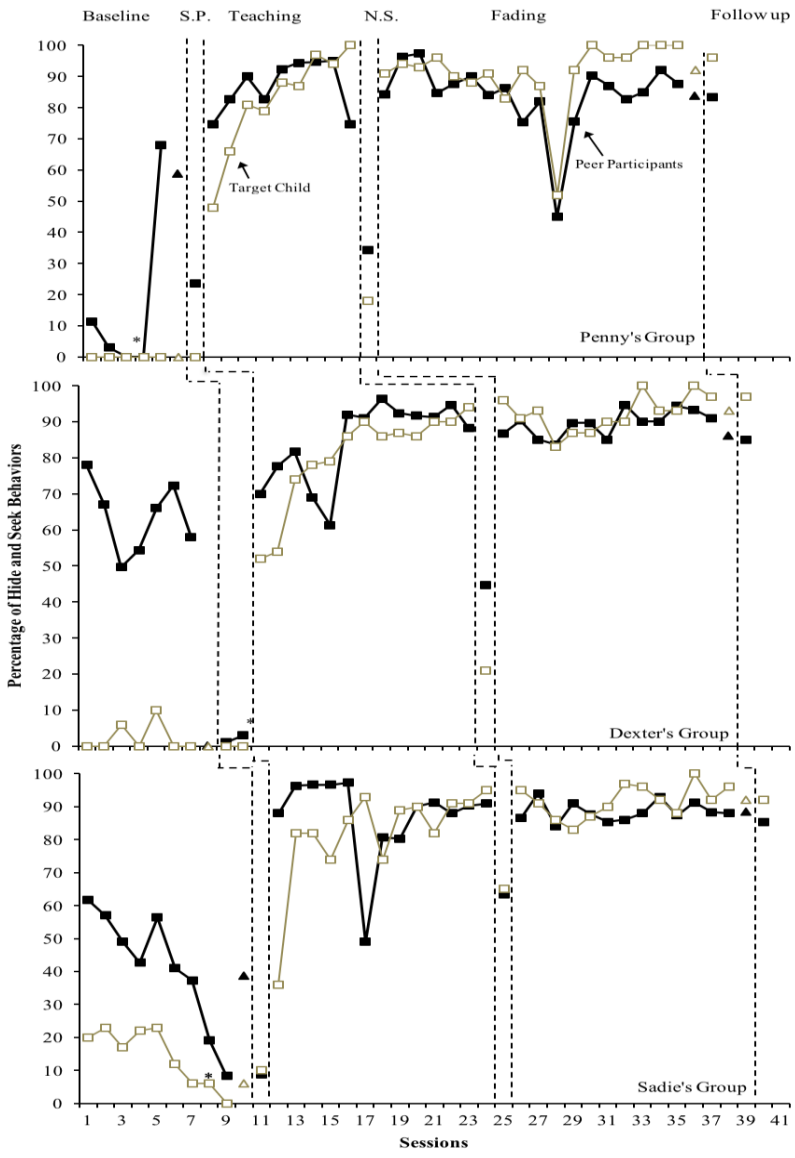

Figure 6. The percentage of independent hide-and-seek behaviors for Penny's group, Dexter's group, and Sadie's group with the target child's data superimposed on the graph.

Before treatment, Sadie spent 100% of the session in the same areas as other peers and 77% of the session engaged in the same activity. She made 24 vocal initiations to the peers and they made 36 vocal initiations towards her. After treatment, Sadie only played in the same area 77% of the time and only 63% of the time engaging in the same activity with other peers. She made 33 vocal initiations towards the peers, and peers made 31 vocalizations directed at her. While it appears that her peer play decreased, during the initial unstructured play probe she played blocks with one peer for the entire session and during the second unstructured play probe she played a variety of imaginative games (e.g., firefighters) with all three peers.

Script Fading

We transcribed the statements made by all participants when they were found and when they found others (see Table 4). We taught three different statements for the seeker role (i.e., "found you," "see you," and "got you") and three different statements for the hider role (i.e., "oh no," "ahh man," and "dang it"). We hypothesized that by teaching multiple scripts paired with one color, the participants might vary the phrases they used and that we would be able to fade all of the scripts. We were able to completely fade all the scripts for all of the participants, including the colored strips that were paired with the scripts.

Penny consistently used the phrases "found you" and "dang it." She did use the phrases "see you" and "got you" a few times. Dexter consistently used the phrase "found you" and, in over half of the sessions, used the phase "ahh man." He also used the

phrases “oh man,” “oh no” and “dang it.” Sadie exclusively used the phrase “found you” as the seeker; however, she did vary the phrases used as the hider (i.e., “oh no,” “ahh man,” and “dang it”). She even used novel phrases, such as: “oh rats,” “oh man,” “oh well,” “you got me,” “surprise” and “oh gosh.”

Nine of the 12 peer participants consistently used the phrase “found you” when playing the role of the seeker. One peer participant used a different statement each

Table 4

Frequency of Varied Statements

Phrase	Number of sessions in which phrase was used
Penny	
Got you	1
See you	3
Found you	18
Dang it	21
Dexter	
Got you	1
See you	3
Found you	27
Dang it	4
Ahh man	19
Oh no	2
Oh man	3
Ugh oh	1
You found me	1
Sadie	
Found you	23
Dang it	4
Ahh man	2
Oh no	5
Oh man	2
Oh rats	6
Oh well	15
You got me	1
That was scary	1
Surprise	3
Oh gosh	1

session, one rotated between “found you” and “see you,” and the last peer participant initially varied the phrase used, however towards the end of the study the peer participant consistently used the phrase “found you.” All 12 of the peer participants varied the phrase used when playing the role of the hider. Six peer participants consistently used all three of the taught phrases, “oh no,” “ahh man,” and “dang it.” Two of these six peers used at least one novel phrase including: “I saw you,” “oh man,” and “ok good.” One peer participant consistently used the phrase “oh no” and sometimes used the phrase “ahh man.” Two peer participants primarily used the phrase “dang it” and sometimes used the phrase “ahh man.” Three peer participants used at least one of the taught phrases but also consistently used novel phrases including, “you found me,” “aww nuts,” “oh man,” and “aww come on.”

CHAPTER V

DISCUSSION

The primary purpose of this study was to investigate whether activity schedules would be a useful technology to teach children with ASD to play a complex social game with typically developing peers. This study sought to extend the results of Brodhead et al. (2014) by using typically developing peers as play partners and systematically fading the activity schedules completely or to a less intrusive version. The specific objectives of the procedure were (a) increase participants' engagement in hide-and-seek behaviors, (b) maintain participant responding while systematically fading the schedules, (c) assess the generalization and maintenance of these skills, and (d) assess if script fading lead to varied statements. The study is discussed based on these objectives. Implications for future research are also addressed.

Hide-and-Seek Behaviors

In 2014 Brodhead and colleagues taught six children with ASD to play hide-and-seek in pairs using activity schedules. All of the participants in the study were able to play hide-and-seek when the schedules were present. We found similar results in the current study. The percentage of hide-and-seek behaviors increased for all three of the target children after the activity schedules were introduced. Responding rapidly increased once prompting was provided and all participants met criterion for fading within 9-13 sessions.

The schedules used in the current study were much more complex than those used in Brodhead et al. (2014). In the previous study the seeker would only search, at the most, two locations and locate one peer. In the current study the seeker could search as many as seven locations and locate three peers. Additionally, the distance between locations in the current study was much greater than those in the previous study. Also, once the hiding location pictures were faded, the participants could hide in any location in the hallway, increasing the number of possible locations in which the seeker must search. Not only did this increase the response effort required of the seeker, but the opportunities for distractions also increased. Other adults and children were often present, walking through or engaging in other activities, in the hallway at the preschool creating a more natural environment for hide-and-seek. In this way, the game play was more true to a typical game of hide-and-seek.

We taught nine different scripts in this study and faded all nine of the scripts, whereas in the previous study only four scripts were taught and only two of the four were faded. We taught multiple phrases for participants to use as the seeker and hider rather than just one.

Even with the increased complexity of these schedules, the children with ASD were all able to follow the schedules and play hide-and-seek. The typically developing children were also able to follow the activity schedules despite never being exposed to activity schedules before the study was initiated. This is an important finding, as this could be an intervention meeting the definition for universal design. All the children used the same materials and were provided with a "one size fits all" intervention that

resulted in increased hide-and-seek behaviors for everyone involved. These interventions could be useful in general education for promoting inclusion of children with ASD in large-group play.

Penny met the fading criterion in the fewest number of sessions. Penny was the most enthusiastic to play the game and was the least distracted. Her sessions were the shortest. Overall, the schedule appeared to be most effective for Penny, however why this was the case is unknown. Interestingly, she was the only participant who did not attend the preschool outside of research sessions. This could have impacted her motivation to play the game, as this was the only time she could access the preschool.

Penny was the only participant who proceeded through all of the fading steps including removing all visual cues. However, she was not able to perform at treatment levels once all the visual cues were removed. During these sessions, she played the role of the seeker multiple times and did not give the other participants a chance to be the seeker. Because of this, we reintroduced the visual cue displaying the order of the seekers. She was then able to play hide-and-seek at 100% accuracy for three consecutive sessions. Overall, she responded to the schedule fading procedure with the least amount of difficulty. Before initiating sessions, we hypothesized she would have the most difficult time following activity schedules. She had attended the autism preschool for the shortest amount of time and overall had the lowest level academic skills. She also was the only participant who did not spend therapy time in the typically developing preschool classroom. It is unclear precisely why she responded so well to the schedules. However, it likely had to do with motivation and session length, as was mentioned above.

Dexter had the most difficult time initially following the activity schedules out of the three participants. We had to conduct a short practice session with him to rehearse the hider behaviors. After this practice session his responding became more stable. However, overall Dexter was the most distracted during the sessions, and his sessions on average were longer than Penny's as he tended to move very slowly.

Dexter progressed through the fewest number fading steps and the last successful fading step for him was the presence seeker binder with the seeker strip. It is unknown if further exposure could have resulted in further fading. We were unable to further modify the fading procedure for Dexter, for practical reasons, because we were losing access to peer participants because they were leaving the preschool for the summer. Dexter was the only participant who struggled with accurately identifying when his turn as seeker was completed. He returned to home base after only locating two hiders. For this reason, it was necessary to include the seeker strip with the picture of all three hiders, so he could visually identify when all the hiders had been located.

During two of the final three fading sessions, he still required some prompting. During one session, he attempted to hide in the same location as another participant, and during another session he needed a prompt to return to home base. The turn in which he required the prompt to return to home base was not his turn to play the role of the seeker, so it was not imperative to game play that he return to home base. Similarly, the mistake of hiding in the same location as another participant would not have interfered with further game play. Both of these errors affected Dexter's data but would not have adversely effected the game.

Sadie had the most variable responding during the initial teaching sessions. Three of the sessions were under 80% accuracy. One was the initial teaching session and the other two were sessions we conducted directly after the preschool outdoor recess. During these sessions Sadie complained about being too hot and tired to play. We then conducted sessions before the recess or 15 min after recess. After we made this modification, her responding became more stable and she then met our fading criterion. Sadie moved through the fading steps with a few minor issues. The mistake she consistently made involved the requirement of counting to 20. She often only counted to 10 or made mistakes when counting from 15-20. Because she was making errors we followed our procedures and presented both schedules rather than just the seeker schedule. However, when she again met mastery criterion to fade the hider binder and location strip, we determined that the errors being made did not relate to the hiding locations being faded. Because of this, we made a slight modification to fading steps three and four for Sadie. We included the circles for counting to the seeker schedule with and without the seeker strip, however once she proceeded to the step in which schedules were removed and only the visual cue displaying the order of seekers was present, the circles were again removed and she continued to count to 20 without additional errors. During pretraining Sadie had an extremely difficult time counting to 20. It took her 21 sessions to reach our mastery criterion. This was interesting as she had the most advanced academic skills out of the three participants, but the counting remained a consistent error throughout the sessions.

Sadie engaged in a few errors during her last three teaching sessions. During session 35 she needed a prompt to locate the final hider. She and another peer participant had a small disagreement, which lead to Sadie requiring additional prompting. Generally, when Sadie required prompts it was to redirect her to the game play when discussions with other peer participants distracted her.

An important factor in the discussion of the schedule fading is demonstrated by the peer participant data in Figure 5. While we cannot make the same inferences from Figure 5 as those from Figure 4 because the data are averages, there is a clear pattern in the data that indicate peer participants' responding decreased when the activity schedules were not present. They had a difficult time taking turns and accurately completing all the seeker behaviors when all of the visual cues were removed. It appeared that hide-and-seek, as was specifically defined in this study, was difficult for typically developing young children to play, as well as for those with ASD. This is important to note because the visual cue displaying the order of seekers was much less intrusive and perhaps necessary for all participants in order to play the game appropriately, rather than only the target children. Additionally, during the fading process the peer participants would often ask, "where is the binder" or "why is there only one binder today" indicating that the peer participants did not find the schedules aversive, which might also indicate that the peers accepted the schedules, thereby reducing stigmatization of the target child.

Overall, the data paths for the peer participant groups followed that of the corresponding target child. This is of interest as it was hypothesized that typically developing children would play hide-and-seek without additional assistance. It is likely

that our definition of game play (i.e., everyone having to take one turn) affected their scores. However, even after teaching the peer participants to play hide-and-seek according to our rules they continued to respond more appropriately when the schedules were present. These data suggest that typically developing children may also benefit from the presence of a subtle visual prompt to play this complex game in this precise way.

General Hiding and Seeking Behaviors

One of the primary goals of this study was to extend the literature on activity schedules by examining the effects of systematically fading the schedules. In the previous studies when activity schedules were removed, participant responding decreased to that of baseline sessions (e.g., Brodhead et al., 2014; Betz et al., 2008). However, we sought to examine the effects of introducing intermediate fading steps rather than abruptly removing the schedule. We were able to fade the activity schedules, to some extent, for all three participants.

While we were unable to completely fade all the visual cues for any of the participants, we were able to teach the three participants the general skills of hiding and seeking. By the end of the study there were not any visual cues for possible hiding locations. The participants were all able to accurately and efficiently search for peers in locations we specifically taught, as well as in novel locations. This is important because we did teach participants to search using four different sequences of hiding locations. A potential negative side effect of teaching children with autism to search in preselected sequences was they might continue to follow the sequences while searching even after

they were faded. However, when we faded these location sequences, the participants did not follow a specific sequence for seeking. During sessions with the location strip, sometimes the seeker saw participants hiding but first were required to search in another location before "finding" that participant. However, once we faded the locations, participants flexibly located participants without following an order. All of the target children first searched hiding locations where children often hid, which is an appropriate response when playing hide-and-seek. They also "strategically" searched for hiders by moving from one location to the next in a manner that matched that of someone playing the game in the natural environment.

The participants were also able to independently hide in both taught and novel locations. Participants were required to hide in locations where other participants were not hiding. Thus, when participants hid in novel locations they were not simply following another participant to that hiding place. The target children often hid in the same location more than once during a session, however the peer participants also did this, so it did not seem necessary to require them to play differently. Peer participants appeared to be more rigid about hiding in specific locations than the target children. None of the participants exclusively hid in one location.

The target children's ability to engage in these hiding and seeking behaviors is promising. It could be the case that we provided the participants with enough exemplars of hiding locations to lead to the more generalized behavior of hiding. We taught a variety of different ways to hide, as some locations required hiding under, some required hiding inside, and some required hiding behind. It may be important to incorporate the

different types of hiding locations as it may lead to more generalized responding as was observed during the sessions conducted outside.

Generalization and Maintenance

All three of the target children performed the hide-and-seek behaviors in the outdoor play area. This supports the conclusion that the target children learned the actual skills of seeking and hiding since we never provided them with possible hiding locations in this outside play area. They independently searched the novel environment in a manner that resulted in locating the three hiders. The area in which the game was played was much larger than that of the common area inside (the training location). The hiding locations looked very different than those inside and were much further apart. There were also many more distractions outside including play equipment, plants/trees, and even animals (i.e. rabbits). While some form of visual cue was present for all of the three target participants, none included pictures of hiding locations for the seeker or hiders. It is impressive that the participants responded appropriately even in the face of all these additional barriers.

We still provided prompts for the participants during this session, however the prompts were minimal and the errors made were not necessarily detrimental to the game. Penny did not return to home base after being found for one round. However, she was not the seeker for the next round so it is likely that once the next seeker began counting she would have hidden appropriately. Dexter did not make an appropriate comment when found (e.g., “ahh man”) for one turn. Sadie did not return to home base after being

found during the last round. The game was over once all participants returned to home base so her failure to return would not have impeded the game.

During the follow up sessions, we did not provide any prompts to any of the participants. These sessions included the visual cues for displaying the order of seekers for Penny and Sadie, and the seeker schedule with seeker strip for Dexter. All three of the target children performed the majority of the behaviors even 2 weeks after sessions. The only error Penny made was she did not use an appropriate phrase when found (e.g., "dang it") for one turn. Dexter made a schedule error that almost impeded his locating all three hiders. Sadie hid in the same location as another hider.

Script Fading

We were able to fade all the scripts for all three of the target children; this included the colors paired with the scripts. This is an important development in script fading from Brodhead et al. (2014) in which participants continued to wear watches that had been paired with scripts in order to prompt them to use the appropriate phrases. While we did not require participants to use the multiple phrases, we did provide them the opportunity to select a phrase to use (unless they required prompting). Because of this, while across sessions participants often used the same phrases, across participants the statements varied leading to more natural sounding sessions.

While we were able to fade the scripts completely, the majority of participants (including peer participants) engaged in some form of pointing behavior when using the scripts associated with being the seeker. For example, participants would point to the

area below their picture and say "my turn." Even though the script was no longer present they continued to point to the Velcro that had been paired with the scripts. Also, when pictures of the hiders and hiding locations were present, many participants continued to point to the picture as if the script was still attached. Once the schedule was faded to the visual cue displaying the order of seekers, some participants continued to touch the table; however this occurred less often than when the binder was present.

It is interesting to note that once scripts were completely faded, Penny independently began to touch her wrist when using the scripts as the seeker and hider (e.g., "found you," "dang it"). This was not a response that was taught to participants or ever modeled. It seemed as though she created a mediating response to prompt herself to use the appropriate statements. It is unknown why this transfer occurred; however, it would be interesting for researchers to report if this is a common finding across script fading studies. It is possible that our prompting procedure lead to this peculiar pattern of responding. We often attribute this type stereotypical responding to ASD, but in this study, typically developing children also engaged in these behaviors. Further examination of this finding is necessary to identify prompting procedures that do not lead to unnecessary behavior that could be stigmatizing.

Although we were able to fade all the scripts for all of the participants, teaching multiple scripts did not lead to variability for all participants. The majority of participants used the same phrase when locating hiders (i.e., "found you"). However, out of the three taught phrases, this was the most appropriate and most typical for playing hide-and-seek. Two of the three target children and three of the 12 peer participants often

did not vary the statements made when playing the role of the hider. Overall the majority of participants did vary the phrases they used when they were found. They often rotated through the three taught phrases and used novel phrases. This is an important finding because it suggests their behavior was under the control of the contingencies of the game.

The inflection used by the participants varied based on the phrase used. For example, when Sadie said, "oh well," she used a softer voice and it was slow and drawn out. In contrast when she said, "surprise" she used a high pitched voice and said it really quickly, as one would when saying surprise. Dexter also used appropriate tone and intonation when saying "ahh man." This provides evidence that there was a transfer of stimulus control from the script to the appropriate environmental stimuli (e.g., the presence of a hider).

Unstructured Play Probes

In order to assess possible collateral effects of the intervention, we set up free play situations between the child with ASD and three of the typically developing peers who participated in the study. While we cannot specifically attribute any of the changes in behavior to our intervention, the findings suggest that our structured and narrowly focused intervention did have a broader impact on the global play interactions between the target children and peer participants. Overall, we did see improvements in the amount of time the target children interacted with the peer participants. Before baseline, Penny played somewhat appropriately but spent a great deal of time simply walking around the room and Dexter spent the entire 10 min sitting in a chair simply watching the

other children. After treatment, both Penny and Dexter played with the peers at least part of the session. Penny initiated play with the peer participants and appropriately responded to their play comments. For example, one of the peers said, "I want to be a cat," and Penny approached her and said, "Here kitty kitty." Anecdotally, one-on-one therapists report that Dexter now interacts with other children when attending the typically developing preschool, whereas before the study initiated, he primarily interacted with his one-on-one therapist and the preschool teacher.

Sadie interacted with peers during the unstructured play probes before and after treatment. However, she had been spending therapy time at the typically developing preschool for over a year. Most of the peer participants knew her name before the study and had interacted with her at some point. While the intervention helped her play hide-and-seek, it may not have been necessary to increase appropriate interactions between her and the peer participants.

We believe it is likely that a learning history and contingencies of reinforcement impacted the behavior of target children. It is possible that during research sessions that the target children contacted reinforcement for initiating play with the peer participants. After learning to make these very situation specific initiations and the initiations resulting in peer reciprocation, the target children may have been more likely to engage in play initiations outside of research sessions. Many social skills interventions target teaching children with ASD to appropriately initiate play and provide artificial reinforcement for engaging in these behaviors. Within the context of this intervention, we were able to arrange situations in which the target child made appropriate initiations and peer

reciprocation served as a natural reinforcer. Because the natural contingencies supported these behaviors, they continued to occur in the absence of prompting.

Future researchers should consider collecting similar measures to assess collateral effects of play interventions beyond the specific goals targeted in the study. It is important to identify interventions that improve generalized play skills and measures such as those used in the unstructured play probes could provide some of this information.

Limitations and Future Directions

There are some limitations of this study that are worth discussing. The primary limitation is the use of prompts throughout the teaching and fading sessions. With the exception of Penny, who engaged in all the behaviors independently for three consecutive sessions, the other two participants needed prompts in the final fading sessions. However, as discussed above, the errors that were prompted were those that would not have impeded game play. Additionally, during the follow up session we did not provide any prompts. While all three of the target children made one error, they were still able to play the game with the peers without any adult assistance. Future researchers may want to examine the use of activity schedules without using any prompts during the fading phase.

A second limitation is the scripted manner in which we outlined game play. In order to accurately collect data it was important for us to define the game in a very precise manner. However, this limited definition may have affected the participants'

scores and our ability to completely fade the schedules. We attempted to mimic the way in which most typically developing children play hide-and-seek, but because we scripted the game, it became necessary for the participants follow the specific rules we taught. The participants engaged in the majority of the play behaviors that resulted in playing the game, but it was necessary for them to play in a more specific manner than game play in the natural environment may require (i.e., responding appropriately when found, hiding in different locations from other players, etc.).

Another possible limitation was the presence of the video recorder. While we made attempts to conceal ourselves, it may have decreased the response effort of the seeker. Some of the peer participants commented on this, mentioning they knew someone was hiding in a specific location because they saw someone recording. However, it is unclear if the target participants made this same connection. While this may have facilitated the hiders ability to find those who were hiding to some extent, it is unlikely this exclusively controlled responding. Also, practically speaking this was unavoidable, as we needed video footage of each participant in order to record data. Future researchers might investigate other technological options that would reduce adult interference.

Additionally, our requirement for peer participants to refrain from providing aid to the target participant is a limitation. Because we specifically instructed the peer participants to avoid providing the child with ASD with assistance, it is possible the typically developing children would have taught the target child to play hide-and-seek without our intervention. Although peer participants were modeling appropriate

components of hide-and-seek during baseline, the peers were still not engaging in many of the behaviors to complete the game, so it is unlikely they could have independently facilitated teaching, as many of them needed help playing the game as well. However, future researchers may want to investigate this limitation by including peer facilitation as a phase in baseline.

A final limitation is the fact that many of the peer participants played hide-and-seek more accurately with visual cues. Again, this could be an artifact from our rigid definitions for playing hide-and-seek. However, it may be the case that hide-and-seek would be more appropriate to facilitate using older children. We, as behavior analysts, may need to collect more peer-normed samples before teaching skills to children with ASD, as our expectations may be unrealistic. Future researchers might recruit older typically developing children. This may also increase the likelihood that if given the opportunity they could teach children with ASD to play hide-and-seek. Then if that did not lead to success implementing the activity schedule could be a next step.

Future researchers may also want to use activity schedules to teach other complex social games. We selected to teach hide-and-seek because it seemed to lend itself well to teach using activity schedules. However, it would be interesting to identify other possible games to teach children with ASD to engage in with typically developing peers and identify the utility of using activity schedules to facilitate these games. The utility of activity schedules beyond teaching social games should also be investigated. It would be interesting to assess whether activity schedules could promote children with ASD to engage in group work with typically developing peers. The possibility of using schedules

as a tool to promote inclusion for children with ASD in typically developing classrooms warrants further investigation as this could be an important development for the field.

Only three participants completed this study, so the extent to which these results generalize across the broader population of children with ASD is unknown. Future research might replicate and extend the findings of this study to support the external validity of these results.

In summary, we aimed to extend the present literature base on activity schedules by investigating the effects of a systematic fading procedure to provide the least intrusive prompts necessary to produce successful responding for young children with ASD. Because children with ASD have deficits in the area of social play, we developed activity schedules to teach children to play a complex social game, hide-and-seek. In order to teach this social game in a more natural environment we included typically developing peers and conducted sessions in the common area of a typical preschool. We found that all three of the target participants were able to play hide-and-seek using the activity schedules and were able to continue playing appropriately even when the majority of schedule components had been faded. This study is the first to teach social play to a group of children using activity schedules. It is also the first study to successfully fade the majority of components in activity schedules while still facilitating complex game play between children with ASD and typically developing children.

There are several exciting and promising findings from this study that could have a broader impact on the lives of individuals with ASD beyond teaching hide-and-seek. We were able to teach children with ASD to play a structured game using a relatively

simple technology, activity schedules, and this lead to participants engaging in variable responding (e.g., using different phrases, hiding and seeking in novel locations). Children with ASD often engage in very rigid and repetitive behavior, however, participants in this study were able to vary their behavior after being taught multiple responses for different behaviors. They not only varied their responses between those that were specifically taught but also engaged in novel responses. Also, two of the three participants were able to engage in all of the components for the hider and seeker roles without any visual cues. The only prompt provided was the visual cue which showed them which chain of behavior to engage in, the hider chain or seeker chain. There are other situations in which being able to engage in long chains of behavior with a simple visual cue would be extremely beneficial for children with ASD. Additionally, after implementing this teaching procedure two of the three participants engaged in more appropriate play with typically developing peers outside of the context of hide-and-seek.

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Appendix

Data Sheets

BASELINE DATA SHEET

Seeker Data

Says they are the seeker	"Go hide"	Counts	"Ready or not here I come"	Finds kid #1	Statement ________	Finds kid #2	Statement ________	Finds kid #3	Statement ________

Says they are the seeker	"Go hide"	Counts	"Ready or not here I come"	Finds kid #1	Statement ________	Finds kid #2	Statement ________	Finds kid #3	Statement ________

Says they are the seeker	"Go hide"	Counts	"Ready or not here I come"	Finds kid #1	Statement ________	Finds kid #2	Statement ________	Finds kid #3	Statement ________

Says they are the seeker	"Go hide"	Counts	"Ready or not here I come"	Finds kid #1	Statement ________	Finds kid #2	Statement ________	Finds kid #3	Statement ________

Says they are the seeker	"Go hide"	Counts	"Ready or not here I come"	Finds kid #1	Statement ________	Finds kid #2	Statement ________	Finds kid #3	Statement ________

Hider Data

Goes to hiding location (only after someone counts or says go hide)	Remains in location until found by the seeker	Appropriate response ___________________________

Goes to hiding location (only after someone counts or says go hide)	Remains in location until found by the seeker	Appropriate response ___________________________

Goes to hiding location (only after someone counts or says go hide)	Remains in location until found by the seeker	Appropriate response ___________________________

Goes to hiding location (only after someone counts or says go hide)	Remains in location until found by the seeker	Appropriate response ___________________________

Goes to hiding location (only after someone counts or says go hide)	Remains in location until found by the seeker	Appropriate response ___________________________

Goes to hiding location (only after someone counts or says go hide)	Remains in location until found by the seeker	Appropriate response ___________________________

Goes to hiding location (only after someone counts or says go hide)	Remains in location until found by the seeker	Appropriate response ___________________________

TREATMENT DATA

Seeker Data

Opens schedule*	Closes schedule*

Touches script*	"My turn"	Touches script*	"Go hide"	Counts to 20	Points to script	"Ready or not here I come"	Turns page*	Removes seeker strip*

Touches Picture*	Location #1	Points to script	Appropriate statement _____	Moves picture*	Touches Picture*	Location #2	Points to script	Appropriate statement _____	Moves picture*

Touches Picture*	Location #3	Points to script	Appropriate statement _____	Moves picture*	Touches Picture*	Location #4	Points to script	Appropriate statement _____	Moves picture*

Touches Picture*	Location #5	Points to script	Appropriate statement _____	Moves picture*	Touches Picture*	Location #6	Points to script	Appropriate statement _____	Moves picture*

Touches Picture*	Location #7	Points to script	Appropriate statement _____	Moves picture*	Returns to home base once all hiders are located	Returns seeker strip

Hider Data

Opens schedule*	Closes schedule*

Removes hiding location*	Goes to corresponding location	Remains in location until found by the seeker	Points to script	Appropriate response _____	Returns to home base	Returns Picture	Turns Page*

Removes hiding location*	Goes to corresponding location	Remains in location until found by the seeker	Points to script	Appropriate response _____	Returns to home base	Returns Picture	Turns Page*

Removes hiding location*	Goes to corresponding location	Remains in location until found by the seeker	Points to script	Appropriate response _____	Returns to home base	Returns Picture	Turns Page*

TREATMENT FIDELITY

Baseline/Probe Sessions		Child:
Date:	Initials:	Session Number:
Started the session by saying "play hide and seek, one of you will be the seeker and the others the hiders"		Y N
Activity schedules were not present (except for probe session)		Y N
Did not provide any physical prompts except to guide the participant back to the play area or block inappropriate behaviors		Y N
Praise is not provided		Y N
Video taped the session		Y N
Session lasted 10 minutes		Y N

Treatment Sessions		Child:
Date:	Initials:	Session Number:
Started the session by saying "play hide and seek"		Y N
Provided physical prompts from behind the participant		Y N
Prompts were provided within 3 s of a mistake or no response		Tally Y N
Followed the correct prompting procedure for scripts: first provide prompt by having child touch the script and if still doesn't respond provides verbal prompt		Tally Y N
The activity schedule was in the correct order		Y N
Session ended when activity schedule was finished		Y N
Video taped the session		Y N

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Jessica S. Akers

Education:

Ph.D. (In Progress): Utah State University
Department of Special Education
And Rehabilitation
Disability Disciplines with an emphasis in Applied Behavior Analysis
Advisor: Thomas S. Higbee

M.A. 2011: California State University, Fresno
Department of Psychology
Applied Behavior Analysis
Advisor: Amanda Adams
Thesis: Using script fading to increase play-based language between children with autism and their typically developing sibling

B.A. 2009: California State University, Fresno
Department of Psychology

Professional Certifications and Training:

- Board Certified Behavior Analyst-Certification number: 1-12-10034

Professional Memberships:

- Association of Behavior Analysis (ABAI)
- California Association of Behavior Analysis (CalABA)
- Utah Association of Behavior Analysis (UTABA)

Teaching Experience Distance Education:

Fall 2013 Utah State University

- Co-instructor: Undergraduate Level course in Applied Behavior Analysis
  SPED 5010

Fall 2012 Utah State University

- Teaching Assistant: Graduate Level course in Behavior Analysis
  SPED 6720

Spring 2012 Utah State University

- Teaching Assistant: Graduate Level course in Behavior Analysis

SPED 6710

Fall 2011 Utah State University

- Teaching Assistant: Undergraduate Level course in Applied Behavior Analysis

SPED 5010

Teaching Experience On-campus:

Spring 2013 Utah State University

- Co-instructor: Undergraduate Practicum course: Working with Young Children with Autism

SPED 5840

Peer-Reviewed Publications:

- Brodhead, M. T., Higbee, Gerencser, K. R., & Akers, J. S. (2015). The use of a discrimination training procedure to teach mand variability to children with autism. *Journal Of Applied Behavior Analysis*.
- Brodhead, M. T., Higbee, T. S., Pollard, J. S., Akers, J. S., & Gerencser, K. R. (2014). The use of linked activity schedules to teach children with autism to play hide- and- seek. *Journal Of Applied Behavior Analysis*, *47*(3), 645-650.
- Pollard, J. S., Higbee, T. S., Akers, J. S., & Brodhead, M. T. (2014). An evaluation of interactive computer training to teach instructors to implement discrete trials with children with autism. *Journal Of Applied Behavior Analysis*

Research in review:

- Akers, J. S., Higbee, T. S., Pollard, J. S., Gerencser, K. R., & Pellegrino, A. J., (under review). An evaluation of photographic activity schedules to increase independent playground skills in young children with autism. *Journal of Applied Behavior Analysis*.
- Akers, J. S., Pyle, N., Higbee, T. S., Pyle, D., & Gerencser K. R., (under review). A synthesis of script fading effects with individuals with Autism Spectrum Disorder: A 20-year review. *Journal of Autism and Developmental Disorders*.
- Pyle, D., Pyle, N., Lignugaris-Kraft, B., Duran, L., & Akers, J. (in review). A synthesis of peer-mediated academic interventions for English language learners. *Review of Educational Research.*

Research in progress:

- Akers, J. S., Higbee, T. S., Gerencser, K. R., & Pellegrino, A. J., (in progress). An evaluation of group activity schedules to train children with autism to play hide-and-seek with typically developing peers.
- Akers, J. S., Higbee, T. S., Reinert, K. S., & Pollard, J. S. (in progress). Sibling-implemented script fading to promote play-based statements in children with autism.

Presentations:

- Kelley, K.N., Akers, J. S., & Higbee, T.S. (2011). *Functions of behavior*. Guest lecture for Speech and Language Pathology students and faculty, Utah State University, Logan, UT.
- Kelley, K.N., Akers, J. S. & Higbee, T.S. (2011). *Using reinforcement in teaching*. Guest lecture for Speech and Language Pathology students and faculty, Utah State University, Logan, UT.
- Kelley, K.N., Akers, J. S. & Higbee, T.S. (2012). *Behavioral interventions for students with autism*. Presentation for Head Start teachers and paraprofessionals. Logan, UT.
- Pollard, J., Brodhead, M., Akers, J. S., Hartzeim, D., & Higbee, T. S. (2012). *Ethical considerations for clinical applied behavior analysts*. Workshop presented at California Association for Behavior Analysis. Garden Grove, CA.
- Brodhead, M, Akers, J. S., Higbee, T. S. (2012) *Considering Ethical Behavior in educational settings: Part 1*. Workshop given at annual Effective Practices Conference. Logan, UT.
- Brodhead, M, Akers, J. S., Higbee, T. S. (2012). *Considering Ethical Behavior in educational settings: Part 2*. Workshop given at annual Effective Practices Conference. Logan, UT.
- Akers, J. S., Brodhead, M, & Higbee, T.S. (2012). *Using activity schedules to promote independence in early learners*. Workshop given at annual Effective Practices Conference. Logan, UT.
- Hartzheim, D., Akers, J. S., & Higbee, T.S. (2012). *Understanding and Managing Challenging Behavior*. Guest lecture for Speech and Language Pathology students and faculty, Utah State University, Logan, UT.
- Akers, J. S., Gerencser, K., & Higbee, T.S. (2012). *Understanding and Managing Challenging Behavior*. Presentation for the Utah Early Childhood Conference, Provo, UT.
- Pollard, J.S., Higbee, T.S., Akers, J.S., & Brodhead, M.T. (2013). *An evaluation of an interactive computer training to teach instructors to implement discrete trials with children with autism*. Presentation for Utah Valley University Autism Conference, Orem, UT.
- Akers, J. S., Gerencser, K. R. & Higbee, T. S. (2012). *Introduction to Autism and Applied Behavior Analysis*. Presentation for Child & Family Support Center, Logan, UT.
- Pollard, J. S., Higbee, T. S., Akers, J. S., & Brodhead, M. T. (2013). *An evaluation of an interactive computer training to teach instructors to implement discrete trials with children with autism*. Presentation for the Association of Behavior Analysis. Minneapolis, MN.
- Akers, J. S. (2014). *Fragile X-syndrome: Growing up with siblings with disabilities*. Guest lecture for Young Children with Disabilities: Characteristics and Services, Utah State University, Logan, UT.
- Akers, J. S. & Higbee, T. S. (2014). *Introduction to Autism and Applied Behavior Analysis*. Presentation for School Psychology students and faculty, Utah State University, Logan, UT.

- Akers, J. S. & Higbee, T. S. (2014). *Using Environmental Supports with Children with Disabilities*. Guest lecture for Early Childhood course, Utah State University, Logan, UT.
- Akers, J. S., Contreras, B., Higbee, T. S. (2014). *Using activity schedules and script fading with children with autism*. Guest lecture for Early Childhood Alternative Teacher Preparation Program course via Adobe Connect online platform, Utah State University, Logan, UT.
- Akers, J. S., Higbee, T. S., Reinert, K. S., & Pollard, J. S. (2015). *Sibling-implemented script fading to promote play-based statements in children with autism*. Presentation for California Association of Behavior Analysis. San Diego, CA.
- Akers, J. S., Higbee, T. S., Pollard, J. S., Gerencser, K. R., & Pellegrino, A. J., (2015). *An evaluation of photographic activity schedules to increase independent playground skills in young children with autism*. Presentation for the California Association of Behavior Analysis. San Diego, CA.
- Akers, J. S., Higbee, T. S., Reinert, K. S., & Pollard, J. S. (2015). *Sibling-implemented script fading to promote play-based statements in children with autism*. Presentation for the Association of Behavior Analysis. San Antonio, TX.
- Akers, J. S., Higbee, T. S., Pollard, J. S., Gerencser, K. R., & Pellegrino, A. J., (2015). *An evaluation of photographic activity schedules to increase independent playground skills in young children with autism*. Presentation for the Association of Behavior Analysis. San Antonio, TX.
- Akers, J. S., & Higbee, T. S., (2015). *Current research in play and language skills for young children with autism*. Presentation for the Utah Association of Behavior Analysis.

Poster Presentations

- Akers, J. S. & Adams, A. (2011). *Using script-fading to increase play-based language between children with autism and their typically developing siblings*. Poster presentation for Nevada Association of Behavior Analysis. Reno, NV.
- Akers, J. S. & Adams, A. (2012). *Using script-fading to increase play-based language between children with autism and their typically developing siblings*. Poster presentation for California Association of Behavior Analysis. Garden Grove, CA.
- Akers, J. S. & Adams, A. (2011). *Using script-fading to increase play-based language between children with autism and their typically developing siblings*. Poster presentation for Association of Behavior Analysis. Seattle, WA.
- Brodhead, M, Higbee, T. S., Pollard, J., & Akers, J. (2012) *The use of activity schedules to promote social and on-task behaviors in children with autism during a game of hide and seek*. Poster presented for Utah Association of Behavior Analysis. Logan, UT.

Professional Experience:

2013- Current Granite School District
Consultant

- Supervising two preschool autism model classrooms providing one-on-one instruction
- Supervising two hybrid model classrooms (kindergarten and 1st-3rd grade) providing one-on-one, two-on-one and group instruction for children with autism
- Training paraprofessionals to implement discrete trial instruction
- Developing behavior plans
- Curriculum programing

2012-2013 Park City School District
Consultant

- Training and providing feedback for teaching providing one-on-one instruction
- Training to use the Verbal Behavior Milestones Assessment and Placement Program

2011- 2013 Utah State University ASSERT Preschool
Case Manager

- Managing client cases
- Monitoring client progress
- Developing behavior plans
- Supervising behavior therapists
- Providing training for new hires
- Conducting parent observations and trainings

2009-2011 Central California Autism Center
Clinical Supervisor

- Managing client cases
- Monitoring client progress
- Developing behavior plans
- Curriculum programing
- Supervise behavior therapists
- Train behavior therapists
- Plan and facilitate additional naturalistic teaching opportunities for clients