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Teaching Board Games to Two Children with an Autism Spectrum Disorder

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Abstract Children with an autism spectrum disorder (ASD) often have reduced play skills, interfering with their ability to interact with same-age peers. One way that children interact is to play structured games; thus, teaching children with ASD to play structured games may give them additional opportunities to interact with peers. The purpose of this study was to teach 2 children diagnosed with ASD 3 different age-appropriate structured board and card games. The teaching procedure was implemented in a group instructional format and participants' behavior was measured in naturalistic probes implemented with the researcher. Utilizing a multiple probe design across behaviors and replicated across participants, results indicated that both participants were able to learn all three games during these naturalistic probes. Furthermore, participants were able to generalize game play to a second teacher in less structured generalization probes.

Keywords Games · Role-playing · Social skills · Teaching interaction procedure

One of the diagnostic criterion for autism spectrum disorders (ASD) is a qualitative impairment in social interaction, including lack of social reciprocity such as not actively participating in social play or games (American Psychiatric Association 2000). It may be important to teach children with ASD to play structured games, as it is a common way for children to interact with each other and may lead to the development of friendships.

Researchers have taught adolescents and adults with ASD how to play video games (Blum-Dimaya et al. 2010), soccer (Luyben et al. 1986), and darts (Schleien et al. 1981). In addition, Charlop-Christy et al. (2000), taught one adolescent, age 11 year 3 months, to play the card games "War" and "10" (a modified blackjack game) in a study comparing the effects of video modeling and in vivo modeling;

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results showed that video modeling was more effective at teaching game skills. None of these studies have included children under the age of nine nor, except for the Charlop-Christy et. al. study, have they taught participants how to play games within a turn-taking context; thus, the research has remained limited for younger children with ASD.

Research that has focused on younger children has primarily focused on teaching toy play (e.g., Paterson and Arco 2007) and pretend play (e.g., Hine and Wolery 2006), rather than structured games. However, Baker (2000) did teach three young participants (5–6 years old) with ASD how to play a Bingo game that incorporated ritualistic themes. The researchers taught the object of the game, rules of the game, how to initiate play, set up, and turn taking with an older sibling during a 5 min probe. Across all participants, learning to play the game led to increased appropriate social interactions and joint attention with their sibling and decreased non-engagement during play sessions. The authors, however, did not specifically describe the teaching methodology, other than stating that the participants were prompted to play the game, reinforcement was provided for winning, and adult involvement was systematically faded. In addition, the authors did not measure the participants' competence in accurately playing the game. Additionally, incorporating thematic ritualistic behaviors into the game may create a problem with generalization, since they learned to play the game using non-standard materials and it is unclear how motivated participants would be to play games not related to thematic ritualistic behaviors. Thus, it is not clear exactly how the children were taught to play the games, how accurately the children played the games throughout the study, and how motivated the children would be to learn and play games using standard play materials.

Given the limited research on teaching young children with ASD how to appropriately play structured games and the importance of teaching children game play; the purpose of this study was to teach two participants diagnosed with an autism spectrum disorder how to play three different structured, turn-taking board and card games using a procedure which includes labeling the behavior, providing rationales, breaking the skill down into smaller components, the teacher modeling the behavior, the learner role-playing, and reinforcement (see Leaf et al. 2010).

Method

Participants

Brady was a 7-year-old boy diagnosed with autistic disorder. Brady had a Social Skills Rating Scale Parent Version (SSRS-P) standard score of 98. Brady engaged in statement-question conversations, displayed parallel and imaginative play, basic social skills (e.g., eye contact, sharing, and greetings), and more advanced social skills (e.g., humor and changing the conversation). Brady displayed deficits in structured play, following rules, playing what others wanted to play, and displayed stereotypy and non-compliance.

Hank was a 5-year-old boy diagnosed with Pervasive Developmental Disorder-Not Otherwise Specified. Hank had a SSRS-P standard score of 67. Hank engaged in statement-question conversations, displayed imaginative play, and displayed basic

and more advanced social skills. Hank displayed deficits in structured play, following rules, and playing what others wanted to play.

Setting

The researchers conducted this study at a social skills group for children with ASD. The social skills group was implemented for 16 months and this study was conducted during the final 3 months. Both participants had been members of the social skills group since the beginning of the group and had previous experience with the teaching methods evaluated in this study. Prior to this study, children in the group were taught basic social skills (e.g., eye contact, commenting, and turn taking) and more advanced social skills (e.g., empathy and winning graciously) (see Leaf et al. 2010) but were not taught structured games.

The social skills group met twice a week for 2 h per meeting; research sessions, for this study, were conducted 1–2 times each group. Research sessions occurred during regular scheduled small group instruction; the other members of the social skills group engaged in other research studies or small group instruction learning a variety of social skills. Research sessions consisted of a naturalistic probe and a teaching session, which lasted approximately 15–20 min. The naturalistic probe took place at a half-circular table with a researcher sitting on the opposite side of a single participant. The teaching session took place at the same table with the researcher sitting on the opposite side of the two participants and an additional third child. During teaching sessions, a support teacher sat behind the participants to help provide reinforcement and redirect aberrant behaviors.

Target Skills

Both Brady and Hank's parents expressed interest in teaching games as part of the social skills group and, therefore, the researchers taught the participants to play Go Fish[®], Uno[®], and Yahtzee Junior[®], which were broken down into 21, 20, and 24 smaller skill steps, respectively. These games were selected because each participant had the games in their homes but they were seldom played. The steps were taken directly from the instructions included in each of the three games and can be found in Table 1.

Dependent Variable and Probes

Dependent Variables The researchers measured how well the participants displayed the skill steps for each of the three games during naturalistic probes and generalization probes. Both naturalistic probes and generalization probes were conducted in a one-to-one setting and were unprompted and unreinforced opportunities for the participant to play the games with a known adult. Naturalistic probes were conducted with the same teacher that the participants role-played with during the teaching procedure and generalization probes were conducted with a second teacher within the social skills group who did not teach any of the three games.

For all naturalistic and generalization probes, using a pen and paper with the task analysis on it, the researchers recorded which steps the participant displayed correctly, which steps the participant did not display correctly, which steps the participant

Table 1 Task analysis for games taught

Go fish	UNO	Yahtzee Jr.
1. Deals each player 5 cards	1. Gives each player 7 cards	1. Finds all five character pieces
2. Puts rest of cards in middle	2. Puts rest of cards down in middle	2. All pieces are same color
3. Asks teacher if they have a card	3. Flips over top card	3. Puts all dice in the cup
4. Card asked for matches one in their hand	4. Puts down a card with same color or number as top face upcard, or a wild card	4. Shakes the cup
5. If yes: Adds card to hand	5. If a wild card, picks a new color from in hand	5. Rolls out all the dice
6. If yes: Asks another question	6. If no cards that match, pick one from pile	6. If matches: puts matching dice to side
7. If no: Takes card from deck	7. Does not take another turn	7. If no matches: puts one dice aside
8. If no: doesn't ask another question	If Teacher puts down draw two:	8. Puts dice back in cup
9. Continues to ask questions until gets a no	8. Takes two cards	9. Rolls two more times or until 5 of same
10. Waits for teacher to take turn	9. skips turn	10. After every roll, puts aside any matching dice
11. Responds correctly to teacher's questions	If teacher puts down wild draw four:	11. Finds chip of matching character
12. Begins second turn: asks teacher if they have a card	10. Takes four cards	12. Puts chip on board in right location
13. Card asked for matches one in their hand	11. Skips turn	13. Waits for teacher to take turn
14. If yes: Adds card to hand	12. Puts down a card with same color or number as top face up card, or a wild card	14. Initiates second turn: shakes the cup
15. If yes: Asks another question	13. If a wild card, picks a new color from in hand	15. Rolls out all the dice
16. If no: Takes card from deck	14. If no cards that match, pick one from pile	16. If matches: puts matching dice to side
17. If no: doesn't ask another question	15. Does not take another turn	17. If no matches: puts one dice aside
18. Continues to ask questions until gets a no	If person puts down draw two:	18. Goes for different character than on first turn
19. After no, waits for teacher to take turn (e.g., doesn't ask another question)	16. Takes two cards	19. Puts dice back in cup
20. Responds correctly to teacher's questions	17. Skips turn	20. Rolls two more times or until 5 of same
21. If ever out of cards, takes three from middle pile	If other person puts down wild draw four:	21. After every roll, puts aside any matching dice

Table 1 (continued)

Go fish	UNO	Yahtzee Jr.
	<p>18. Takes four cards 19. Skips turn 20. If ever only one card left, says "UNO"</p>	<p>22. Finds chip of matching character 23. Puts chip on board in right location 24. Waits for teacher to take turn</p>

omitted, and which steps were not applicable. Given that for each turn of a game, the opportunity to engage in certain steps may not be available, steps were only scored for which there was an opportunity for the participant to complete the step. For example, for go fish, after the participant asked the teacher for a card, if the teacher responded with “yes”, the researcher recorded whether the participant engaged in all of the appropriate steps following a “yes” and recorded N/A for all of the steps for following a “no”. The researchers then calculated the percentage of steps the participant displayed correctly and divided it by the total number of steps for which there was an opportunity to engage in. A game was considered mastered when both participants showed stable and high levels (i.e. displaying above 80% of behavioral steps) of responding during naturalistic probes. There was no mastery criterion during generalization probes.

Naturalistic Probes The naturalistic probe began with a teacher bringing the participant to the table and having him sit across from the researcher. The researcher provided the participant with the discriminative stimulus: “Let’s play [game]” and put the game in the middle of the table. The participant was given 30 s to begin to set up the game and if he did not do so the researcher quickly set up the game. If the participant began to set up the game, the researcher allowed the participant to continue until the set up was complete or until the participant stopped for 30 s. Once the game was set up, the participant was given 30 s to take his first turn and if he did not do so the researcher said “Thank you for playing” and sent him back to the group. If the participant began to play, the researcher and the participant each took two turns of the game. If the participant displayed a step incorrectly, or took his turn incorrectly, the researcher allowed him to continue without providing any feedback. The researcher then continued to take her turn using the appropriate steps of the task analysis. After two turns of the game had been played, or if at any time the participant stopped playing the game for more than 30 s, the researcher thanked the participant and sent him back to the group.

Generalization Probes Generalization probes were conducted identical to naturalistic probes with two exceptions. First the generalization probes were conducted in a different room of the social skills group rather than at the table where naturalistic probes and teaching sessions were conducted. Second, a teacher who did not conduct any teaching sessions was used during generalization probes.

Design

A multiple probe design across behaviors and replicated across participants was used to determine effectiveness of intervention for both participants. When using the multiple probe design, functional control is demonstrated if the targeted behaviors change when, and only when, the independent variable is implemented. Due to the design, probe and teaching phases were alternated. Participants remained in the probe phase until they displayed stable responding on the skill that was going to be taught next and remained in the teaching phase until they showed stable, high responding on naturalistic probes. Ideally, researchers should implement a series of baseline probes throughout the study (Cooper et al. 1987); however, several studies have used the

multiple probe design where baseline probes have only been implemented once a skill has reached mastery criterion (e.g., Akmanoglu and Batu 2004; Akmanoglu-Uludag and Batu 2005; Batu et al. 2004; Birkan 2005).

General Procedures

The Research Consisted of Two Phases: Probe and Teaching Phases.

Probe Phase (PP) The purpose of the probe phase was to determine baseline levels of skills not yet taught and maintenance levels of skills previously mastered. Research sessions in this phase began with the researcher implementing naturalistic probes for both children across all three games. Thirty minutes after naturalistic probes the researcher implemented generalization probes for each game. During the probe phase, generalization probes were not conducted each research session. Generalization probes for each skill were conducted at least once each probe phase.

Teaching Phase (TP) Each research session in this phase began with the researcher implementing naturalistic probes for the current target skill to determine how well participants displayed the skill steps for the game currently being taught. After a brief break, the researchers then implemented the teaching procedure (described below). If a second research session was scheduled for that day, the researchers gave the participants at least a 30 min break and then implemented a second naturalistic probe and the teaching procedure for a second time.

Teaching Procedure

During teaching we taught students the rules of each of the games but did not teach them game strategy. We taught the skills in a group instructional format for two reasons: (1) participants may observationally learn from each other and (2) teaching social/play skills in groups may be important in promoting social interaction.

During teaching, the researchers first stated the game that the participants were learning (e.g., “We are learning how to play UNO”) and sequentially had each participant repeat the game to be learned. If the participant stated the game correctly (e.g., “Uno”) the researcher provided two tokens to the participant and moved on to the next participant. If a participant answered incorrectly, then the teacher verbally prompted the answer (e.g., teacher saying “Uno”), had the participant repeat the answer, and provided the participant with one token. If the participant still did not answer correctly or did not answer, the researcher stated that they needed to answer and provided the prompt again (e.g., the teacher said “You need to try, we are talking about Uno”). If the participant responded correctly the researcher provided social praise to the participant and moved on to the next participant. If the participant still did not answer the researcher provided corrective feedback (e.g., “Bummer no tickets for you.”) and moved onto the next participant. The same reinforcement schedule and prompting strategy was used for the rationale, breaking the skill into smaller steps, and teacher modeling the behavior.

After the researcher had the participants state the game to be learned, they had each participant provide a rationale for why they should play games correctly (e.g., “If you play correctly, your friends will play with you.”) and stated the purpose of the game (e.g., “When playing UNO, you want to get rid of all of your cards first.”). The first rationale was similar across all three games; the second rationale depended on the game currently being taught.

Next, the researcher broke the game into smaller behavioral steps. During the first session the researcher stated each of the steps and had each participant state the steps in the correct order. After the first teaching session of a new skill, the researcher did not initially state the steps but rather had each of the participants state the steps (e.g., Hank stated the first step and then Brady stated the first step). If both participants were unable to state a step, the researcher stated the step and had each participant repeat that step of the game. All steps were taught simultaneously.

The researcher then modeled playing the game correctly with another teacher. Following the teacher model, each participant was asked to label whether the researcher engaged in appropriate or inappropriate game play (i.e., “cool” or “not cool”) and describe what steps the researcher displayed correctly. Finally, the researcher had each participant role-play the game with the teacher. During role-plays a whole-task presentation prompting procedure was used. If at any point the participant made a mistake, he was stopped. Corrective feedback was provided and the participant was told to continue from the step where the mistake was made. The researcher provided 10 tokens if the participant role-played correctly with no prompting, 5 tokens for role-playing with only 1 prompt, and 2 tokens if more than one prompt was required. If the participant refused to play the game with prompts (non-compliance) he earned no tokens.

The tokens that the participant earned throughout the teaching procedure were cashed in at the end of the social skills group for smaller tangible items (e.g., bouncy balls, whoopee cushions, beads).

Data Collection, IOA, and Procedural Integrity

Using a pen and paper with the task analysis on it the lead researcher recorded each of the steps the participant displayed during all naturalistic and generalization probes. A second independent observer simultaneously scored which steps the participant displayed correctly or incorrectly during 48% of naturalistic and generalization probes across both participants and all skills. Agreement was defined as both observers scoring that the participant correctly or incorrectly demonstrated, or omitted, each of the behavioral steps. IOA was calculated by dividing number of agreements by the total number of steps scored and converting this into a percentage. Mean agreement was 98.8% (range 87.5–100%).

The researchers also calculated treatment fidelity for the implementation of the teaching procedure. During 33% of all teaching sessions an independent observer scored whether the researcher: (a) labeled the behavior; (b) had the participant label the behavior; (c) had each participant provide a rationale; (d) attempted to have each participant state each of the behavioral steps; (e) modeled the behavior; (f) had each participant role-play the behavior; (g) provided reinforcement appropriately throughout; and (h) provided prompting appropriately throughout. Treatment fidelity was calculated by dividing the number of teacher behaviors performed correctly by the

number of planned teacher behaviors ($n=8$). Treatment fidelity was 97.5% (range 92–100% across sessions).

Results

Figures 1 and 2 show the percent of skill steps correctly performed on naturalistic (closed circle) and generalization (open square) probes for Brady and Hank, respectively. Across the x-axis are sessions and across the y-axis is percentage of steps demonstrated correctly. Each panel represents a different board game or card game taught. The graphs are broken into the two phases (PP and TP). There was a teaching session implemented prior to the first TP data point for each skill.

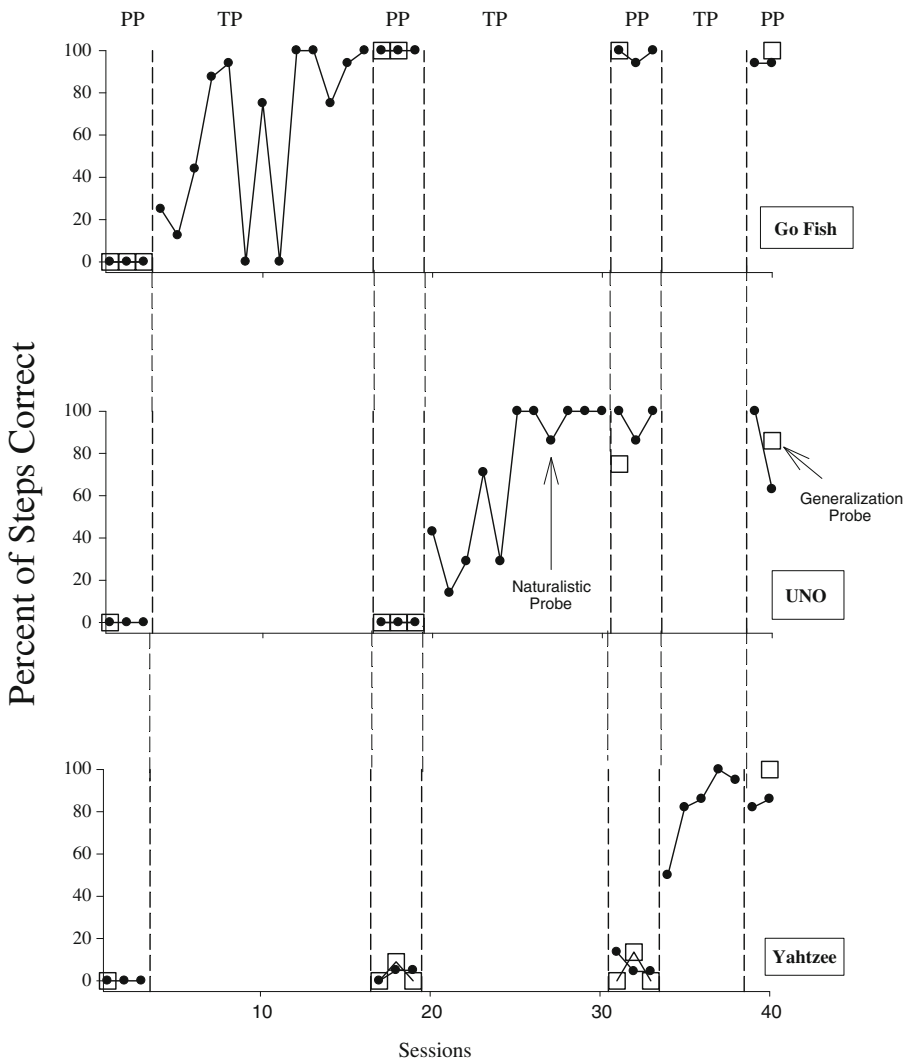


Fig. 1 Naturalistic and generalization probes for Brady

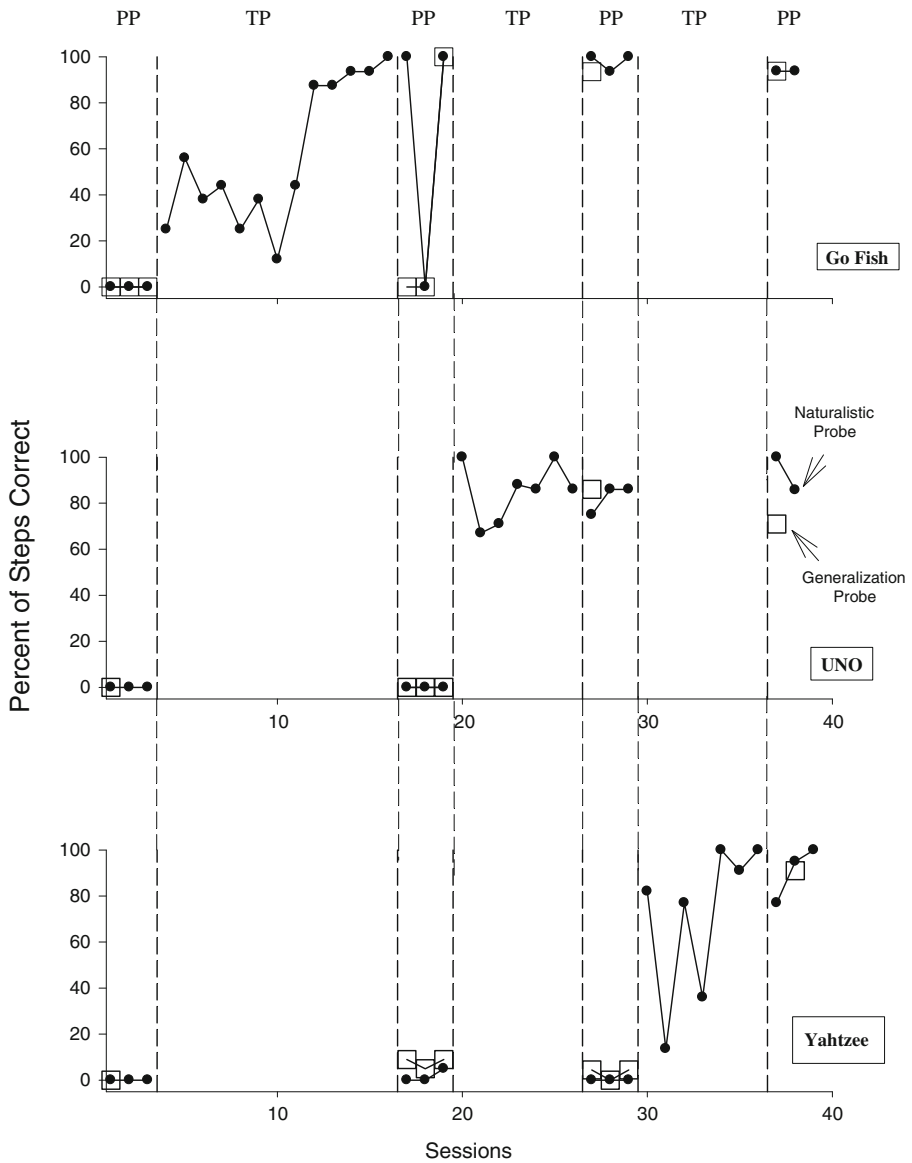


Fig. 2 Naturalistic and generalization probes for Hank

Brady and Hank learned all three games in 29 and 27 teaching sessions, respectively; and showed high levels of generalization following intervention. Prior to intervention, Brady and Hank displayed an average of 1.8% and 0.3% of steps across the three games during naturalistic probes, respectively, and 1.7% and 2.3% of steps during generalization probes, respectively. Following intervention, Brady and Hank displayed an average of 93.7% and 86.6% of steps across the three games during naturalistic probes, respectively, and 94.4% and 66.9% of steps during generalization probes, respectively.

Discussion

The results of the study showed that the teaching procedure implemented in this study was an effective way to teach children diagnosed with ASD board and card games. These activities are common ways in which young children typically interact; thus, teaching these activities to children with autism may increase the opportunities they have to socially interact with peers. In addition, teaching children with autism a variety of board and card games may be a means for working on other important social skills, such as initiation and sportsmanship. The children were taught to play three different structured games, using standard materials, which are frequently found in the homes and classrooms of children this age. These factors may increase the abilities of the participants to generalize game play to typical peers in the home or regular classroom environment. Furthermore, participants were taught to play the target games within the context of a social skills group, instead of during 1:1 instruction. Teaching children with autism play and social skills within the context of a social skills group may increase opportunities to practice newly acquired skills with a population (other children) similar to those they will be expected to display the skills with. The results of this study also showed that implementation of the teaching procedure resulted in high levels of learning, maintenance, and generalization; both participants were able to play all 3 games with 100% accuracy during naturalistic probes and demonstrated high levels of accuracy during generalization probes.

Despite the positive findings there remain several limitations that should be addressed by future researchers. Several limitations are related to measures that were not, or could not, be collected. First, probes were only conducted with adults; no probes were conducted with peers. The main purpose of teaching play skills to children with ASD is that they will use these skills to increase positive interactions with same age peers. Unfortunately, we were unable to assess how well the participants would play games with peers because there were no peers in the group capable of playing the games appropriately prior to intervention. Future researchers should look at whether children generalize game play to peers and how learning games may affect natural free-play interactions with peers when games are present.

Second, the researchers did not measure long-term maintenance because of the group being terminated. Third, data was not taken to completion of the game, so it is unknown whether the participants would be able to play the games to completion and acknowledge the ending of the game. Due to the short length of group sessions, the possible length of each game, and the need to get in multiple probes and other activities, we were unable to let the participants play the games until completion. Finally, there was a limitation that was related to the research design. Typically when implementing a multiple probe design the researchers want to implement baseline probes throughout the entire study. In this study we only implemented baseline probes prior to any intervention and once both participants reached mastery criterion on a skill. Although this implementation of the multiple probe design has been implemented in previous studies (e.g., Akmanoglu and Batu 2004; Akmanoglu-Uludag and Batu 2005; Batu et al. 2004; Birkan 2005; Leaf et al. 2010) it does weaken the level of control. Future researchers should implement baseline probes frequently to gain more functional control. In addition, since learning was measured through daily probes, the participants may have had the opportunity to observe the

researcher correctly playing the games during probes, which may have contributed to learning of appropriate game play. Despite these limitations, the teaching procedure was effective in teaching two children diagnosed with ASD how to effectively play three structured board and card games.

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