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Utilizing Group Teaching Interaction and Generalization Procedure to Improve Social Skills of Students with Autism Spectrum Disorder

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**Utilizing Group Teaching Interaction and Generalization Procedure to
Improve Social Skills of Students with Autism Spectrum Disorder**

by

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A Thesis

Submitted to the Graduate Faculty of
St. Cloud State University
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Abstract

Impairment in social behavior is one of the core diagnostic features of Autism Spectrum Disorder (ASD). Also, the previous research displayed limited success with generalization of social skills from training setting. Teaching Interaction procedure (Leaf et al., 2009) is used to teach social skills to students with ASD. This study examines the effectiveness of a group Teaching Interaction procedure to teach social skills to four participants with ASD in a school setting. The programmed generalization procedure (Kassardjian et al., 2013) was used to transfer the trained skills into the participants' regular classroom.

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Chapter I: Introduction and Literature Review

One of the core diagnostic features of Autism Spectrum Disorder (ASD) is qualitative impairments in social behavior (American Psychiatric Association, 2013). Impairment in social behavior may have negative impacts on children with ASD such as poor quality of friendship (Bauminger & Kasari, 2000), problems in school (Ladd, Birch, & Buhs, 1999), depression (Stewart, Barnard, Pearson, Hasan, & O'Brien, 2006), and thoughts or attempts of suicide (Mayes, Garman, Hillwig-Garcia, & Syed, 2013).

Numerous interventions have demonstrated effectiveness of training social skills. These interventions include video modeling (Apple, Billingsley, & Schwartz, 2005; Charlop-Christy, Le, & Freeman, 2000), Pivotal Response Training (Stahmer, 1995), social stories (Barry & Burlew, 2004; Gray & Garand, 1993), Behavioral Skills Training (Stewart, Carr, & LeBlanc, 2007), and Teaching Interaction (Leaf, Taubman, Bloomfield, Palos-Rafuse, Leaf, McEachin, & Oppenheim, 2009)

The Teaching Interaction (TI) procedure (Leaf et al., 2009) has demonstrated effectiveness to teach social skills to children with ASD. There are six essential components involved in the procedure—description of the target skill, explaining rationale to engage in the skill, demonstration of the target skill by a teacher, a participant practicing the skill in a role play, corrective feedback from the teacher, and reinforcement. First, the teacher states and describes the target skill to be taught. The target skill is broken down to small steps and described. During the description, the teacher can require students to name each step. Second, the teacher describes the rationale to engage in the target behavior. Third, the teacher demonstrates the target skill. The teacher can either demonstrate the skill with all the components or omitting a step. The student is required to determine if the demonstration included all the steps, or identify which step was missing from the demonstration. Fourth, the

teacher requires the student to practice the target behavior in role play with teacher or other model student. Fifth, the teacher gives feedback on the student's performance during role play. Social praise is given if the student correctly performed all the steps in the role play. If the student misses any step in the role play, the teacher gives corrective feedback and requests the student to practice the target skill once again. Finally, reinforcement is used for correctly answering the question during description, rationale, and demonstration, and performing correct steps during role play.

Teaching Interaction procedure is similar to another commonly used intervention, Behavioral Skills Training (BST) (Sturmey, 2008). Behavioral Skills Training demonstrated effectiveness for teaching various skills such as safety skills (Johnson et al., 2004), gun safety for children (Himle, Miltenberger, Flessner, & Gatheridge, 2004), and implementation of Discrete Trial teaching for teachers (Sarokoff & Sturmey, 2004). Previous researchers utilized Behavioral Skills Training to teach social skills such as sexual abuse prevention skills for adult women (Lumley, Miltenberger, Long, Rapp, & Roberts, 1998; Miltenberger et al., 1999), child abduction prevention skills (Pouche, Brouwer, & Swearingen, 1981), and conversational skills (Stewart, Carr, & LeBlanc, 2007). The Teaching Interaction procedure is different than the Behavioral Skills Training is that it includes description of rationale to engage in the target skills. Inclusion of rationale component may be important for the student to provide self-instruction to himself or herself to engage in the target skills when the teacher is not present. Thus, the rationale that the teacher provides should be potentially rewarding to the student.

Leaf et al. (2009) first investigated the effectiveness of teaching interaction procedure for students with ASD. Three children with ASD, age range between 5- to 7-years-old, participated in their study. The training and observation sessions were conducted during

eight-week summer school program at a private behavioral agency. Training sessions were 30 min in length each day during the summer school program. Target social skills were picked from four domains (i.e., play skills, language skills, emotional skills, and choosing same friend). Data on correctness of steps in the targeted social skills were collected during the structured probe sessions, where participants were required to display learned skills with a person differed from teaching setting, no priming, and with no reinforcement. Probe sessions were conducted at least one hour after teaching sessions. Pre- and post-intervention tests were also conducted to measure the frequency of conversations between target peers in naturalistic environment and percentage of intervals that participants engaged with the play materials. A multiple baseline design across targeted skills, replicated across the participants was used to assess the effect of treatment. Inter-observer reliability was obtained for 30% of all probe sessions for all the students. Inter-observer agreement for skill acquisition was a mean of 94.5%, ranging from 88 to 100%. Inter-observer agreement for pre- and post-intervention test was 88%, ranging from 85 to 100%, for conversation, and 100% for engagement in play materials.

During the baseline, all participants showed zero or a low percentage of correct steps in the targeted social skills. Although there was wide range in improvements across target skills and across participants, all the participants increased the correctness of the steps once the teaching interaction procedure was implemented. Two participants displayed two out of four targeted skills, and another participant displayed one out of four targeted skills above 80% during intervention phase. Probe sessions during maintenance phase showed that two out of three participants maintained the relatively high percentage of correct steps in targeted skills. The results of pre- and post-intervention tests showed both conversation with targeted peers and play engagement in naturalistic settings increased after the intervention. Leaf et al.

(2009) concluded that the teaching interaction procedure package was effective to teach social skills to children with ASD. Maintenance procedure that involves fading out the reinforcement, and more extensive assessment of generalization of the learned skills were suggested for future studies.

Leaf, Dotson, Oppenheim, Sheldon, and Sharman (2010) investigated the effect of Teaching Interaction procedure in group settings to teach social skills to young children diagnosed with ASD. Five children, age from 4- to 6-years-old participated in the study. The social skill groups were held during afterschool program for 1.5 hours twice a week. Three out of five participants were taught four social skills (i.e., showing appreciation, giving a complement, making an empathetic statement, and changing the game when someone is disinterested). The other two participants were taught two social skills (i.e., showing appreciation and giving a compliment). The percentage of occurrence of correct steps in the socials skills taught were measured during probe sessions. Three different types of probes were used: (a) teaching probes as a part of the Teaching Interaction procedure to assess the participants' progress, (b) baseline/maintenance probes when there was no programmed consequences based on the participants' performance, and (c) generalization probes with a person who was not involved in teaching. Mastery criterion was set as the participant displaying all of the correct steps in the target skills for three consecutive role plays, across at least two days. Inter-observer agreement was calculated for 44% of baseline/maintenance probes and teaching probes, and 57% of generalization probes. Inter-observer agreements were average of 94.8%, with range between 80 to 100%, for baseline/maintenance probes and teaching probes, and 92.8%, with range between 75 to 100%, for generalization probes. A multiple probe design across the targeted skills was used to evaluate the effect of intervention.

During the baseline probes, none of the participants showed more than 50% of correct steps of the targeted social skills. After the implementation of the Teaching Interaction procedure, two out of three participants who were taught four social skills reached mastery criteria for all social skills taught. Another participant reached mastery criteria for three out of four targeted social skills. All of the participants who were taught two social skills reached mastery criteria for both social skills. All participants reached the mastery criteria in no more than 10 instructional sessions. Although the Teaching Interaction procedure was effective to teach most of all targeted social skills, the generalization probe data showed mixed results. Only 57% of the targeted social skills reached mastery criteria (i.e., 100% correct steps of the targeted skills across three days) without any promotion for generalization. With 28.57% of the targeted skills needing reinforcement and re-practice, and 14.28% needing priming to utilize targeted social skills to reach the mastery criteria. One participant did not reach mastery criteria during generalization phase due to early withdrawal from the study. The maintenance probe data showed that most of the participants maintained the learned social skills up to eight weeks after the termination of the Teaching Interaction procedure. The authors concluded that the group Teaching Interaction procedure was effective to teach social skills to children with ASD, and suggested the assessment for generalization of the learned social skills with other environments and peers for future studies.

Dotson, Leaf, Sheldon, and Sherman (2010) also investigated the use of group Teaching Interaction procedure to teach conversational skills to five adolescents with ASD and Attention Deficit/Hyperactive Disorder (ADHD). Two male and two female adolescents with ASD, and one male adolescent with ADHD participated in the study. The observation and training were conducted during a social skills group which was held twice a week. Target

conversational skills included conversational basics (i.e., maintaining eye contact, maintaining appropriate distance, maintaining appropriate body posture, and maintaining appropriate voice tone and volume), providing positive feedback to a speaker, and answering open-ended questions. The dependent variable was the correctness of the steps within the targeted skills. Three types of probes were used to measure the dependent variable: teaching probes, baseline/maintenance probes, and generalization probes. Teaching probes occurred during the role play of the Teaching Interaction procedure, where the participant performs the target skill taught with a teacher. Mastery criteria was set as three consecutive role plays with 100% correct steps for a target skill across at least two consecutive teaching sessions. The group Teaching Interaction session was continued until all or all but one of the participants reached the mastery criteria. During baseline/maintenance probes, the participant performed the target skills in a role play with a teacher but did not receive any feedback on his or her performance. Maintenance probes were conducted in a same manner as baseline probes after the teaching sessions were terminated. Generalization probes were conducted as a confederate peer engaging in a behavior which sets an occasion for the participant to perform a target skill in naturalistic settings. Interobserver reliability was obtained 69% during teaching, baseline, and maintenance probes and 89% of generalization probes. Mean inter-observer agreement was 90% (range 66-100%) and 81% (range 67-89%), respectively. A multiple-probe design across the three skills was used to examine the effect of the treatment.

The results indicated that all the participants started to perform the correct steps of the target skills once the Teaching Interaction procedure was implemented. Four out of five participants for conversational basics, all five participants for giving feedback, and all five participants for answering and asking questions reached the mastery criteria. All the

participants maintained the high level of correct steps for conversational basics and giving feedback over several months after the teaching session was terminated. For answering and asking the questions, only three out of five participants maintained the level of correct steps above baseline. However, data from generalization probes demonstrated that skills taught were not fully generalized to the naturalistic setting. Only three out of five participants reached 100% of any of the skills. The study contributed to the research by further demonstrating the effectiveness of the Teaching Interaction procedure to teach social skills with adolescents with ASD and ADHD. However, one primary limitation of the study was the failure to fully generalize the skills to naturalistic settings. The authors suggested that one reason may be due to limited number of structured opportunities for the participant to engage in the target skills during the study. Increasing the number of opportunities to engaging in the skills taught in the naturalistic setting to promote generalization was suggested for the future studies.

Leaf et al. (2012) conducted a study to compare the Teaching Interaction procedure and social stories to teach social skills to children and adolescents with ASD. Social story is another common intervention to teach social skills to people with ASD. (Gray & Garand, 1993). The study compared two procedures on (a) the relative effectiveness of each method to teach social skills and (b) the level of generalization of those skills taught by each method. Six boys, 5- to 13-years-old, participated in the study. Three social skills for both Teaching Interaction procedure and social stories were assigned for each participant randomly. The dependent variable was the percentage of correct steps exhibited by the participants. Data were obtained in two types of probe sessions, performance probes and generalization probes. Performance probes were conducted to determine mastery of the target skills, and it was implemented as the participant displayed a targeted social skill with the experimenter.

Mastery criterion was set as the participant displaying 100% of all steps correctly during performance probes for three consecutive sessions. Generalization probe sessions were done with both known adults who were not involved in the teaching, and with peers. Both pre- and post-intervention generalization probes with adults were conducted for all the participants. Both pre- and post-intervention generalization probes with peers were conducted for two out of six participants. Only post-intervention generalization probes with peers were conducted for three participants. One participant did not participate in the generalization probe with peers due to early withdrawal from the study. Inter-observer agreements were calculated for 40% of performance probes, 46% of generalization probes with adults, and 37% of generalization probes with peers. Average percentage of agreements were 97%, 97%, and 97%, respectively. A parallel treatment design was used to compare the effects of two procedures.

All the participants showed low level of the correct steps for the targeted social skills during the baseline. After both procedures were implemented, all participants reached the mastery criteria for all the social skills taught when the Teaching Interaction was used. However, only 4 out of 18 skills taught reached mastery criteria when social stories were used. The results demonstrated that the Teaching Interaction procedure increased the level of correct steps in the targeted social skills more than social stories. The results of the generalization probes with adults were similar to the results of performance probes. All participants showed higher levels of correct steps during post-intervention generalization probes after the skills were taught with the Teaching Interaction procedure, whereas the level did not increase after the skills were taught using social stories. The results from the generalization probes with peers were similar. The study demonstrated that the Teaching interaction procedure was more effective than social stories, and the skills generalized to

outside of the teaching setting at a higher level than social stories. Leaf et al. (2012) concluded with suggestions for further examination for generalization of the targeted skills to participants' peers.

Kassardjian et al. (2014) systematically replicated the study of Leaf et al. (2012) to compare the effectiveness of the Teaching Interaction procedure and social stories. The study expanded Leaf et al. (2012) by conducting teaching in a group setting, recording the participants' responding in performance probes with their peers, and analyzing participants' verbal responding across both interventions. Three children with ASD, all 5-years-old, participated in the study. Three social skills (i.e., changing the game when his/her peer(s) appeared bored, explaining a prior "cool" condition, and inviting a peer to join a game) were randomly assigned to the Teaching Interaction procedure, social stories, or control condition. The performance probes were conducted to record the correctness of steps in the targeted social skills, and a confederate peer was used for two of the skills (i.e., changing the game when his/her peer(s) appeared bored and inviting a peer to join a game). The participants' mastery of the targeted skills during the performance probes, maintenance of the targeted skills, response to questions during the Teaching Interaction procedure, response to comprehension questions at the end of social stories, and the correct steps of the targeted skills with a teacher during the role-play were collected as the dependent variables. An adapted alternating treatment design was used to compare the two interventions.

The results were similar to Leaf et al. (2012). All the participants reached the mastery criterion during the performance probes for the targeted skills taught with the Teaching Interaction procedure. The participants maintained the targeted skills up to 100 days after the teaching terminated. There were little or no improvements observed for the skills taught with social stories. The study further expanded the research on the choice of the intervention to

teach social skills, and effectiveness of the Teaching Interaction procedure in a group setting. However, one of the limitations that authors suggested is the limited number of skills to evaluate the effects of the interventions. The skills were not counter-balanced between participants since the teaching was conducted in a group setting, thus it is undetermined if the results were idiosyncratic to those specific skills.

In conclusion, the Teaching Interaction procedure has consistently demonstrated effectiveness to teach social skills to children with ASD. All the participants in studies on teaching interaction procedures reached the mastery criterion and maintained newly acquired skills during follow-up sessions. Few researchers conducted comparison studies (Kassardjian et al., 2014; Leaf et al., 2012), and the results indicated that the Teaching Interaction procedure was more effective to teach social skills. The teaching interaction procedure was effective when it was utilized in either one-on-one setting or group setting. However, generalization of learned skills to more naturalistic settings is suggested for further investigation.

Social Skill and Generalization

Stokes and Bear (1977) stated that the generalization of newly acquired behaviors to the natural environment is a fundamental dimension of applied behavior analysis. Despite the importance, only few social skills studies attempt to train or assess generalization in the natural environment, or only limited or no generalization to the natural environment were demonstrated when the assessment was conducted. Rao, Beidel, and Murray (2008) conducted the literature review for social skills interventions for children with High-Functioning Autism (HFA). Ten articles were included for the review, and only three out of 10 articles assessed the generalization of treatment effects outside of the training environment. Also, only one of three studies demonstrated some limited success with

generalization of skills taught. The authors suggested the lack of generalization as one of the limitations of the existing literature in social skills training. Even when some researchers assessed the generalization of target skills, they assessed only some aspects of generalization, such as including follow-up sessions to assess maintenance and generalization (Kamps, Leonard, Vernon, Dugan, & Delquadri, 1992; Nikopoulos & Keenan, 2004), or utilizing generalization probes with new recipient, new activities, and materials for social interaction (Krantz & McClannahan, 1998; Sarokoff, Taylor, & Poulson, 2001).

When the assessment of generalization to the naturalistic environment was conducted, the results have been discouraging. For example, Lumley et al. (1998) investigated the use of the Behavioral Skills Training (BST) to teach sexual abuse prevention skills for women with mental disability. Six women with mild to moderate mental disability, ages 30 to 42, participated in the study. The Behavior Skills Training consisted of knowledge building such as description of appropriate and inappropriate sexual relationships and activities, the description of correct response when sexual abuse lure is presented, modeling of the correct response by a trainer, participants practicing the correct response in a role play, and feedback from the trainer on the performance during the role play. The participants were taught to (a) verbally refuse the request, (b) leave the situation, and (c) report the incident to a trusted adult (i.e., staff member). The participants' performance was observed during role play and rated on a 4-point scale according to the guideline. In situ assessment was used to assess the generalization of skills taught during the Behavioral Skills Training to the naturalistic setting. During the in situ assessment, a male confederate unknown to the participant, who were introduced to the participants as a new staff member, presented one of the sexual abuse lures introduced during the Behavior Skills Training. The participants' performance was rated on the same scale as used during the role play. A multiple baseline across participants were used

to examine the effects of the intervention. The result indicated that all the participants improved their performance to maximum score of 4 points during the role play from baseline once the Behavioral Skills Training was implemented. However, data of the generalization probes showed that there was no improvement from baseline performance for five out of six participants. Authors suggested that investigation of the strategies to enhance generalization of learned skills are warranted for future studies.

Miltenberger et al. (1999) replicated Lumley et al. (1998) and further trained the participants with in situ training to enhance the generalization. Five unmarried women, ages from 33 to 57, participated in the study. Engagement in the sexual abuse prevention skills in response to a simulated sexual abuse lure were taught using Behavioral Skills Training. The in-situ training consisted of a research member who presented the solicitation and a trainer asking the participant to describe what happened during the in-situ assessment 15 min after the incident, telling her the correct response, modeling it for her, and requested her to practice in a role play. Another in situ assessment was conducted within the next three days. The procedure was repeated until the participant was able to perform the score of 4 for three consecutive assessments. A multiple baseline design across participants with generalization probes was used to assess the effects of Behavioral Skills Training and in situ training.

The results were similar to Lumley et al. (1998). All participants quickly improved to scores of 4 during role plays once the Behavioral Skills Training was implemented, however, the scores during in situ assessment after the intervention phase indicated no improvement. In situ training was conducted as the participants failed to display the correct response during in situ assessment, and all the participants demonstrated the correct response during training role plays. At the end of the study, all the participants reached the maximum scores of 4 for in situ assessment.

In another example, Sansosti and Powell-Smith (2008) investigated the effectiveness of computer-presented social stories including video models to improve the social communication skills of children with High Functioning Autism (HFA). Three boys with High Functioning Autism, from 6- to 10-years-old, participated in the study. The training and observation were conducted during the recess time in the regular school hours which all the participants attended. A 15-s partial interval recording was used to record the instances of social communication during observation sessions. The occurrence of social communication by typically developing peers in the same classroom was also recorded as a comparison. During the intervention phase, social stories incorporating video modeling were presented to each participant using a computer prior to the observational sessions. Social stories were developed according to specific target skills for each participant (i.e., joining in, maintaining conversations). Modifications of the procedure was made for two participants during intervention phase because the occurrence of social communication were reduced from the beginning of the same phase. Modifications included the teacher prompting the participants to use the skill they were taught and prompting other students in the classroom to engage in an activity upon the request from the participants. After the intervention phase, fading of the procedure was implemented. Fading procedure included reducing the frequency of social stories, video modeling, and the prompts by the teacher. Follow-up sessions were conducted after two weeks from the intervention fading was completed. Generalization probes were conducted in a different unstructured setting (i.e., after lunch on a separate playground, school cafeteria during lunch). A multiple baseline design across the participants was used to investigate the effect of the treatment.

The results indicated that all the participants increased the interval that they displayed social communication from the baseline. For two out of three participants, there were

significant increases in social communication once the intervention phase began. However, the level of social communication started to decrease to baseline levels as the treatment phase progressed. Modifications of the procedure were made and the social interactions increased once again. For another participant, social communication increased steadily to the level similar to comparison data of typically developing peer. Data from the follow-up sessions indicated that all participants maintained the level of social communication two weeks after the social stories procedure was faded completely. However, data from the generalization probe showed that only one out of three participants increased the social communication in the different setting. Sansosti and Powell-Smith (2008) highlighted that future research should incorporate more programmatic generalization methods for generalization to occur.

Although the Teaching Interaction procedure has been demonstrated to be effective in training social skills, most of the studies also failed to either assess generalization of trained social skills in naturalistic settings, successfully transfer the skills taught outside of the training setting, or fade out generalization procedures (i.e., priming and reinforcement). As noted previously, Leaf et al. (2009) only conducted pre- and post-intervention tests to measure increases in social interaction by the participants in a naturalistic environment, suggesting more extensive generalization assessments for future studies. In Leaf et al. (2010), not all participants reached the mastery criteria during the generalization probes and the generalization procedure was not completely faded out at the end of the study. Leaf et al. (2012) only included pre- and post-intervention generalization probes with peers for two out of six participants, and suggested further examination of generalization of social skills with participants' peers. Dotson et al. (2010) failed to fully generalize the conversational skills taught to naturalistic setting.

Kassardjian et al. (2013) investigated the use of a flexible Teaching Interaction procedure to teach social skills to children with ASD and assess the level of the generalization of skills to naturalistic settings. The flexible Teaching Interaction procedure means that each component is shaped by circumstances occurring within the teaching session and individual characteristics of the learner. For example, the teacher may omit the modeling component of the Teaching Interaction procedure based on the probe derived data from the previous teaching sessions. Kassardjian et al. suggested that the Teaching Interaction procedure be implemented in a flexible manner in clinical settings.

Five children diagnosed with ASD, 4- to 13-years-old, participated in the study. One participant was included in the study as a control and he did not receive the intervention during the course of the research. Settings of teaching sessions depended on locations in which the participants received behavioral intervention, which included participants' homes for two participants, behavior therapy clinic for one participant, and the participant's classroom for one participant. One target social skill was assigned to each participant, making a total of five social skills (i.e., expansion of conversations, sportsmanship, responding to peers, modern greetings, and joining into conversations) included in the study. Dependent variable was the independent correct steps of the targeted social skills. Two types of probes were used: teaching probes and generalization probes. Teaching probes occurred as part of the Teaching Interaction procedure where the participant role-played the social skill being taught. During the baseline phase, the teaching probes were implemented without any intervention procedure (i.e., description of the targeted skills, explanation of rationale, demonstration, or reinforcement). Generalization probes were implemented as the researchers set up opportunities for the participants to engage in the targeted behavior with peers under natural conditions. Generalization probes occurred while the Teaching Interaction procedure

was implemented, and after the intervention was terminated. Inter-observer agreement was obtained for 33% of baseline, teaching, and generalization probe sessions. For each participant, inter-observer reliability was 87.8%, 96.8%, 100%, 100%, and 100%, respectively. A multiple baseline across subjects including control condition was used to assess the effect of the intervention.

Kassardjian et al. (2013) also included a programmed generalization procedure to promote generalization of social skills taught by the Teaching Interaction procedure. Upon the mastery of a targeted social skill in the teaching session, four phases for generalization procedure were programmed: (a) priming was provided to the participant, and both tangible reinforcement and social consequence was provided by the teacher following the correct display of the learned social skill, (b) priming was not provided but both tangible reinforcement and social praise were provided, (c) only the social consequence was provided, and (d) no programmed consequence was provided. Priming involved a teacher informing the participant that there may or may not be occasion(s) to engage in the learned social skills, and reminding the participant to utilize the skill. The participants moved through each phase upon achieving three consecutive generalization probes at 80%-100%.

During the baseline, each participant displayed low to moderate levels of the correct steps of the targeted skills, in averages of 42.7%, 21.25%, 23.7%, and 27.6%, respectively. All four participants reached mastery criteria which were 100% of the correct steps for three consecutive teaching probes. After the termination of the implementation of the Teaching Interaction procedure, all the participants maintained the high level of the correct steps for teaching probes during generalization phase and maintenance phase. During the intervention phase, generalization probes showed no higher than 60% of correct steps of the targeted social skills for all the participants. During the generalization phase, all the participants

increased the percentage of the correct steps to nearly 100%. Teaching probes for the one participant in the control condition showed no improvement of the correct steps throughout the course of the study. For the participant who received no training as a control, there was no change in the level of targeted social skills. Kassardjian et al. (2013) concluded that the flexible Teaching Interaction procedure was effective to teach targeted social skills to children with ASD, and the generalization procedures were successfully faded while keeping the high level of correct responses in the social skills taught in the natural settings.

Kassardjian et al. (2013) contributed to the research on successfully transferring the social skills taught by the Teaching Interaction procedure to naturalistic settings and fading out the generalization procedure. Additionally, the results from the generalization probes demonstrated that generalization of the learned skills occurred only when the generalization procedure had taken place. A limitation is that the flexible Teaching Interaction procedure may be difficult to replicate and may take a great deal of staff expertise to carry out effectively.

The Teaching Interaction procedure contains a number of strategies that promotes generalization as suggested by Stokes and Bear (1977). First, it enables the teacher to introduce natural maintaining contingencies by providing the rationale. Second, the teacher can provide multiple exemplars of both discriminative stimuli to engage in the target skills and responses during the role plays. Finally, the Teaching Interaction procedure, especially in a group setting, enables a teacher to incorporate common stimuli from the naturalistic setting. Common stimuli such as play materials and activities that the student encounter frequently in the naturalistic setting can be readily provided during demonstration and role play. The presence of peers during the teaching session, including practicing the skills with peers during role play, is an advantage of the group Teaching Interaction procedure.

A review of the Teaching Interaction research, indicates that there are several procedures to promote generalization of learned social skills to the naturalistic environment. First, it may be important to increase the opportunities for the participant to engage in the learned skills in the naturalistic setting. Utilizing in situ training (Miltenberger et al., 1999) is one way to accomplish the purpose. Alternatively, priming the student before the session can enhance the opportunities to demonstrate the learned skills, so that he or she would not fail to identify the discriminative stimuli (i.e., peer's behavior) to engage in the learned skills. Second, even though the student is able to demonstrate the learned skills, they may not encounter natural contingency that is frequent enough to maintain the behavior. Normally, reinforcement is on a variable schedule in the naturalistic environment, which means that naturally occurring consequences vary from situation to situation. Often, naturally occurring contingency may not resemble the rationale that is described in the Teaching Interaction procedure. Thus, additional positive reinforcement may be necessary to maintain the learned behavior in the natural environment. Finally, it is important to program systematic fading of the prompting and reinforcement procedure. Programming the fading includes planning the phases that gradually reduce prompting and external reinforcement, and setting the mastery and descending criterion to transition between phases.

The purpose of current study was to teach social skills to students with ASD utilizing the group Teaching Interaction procedure (Leaf et al., 2010) in a school setting. A programmed generalization procedure (Kassardjian et al., 2013) was used to promote generalization of the learned skills in naturalistic environment. The degree of generalization of the skills and the maintenance in naturalistic environment was investigated.

Chapter II: Method

Participants and Setting

Four participants were recruited for the current study. Three boys—Barry, Dennis, and James, and one girl—Kacey, participated in the study. Three participants (Barry, Dennis, and Kacey) were 14-years-old, and one participant (James) was 12-years-old. All the participants were diagnosed with ASD and were able to communicate in full sentences, could understand and answer both close-ended and open-ended questions, and did not have immediate history of severe disruptive behavior (i.e., self-injurious behavior, aggression, or tantrum). All the participants attended a classroom for high-functioning students which consisted of a total of six students with ASD and one student with Attention Deficit/Hyperactive Disorder (ADHD).

Participants were relocated to a training room for group teaching interaction training sessions. Each training session lasted approximately 30 minutes. Teaching sessions were conducted once a day, Monday through Friday. Baseline, training, and maintenance probes were conducted in the training room. Generalization probes were conducted in the regular classroom. The training room was 8 m x 10 m, consisted of four tables, eight chairs, a white board, stationary needed for academic activities, and toys including back-up reinforcers for participants. Toys from the participants' regular classroom were brought to the training room for inviting peers to play.

Social Skills to be Targeted

Target social skills for the participants were determined by conducting observations and through parental interviews. The three social skills trained included inviting a peer to play, offering help to a peer, and giving compliments. The target skills were broken down into smaller steps. Task analysis of the target skill is described in Table 1 (see Appendix).

Dependent Variables

The dependent variable was the percentage of steps of the social skill that the participant correctly displayed. The dependent variable was measured during videotaped probes.

Baseline Probes

Baseline probes were used to assess the performance level of the participants before the training began. The experimenter engaged in the behavior that set the occasion for the target social skill (e.g., SD for target skill) without any description, demonstration or role play during the probe. There were no programmed consequences provided. There was one baseline probe for each social skill per session.

Teaching Probes

Teaching probes were conducted to assess progress of the participants as a part of the teaching interaction procedure. During the fourth component of the teaching interaction procedure, the participants were requested to perform the target skills in role play. The social praise and (reinforcement) or corrective feedback were provided by the teacher after the role play. The first performance during the role play was scored as the probe. The mastery criterion was set at 100% of correct steps performed by the participant for the target skills across three consecutive days. There was one performance probe for each social skill per session.

Generalization Probes

Generalization probes were conducted to assess the participant's performance with peers in natural settings. The experimenter set up the situation for the participant to engage in the target skills while they were engaging in activities with peers. Generalization probes were

conducted during training, generalization, and maintenance phase. There was one generalization trial for each social skill trained per session.

Maintenance Probes

Maintenance probes were conducted in the same fashion as baseline probes.

Reliability

All probe sessions were videotaped. The second independent observer scored the percentage of correct steps displayed by reviewing the video footage. The second observer was trained with the description of the target skills, teaching interaction procedure, use of data sheet, and data taking by observing the experimenter demonstrating the target skills. Interobserver agreement was calculated for at least 30% of probe sessions during baseline, training, generalization, and maintenance phase. Interobserver agreement was calculated by the number of the steps that two observers agreed on divided by the total number of agreements and disagreements multiplied by 100.

Interobserver agreements for baseline probes were 100%, 94.74% (range 90 to 100%), and 95.97% (range 87.5 to 97.22%) for inviting a peer to play, offering help to a peer, and giving compliments, respectively. Interobserver agreements for performance probes were 93.75% (range 89.29 to 96.25%), 98.54% (range 95.83 to 100%), and 97.64% (range 94.44 to 100%) for inviting a peer to play, offering help to a peer, and giving compliments, respectively. For generalization probes, interobserver agreements were 99.22% (range 96.87 to 100%), 98.61% (range 97.22 to 100%), and 96.43% (range 92.86 to 100%) for inviting a peer to play, offering help to a peer, and giving compliments, respectively. For maintenance probes, interobserver agreements were 93.75% (range 75 to 100%), 100%, and 93.75% (range 75 to 100%) for inviting a peer to play, offering help to a peer, and giving compliments, respectively.

Preference Assessment

Multiple stimulus preference assessment without replacement (DeLeon & Iwata, 1996) was conducted prior to the research for each participant. Those potential reinforcers determined by the preference assessment were used for back-up reinforcers for the token system during training sessions and generalization phases.

Procedure

Baseline

Baseline sessions were conducted prior to any teaching of the target skills. During baseline, the participants were requested to meet the experimenter for the training sessions but they were allowed to engage in free-play activities. The experimenter pulled out a participant from the free-play activities and conducted baseline probes. The experimenter engaged in a behavior that set the occasion for the participant to display targeted skills during the probe. There was no programmed consequence or feedback for the performance during the baseline probe. After the baseline probe, the participant was allowed to go back to free-play activities. The baseline session was conducted until a stable level of performance was obtained for the target skill.

Teaching Interaction

Teaching phase followed baseline phase. Teaching interaction procedure was similar to the procedure utilized in Leaf et al. (2010).

A token was given to the participant when she or he independently responded correctly to the questions during description, rationale, and demonstration components. Only social praise was provided when the participant responded correctly with prompting. The participant was also provided a token when she or he demonstrates the correct response for all the steps of the target skill independently during the role play. The participants exchanged

the tokens for back-up reinforcers at the end of the training session. The participants were able to receive a reinforcer depending on the number of tokens that she or he earned during the training sessions or generalization phases. Specifically, the participants were able to exchange a reinforcer which was higher in preference with more tokens.

A flexible prompting approach (Soluaga, Leaf, Taubman, McEachin, & Leaf, 2008) was utilized if the participant responded incorrectly. Various forms of prompting were used: participant restated the correct response after another participant was asked to answer the question, the teacher restated the correct response before asking the participant, or the teacher changed to a question that increased the likelihood of a correct response by the participant.

Description and Rationale

The first step in the teaching interaction procedure was the teacher stating which behavior the participant will learn in the session (e.g., “Today, we are going to talk about giving a compliment”). The participant was asked which target skill will be worked on. In the second step, the teacher provided the rationale for why it is important to engage in the behavior (e.g., “By giving a compliment, you can make your friend happy.”). The participant was asked to provide a rationale for engaging in the behavior to be taught. As the third step, the teacher described the specific steps to engage in the behavior. The participant was asked to describe each step. Mastery criterion for answering questions about descriptions of each step and rationale was the participant displaying the correct response for 100% for three consecutive training sessions. Once all the participants reached the mastery criterion for description and rationale, these components were omitted from the next training session.

Demonstration

Teacher demonstrated the behavior for the participant. Another teacher or participant engaged in the behavior that would occasion the social skill to be taught (e.g., SD for target

skill). The teacher either demonstrated the social skill appropriately or performed the skill with an incorrect response within the steps. After the demonstration, the participant was asked to evaluate how the teacher had performed. If the teacher demonstrated the skill incompletely, then the participant was asked to identify which step was not included in the demonstration. Then the teacher demonstrated the correct form of the skill.

Role Play and Feedback

Following the demonstration phase, the participant practiced the social skill in the role plays. The teacher engaged in the behavior that set the occasion for the social skill being taught. The teacher gave a token and social praise if the participant performed the skill correctly. The teacher provided corrective feedback if the participant incorrectly performed the skill. First, the teacher gave social praise for the components that the participant performed correctly. Then, the teacher gave specific suggestions for the component that the participant performed incorrectly. Finally, the participant was requested to practice the skill once again in the role play. The participants were asked to practice the targeted skills during role play until all participants demonstrated correct responses for all steps or the end of the teaching session. Mastery criterion was set as the participant displaying the correct response for 100% for three consecutive training sessions. Once all of the participants in the group reached mastery criterion, a new target social skill was introduced. The data of Dennis were excluded from the group mastery criteria since his performance was not showing improvement by the group Teaching Interaction procedure.

Generalization

The generalization procedure utilized in Kassardjian et al. (2013) was replicated. The procedure was explicitly implemented after all the participants reached the mastery criterion

on the teaching probes. The mastery criteria for the participant to move on to each generalization phase was set at achieving three consecutive probes at 80%.

During the generalization phases, the same token was given by the classroom teachers to the participant if she or he displayed all correct steps for the target social skills. The participants exchanged the tokens for back-up reinforcers, once before the lunch, and once at the end of the school schedule.

Generalization Phase 1 (priming, tangible reinforcement, and social praise). The participant was primed with information that there may be occasions to perform trained social skills and reminded to utilize the skill. Tangible reinforcement and social praise was provided by the teacher contingent on correct response to generalization probes.

Generalization Phase 2 (tangible reinforcement and social praise). The participant did not receive priming but received a token and social praise following the correct response during this phase.

Generalization Phase 3 (social praise). The participant only received social praise following correct response during this phase.

Generalization Phase 4. The generalization procedure was faded completely during this phase. The participant did not receive priming, (reinforcement), or social praise following correct response.

Maintenance

Data was collected one month after the participants achieved mastery criterion for the fourth generalization phase.

Treatment Fidelity

The second observer scored whether the experimenter demonstrated the planned experimenter behaviors in vivo or using the video footage during the Teaching Interaction

procedure. The fidelity check occurred for at least 30% of sessions per skill. Planned experimenter behaviors during the Teaching Interaction procedure were (a) labeling the target social skills to be taught, (b) providing a meaningful rationale for the participants to engage in the correct behavior, (c) identify when the participant would engage in the target social skill, (d) describing the specific steps of the target social skill, (e) experimenter demonstrating all the steps of the target social skill correctly, (f) request the participants to role-play the target social skill, (g) experimenter provides external consequences for both correctly answering questions and correctly performing role play throughout the entire teaching procedure, (h) experimenter provides step-specific feedback when the participant performed role play incorrectly. Table 2 provides the operational definitions for each component (see Appendix).

Although the teaching interaction procedure always consists of a six-step procedure, the components of the procedure may have been omitted based on participants' performance as noted. Rationale was provided 53%, 71%, and 100% of scored teaching sessions for inviting a peer to play, offering a help to a peer, and giving compliments, respectively. Description of when to engage in the target skill occurred 47%, 59%, and 71% for inviting a peer to play, offering help to a peer, and giving compliments, respectively. Description of the specific steps occurred 26%, 59%, and 64% for inviting a peer to play, offering help to a peer, and giving compliments, respectively. Demonstration of the specific skill occurred 26%, 53%, and 64% for inviting a peer to play, offering help to a peer, and giving compliments, respectively. Labeling the specific skill, requesting the participant to perform in the role play, providing external consequence for correctly answering questions and answers, and providing step-specific feedback occurred 100% for all the target skills.

Experimental Design

A multiple baseline across target skills with generalization probes was used in this study. The study consisted of four conditions (i.e. baseline, intervention, generalization, and maintenance conditions). The generalization probes were carried out throughout all phases.

Chapter III: Results

Skill Acquisition

Figures 1 through 4 (see Appendix) display the performance of each participant on target social skills for baseline, performance, generalization, and maintenance probes. Solid circle represents the participants' performance in baseline, performance, and maintenance probes during training sessions. Open diamond represents the participants' performance in generalization probes in a naturalistic setting. Figure 5 (see Appendix) represents the group average of correct steps during baseline and intervention phase. Figure 6 (see Appendix) represents the group average of correct steps excluding the data of Dennis. The average correct percentages of correct steps for each condition is displayed on Table 3 (see Appendix).

During the baseline, Barry could independently perform an average of 16.67% (range 0 to 25%) for inviting a peer to play, 0% for offering help to a peer, and 26.39% (range 0 to 100%) for giving compliments. During the intervention phase, Barry performed independently an average of 97.55% (range 75 to 100%) for inviting a peer to play, 97.67% (range 75 to 100%) for offering help to a peer, and 85.42% (range 50 to 100%) for giving compliments. During the maintenance probes at two and four weeks after the intervention was terminated, Barry performed correct steps for an average of 75%, 62.5% (range 50 to 75%), and 87.5% (range 75 to 100%) for inviting a peer to play, offering help to a peer, and giving compliments, respectively.

Generalization probes for Barry displays that he performed inviting a peer to play correctly for 0% during intervention phase, and an average of 34.72% (range 0 to 100%) during Phase 1. For offering help to a peer, Barry performed correctly 0% during intervention phase, and 0% during Phase 1. For giving compliments, Barry performed correctly an

average of 60% during intervention phase, and an average of 84.09% (range 0 to 100%) during Phase 1, and 100% for one generalization probe for Phase 2. Maintenance probes at two and four weeks after the termination of training sessions demonstrated that Barry performed correct steps for an average of 0%, 0%, and 87.5% (range 75 to 100%) for inviting a peer to play, offering help to a peer, and giving compliments, respectively.

Baseline probes for Dennis showed that he was able to perform correctly an average of 8.33% (range 0 to 25%) for inviting a peer to play, an average of 9.09% (range 0 to 75%) for offering help to a peer (range 0 to 75%), and an average of 27.78% (range 25 to 50%) for giving compliments. During the intervention phase, Dennis performed an average of 68.60% (range 0 to 100%) for inviting a peer to play, an average of 7.86% (range 0 to 50%) for offering help to a peer, and an average of 61.61% (range 25 to 100%) for giving compliments.

During intervention phase, generalization probes showed that Dennis performed correctly for 0% for inviting a peer to play, 0% for offering help to a peer, and 0% for giving compliments. During Generalization Phase 1, Dennis performed an average of 11.67% (range 0 to 50%) for inviting a peer to play, an average of 1.92% (range 0 to 25%) for offering help to a peer, and an average of 50% (range 0 to 100%) for giving compliments. During maintenance probes at two and four weeks after the intervention was terminated, Dennis performed an average of 62.5% (range 25 to 100%), 0%, and 75% for inviting a peer to play, offering help to a peer, and giving compliments, respectively.

During baseline, James performed correctly for an average of 16.67% (range 0 to 25%) for inviting a peer to play, an average of 47.73% (range 0 to 75%) for offering help to a peer, and an average of 69.44% (range 25 to 75%) for giving compliments. During intervention, James independently performed an average of 99.54% (range 75 to 100%) for

inviting a peer to play, an average of 98.94% (range 75 to 100%) for offering help to a peer, and an average of 99.38% (range 75 to 100%) for giving compliments. During the maintenance probes at two weeks and four weeks after the intervention was terminated, James performed correct steps for 100% for all the target social skills.

For inviting a peer to play, generalization probes for James during intervention phase showed that he performed correctly 0% for intervention phase, an average of 85% (range 25 to 100%) during Phase 1, 100% during Phase 2, 100% during Phase 3, and 100% for Phase 4. For offering help to a peer, James performed correctly 0% during intervention phase, an average of 50% (range 0 to 100%) during Phase 1, 100% for Phase 2, an average of 80% (range 0 to 100%) during Phase 3, and 100% for Phase 4. The generalization probes during the maintenance phase showed that James performed correct steps for 100% for all the target social skills.

Baseline probes for Kacey showed that she was able to perform independently an average of 8.33% (range 0 to 25%) for inviting a peer to play, 0% for offering help to a peer, and an average of 31.94% (range 25 to 50%) for giving compliments. During intervention phase, performance probes for Kacey showed that she performed correctly an average of 98.18% (range 50 to 100%) for inviting a peer to play, an average of 98.40% (range 50 to 100%) for offering help to a peer, and an average of 89.38% (range 25 to 100%) for giving compliments. During the maintenance probes at two weeks and four weeks after the intervention was terminated, Kacey performed correct steps for 100% for all the target social skills.

During generalization probes for inviting a peer to play, Kacey performed correctly 0% during intervention phase, an average of 40.38% (range 0 to 100%) during Phase 1, 100% during Phase 2, 100% during Phase 3, and 100% for Phase 4. For offering help to a peer,

Kacey performed correctly 0% during intervention phase, an average of 37.5% (range 0 to 100%) during Phase 1, an average of 75% (range 0 to 100%) for Phase 2, 100% for Phase 3, and 100% for Phase 4. For giving compliments, Kacey performed correctly an average of 55% (range 0 to 100%) during intervention phase, 100% for Phase 1, an average of 91.67% (range 50 to 100%) for Phase 2, 100% for Phase 3, and 100% for Phase 4. During the maintenance phase, Kacey's performance in generalization probes showed that she demonstrated correct steps for 100% for all the target social skills.

In summary, James and Kacey reached mastery criterion on the performance probes and for generalization phases for all three target skills. Both James and Kacey maintained the skill at two and four weeks after the termination of the training session. Barry reached mastery criterion on the performance probes for all three target skills, but reached mastery criterion only for the first generalization phase of giving compliments. Sessions ended for Barry when James and Kacey reached mastery criterion for the last generalization phase. Barry's target social skills were partially maintained after the termination of the training session and the generalization procedure. Dennis reached mastery criterion on the performance probes for one out of three target skills. Training sessions for Dennis was terminated since the group Teaching Interaction procedure had no or few effects on his performance. After the termination of the training session, Dennis was included in the regular classroom lessons. His maintenance probes displayed that the target social skills were partially maintained after the termination of the training sessions.

Chapter V: Discussion

The purpose of current study was to teach three social skills to students with ASD utilizing the Teaching Interaction procedure in a group setting. Results demonstrated the Teaching Interaction procedure implemented in the group setting was effective in teaching social skills to three out of four participants with ASD. Furthermore, the programmed generalization procedure promoted the generalization of all three social skills from the training setting to a naturalistic setting for two out of three participants who reached mastery criterion during teaching sessions. Those participants also maintained the target social skills after the training sessions and generalization procedure were terminated. The results of those two participants were consistent with the findings of Kassardjian et al. (2013). The findings of the current study extend the research on the Teaching Interaction procedure. First, it provides further empirical support for effectiveness of the procedure in a school setting. Furthermore, the generalization of the target skills to a naturalistic setting was achieved for two participants and the generalization procedure was successfully faded.

The Group Teaching Interaction procedure has been evaluated and has consistently demonstrates its effects on improving social skills (Dotson et al., 2010; Leaf et al., 2010). There are a number of reasons why the group Teaching Interaction procedure is recommended to teach social skills. First, the use of the procedure in a group setting is more efficient than the one-on-one setting by teaching multiple students at the same time. Second, the procedure creates opportunities for group learning skills such as attending to a teacher in a group, responding to peers, and observational learning (Ledford, Gast, Luscre, & Ayres, 2007). Lastly, the students in the Group Teaching Interaction procedure engage in interaction with peers, thus it promotes the generalization of trained skills. For example, a student can practice the skill with another student in role play or evaluate another student's performance.

Despite the positive aspects of the Group Teaching Interaction procedure, there are some disadvantages. One of the disadvantages is that the progress of the improvement can be different from student to student, thus the procedure could take longer for some students in the group to reach mastery criterion while others could progress faster and might be held back by group instruction. Also, the rationale cannot be tailored for each student and it may not motivate all the students to engage in the target social skills.

In this study, the results demonstrated mixed outcomes for two participants. One participant (Dennis) did not show immediate or any improvement of the target skills during the Teaching Interaction procedure. As it was noted in the previous studies (i.e., Leaf et al., 2010), the Teaching Interaction procedure was implemented with participants with relatively high functioning. It is possible that Dennis did not possess prerequisite skills for the Teaching Interaction procedure. Ng, Schulze, Rudrud, and Leaf (2016) evaluated the modified Teaching Interaction procedure to teach social skills to students with ASD who had moderate functioning level. Perhaps the performance by Dennis might have improved if a similar modified procedure had been used instead of the traditional Teaching Interaction procedure. Also, it is unclear which skill is necessary for effectiveness of the Teaching Interaction procedure in the current study. A component analysis is warranted to determine which skill is necessary for the Teaching Interaction procedure to be effective.

The programmed generalization procedure was not effective to transfer the target skills to the naturalistic setting for one participant (Barry). There are a few possibilities why the generalization procedure did not work. First, the rationale provided during the Teaching Interaction procedure might not have been relevant for Barry. Second, the discriminative stimuli were not salient enough to occasion the target skills in the naturalistic setting. It is possible that more fine discrimination training of when to engage in the target behavior was

required for Barry to promote generalization. Lastly, the interval between the priming and the occasions to perform the target skill may have been too long. In the current study, the priming was not specified and mostly occurred at the beginning of school and the end of the training sessions. Therefore, it is possible that priming was not soon or frequent enough for Barry to engage in the target behavior in the naturalistic setting.

There are additional limitations in the current study that need to be addressed. First, the Teaching Interaction procedure consists of multiple components. It is unclear which components of the procedure are needed to produce behavior change. Second, it did not include maintenance probes across an extensive period. It is unclear that improvement will be maintained after several months without intervention. Lastly, this study did not include generalization probes outside of the school setting. It is unclear whether participants displayed the target social skills in other naturalistic settings, such as at their home or in the playground.

This study utilized a group Teaching Interaction procedure, even though the Teaching Interaction procedure is typically used in one-on-one instruction format in clinical settings (Leaf et al., 2010). Future research could compare the total time by the students to reach mastery criterion using individual versus group Teaching Interaction procedure. Future research could also include a social validity measure to evaluate if the teachers are satisfied with the group Teaching Interaction procedure.

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Appendix

Table 1

Examples of Task Analysis of Target Skills

The Skill	Step 1	Step 2	Step 3	Step 4
Inviting a peer to play	Participant turns his/her face towards the peer/adult who is sitting/standing close by (within 2m away)	Participant states the peer's/adult's name	Participant makes an appropriate invitation ("do you want to play?") to peer/adult to join the game	If peer/adult say yes, participant make a statement about the game when the peer/adult starts playing (e.g. "It's your turn"). If peer/adult says no, participant says "it's okay" and goes back to the play.
Offering help to a peer	Participant stands hand length away (within 1 meter) to the peer who is on the task	Participant states the name of the peer	Participant verbally offers help appropriately (e.g. "do you need some help?")	If the peer/adult says yes, the participant engages in the task with peer/adult. If peer/adult says no, the participant says "okay" and walks away.
Giving compliments	Participant faces the peer/adult who is showing off the work with at least 2s	Participant says general compliment (e.g. that's cool, nice work)	Participant says specific compliment (e.g. I like the car you draw) about the situation.	Participant speaks in positive tone of voice (e.g. not monotonic, mumbling, or shouting) throughout.

Table 2

Operational Definitions for Treatment Fidelity

Steps	Description	Operational Definitions
a	Labeling the target social skills to be taught	Experimenter saying the specific sentence, which describes the target social skill to the students.
b	Providing a meaningful rationale for the participants to engage in the correct behavior	Experimenter stating the specific sentence that describes the correct rationale.
c	Identify when the participant would engage in the target social skill	Experimenter stating the specific sentence that describes the correct situations to engage in the target social skill.
d	Describing the specific steps of the target social skill	Experimenter stating each of the steps in the target social skill in correct sequence
e	Experimenter demonstrating all the steps of the target social skill correctly.	Experimenter performs every correct step of the target social skill described during the description component.
f	Request the participants to role play the target social skill.	Experimenter asks each of the participants in the group to perform the target social skills demonstrated in front of the group.
g	Experimenter provides external consequences for both correctly answering questions and correctly performing role play throughout the entire teaching procedure.	Experimenter gives the participant a token every time she or he responds correctly when asked to (a) label the target social skills; (b) state the rationale, (c) state when she or he should display the target social skill; (d) describe the specific steps of the target social skills; (e) perform the target social skill during role play.

Table 3

Mean Percentage Correct Responding Across Conditions and Probes

Participant	Baseline	Teaching Interaction	Generalization				Maintenance
			Phase 1	Phase 2	Phase 3	Phase 4	
Barry							
Invite peer	16.67	97.55	34.72	-	-	-	75
Help peer	0	97.67	0	-	-	-	62.5
Compliments	26.39	85.42	84.09	100	-	-	87.5
Dennis							
Invite peer	8.33	68.60	11.67	-	-	-	62.50
Help peer	9.09	8.09	1.92	-	-	-	0
Compliments	27.78	61.11	50	-	-	-	75
James							
Invite peer	16.67	99.55	85	100	100	100	100
Help peer	47.72	98.93	50	100	80	100	100
Compliments	69.44	99.38	100	100	100	100	100
Kacey							
Invite peer	8.33	98.18	40.38	100	100	100	100
Help peer	0	98.40	37.50	100	100	100	100
Compliments	31.94	89.38	100	100	100	100	100

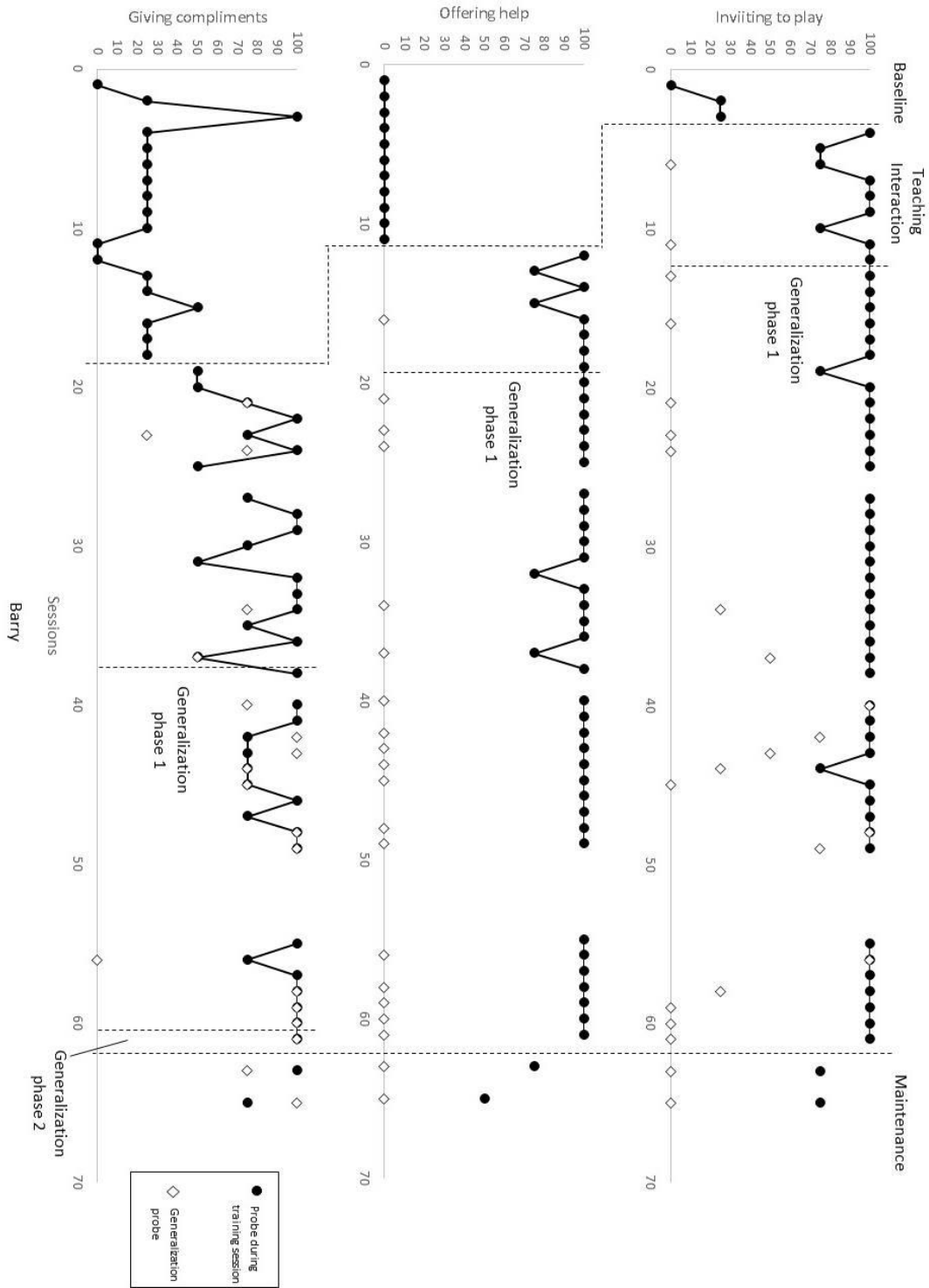


Figure 1. Barry. Percentage of Steps Performed Correctly on Baseline, Teaching, Generalization, and Maintenance Probes

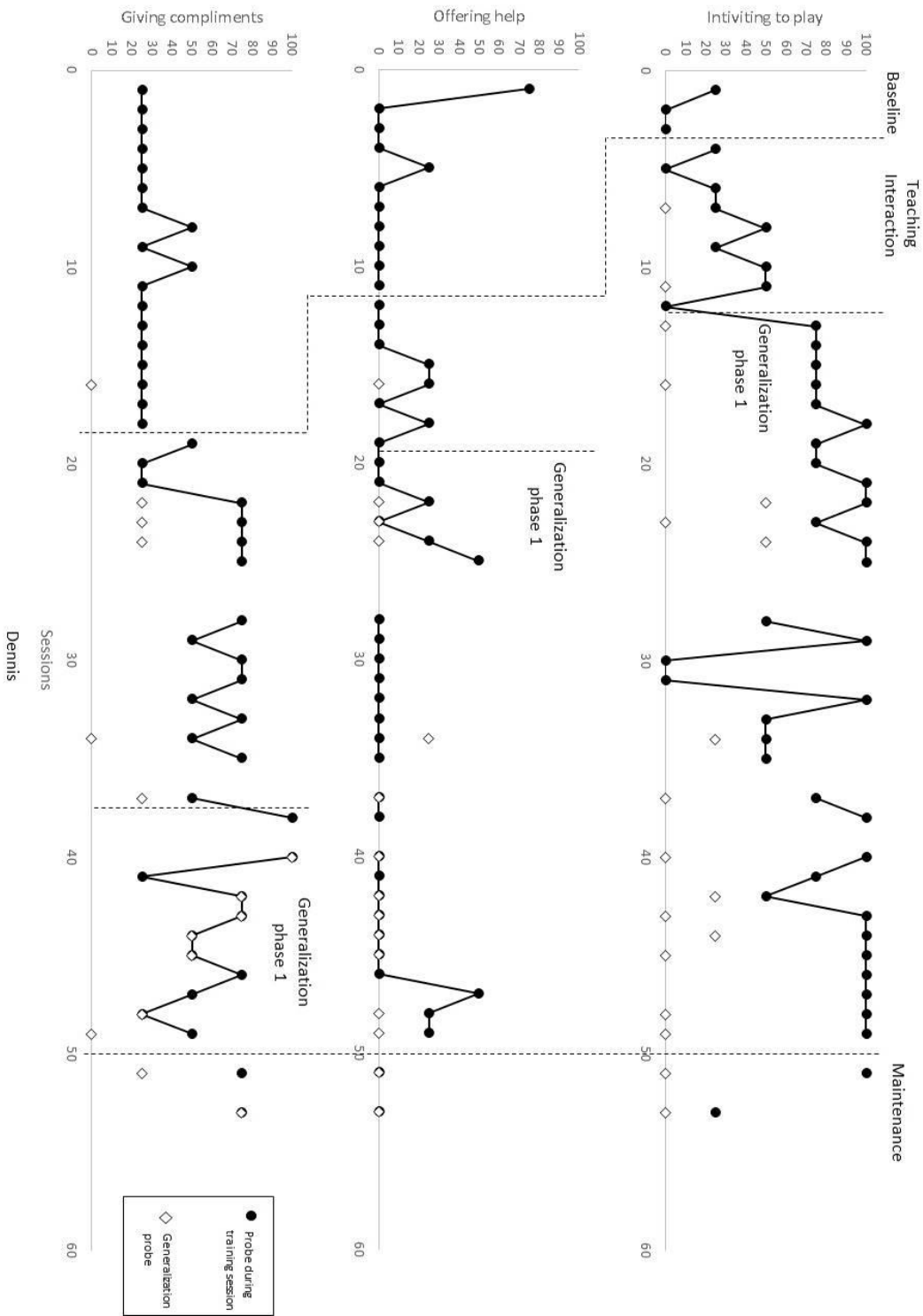


Figure 2. Dennis. Percentage of Steps Performed Correctly on Baseline, Teaching, Generalization, and Maintenance Probes

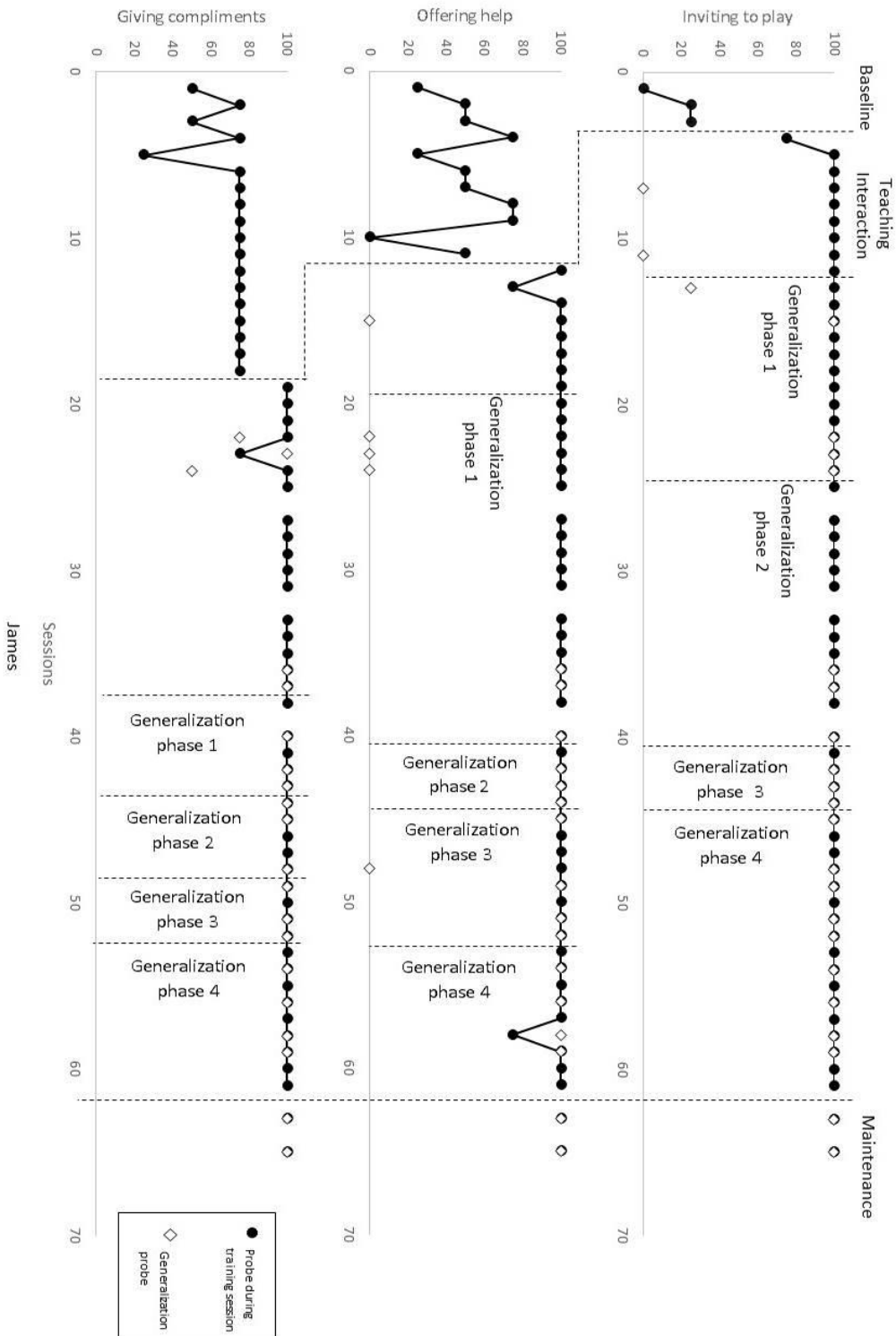


Figure 3. James. Percentage of Steps Performed Correctly on Baseline, Teaching, Generalization, and Maintenance Probes

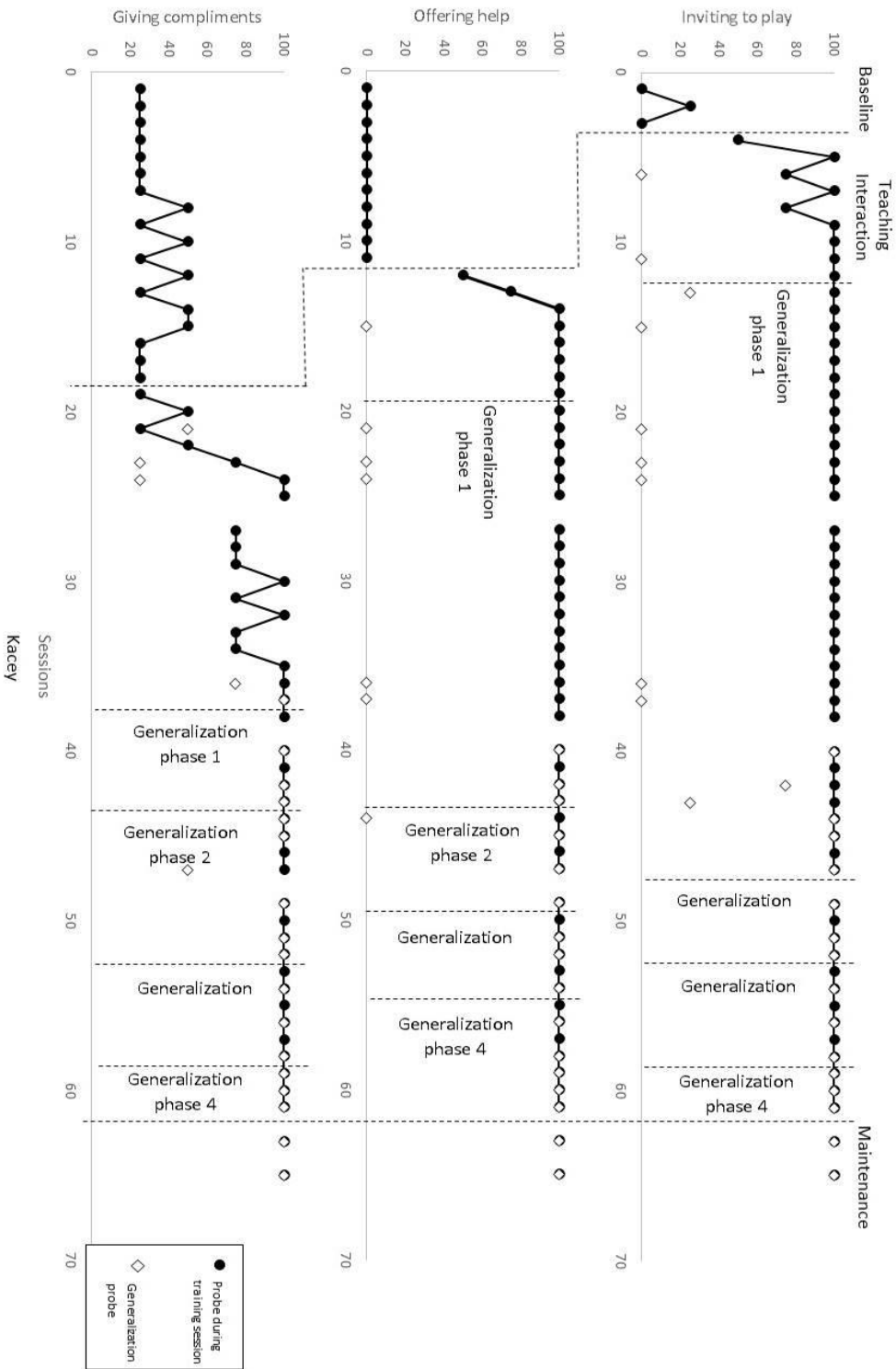


Figure 4. Kacey. Percentage of steps performed Correctly on Baseline, Teaching, Generalization, and Maintenance Probes

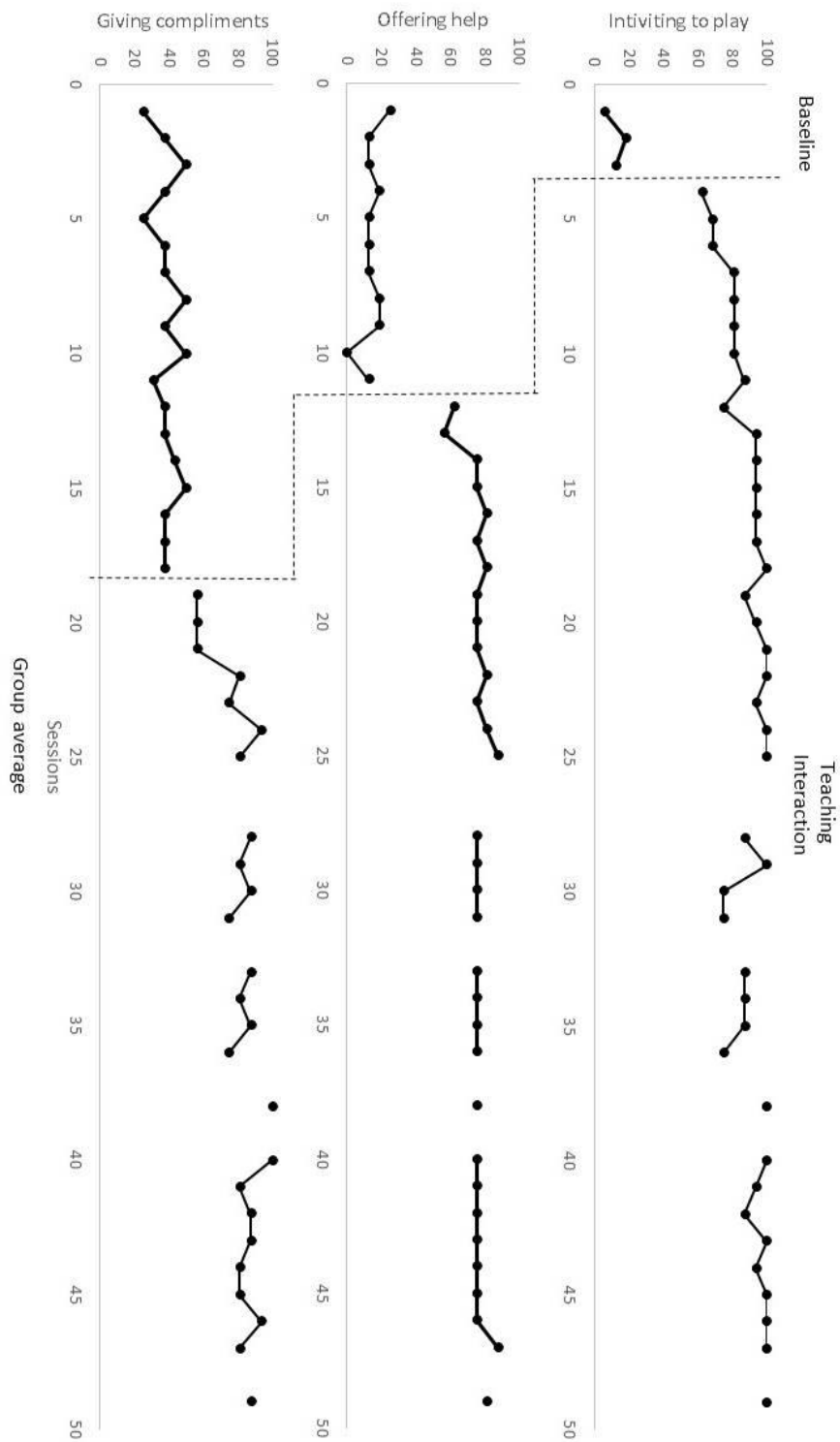


Figure 5. Group Average of Correct Steps during Baseline and Intervention Phase

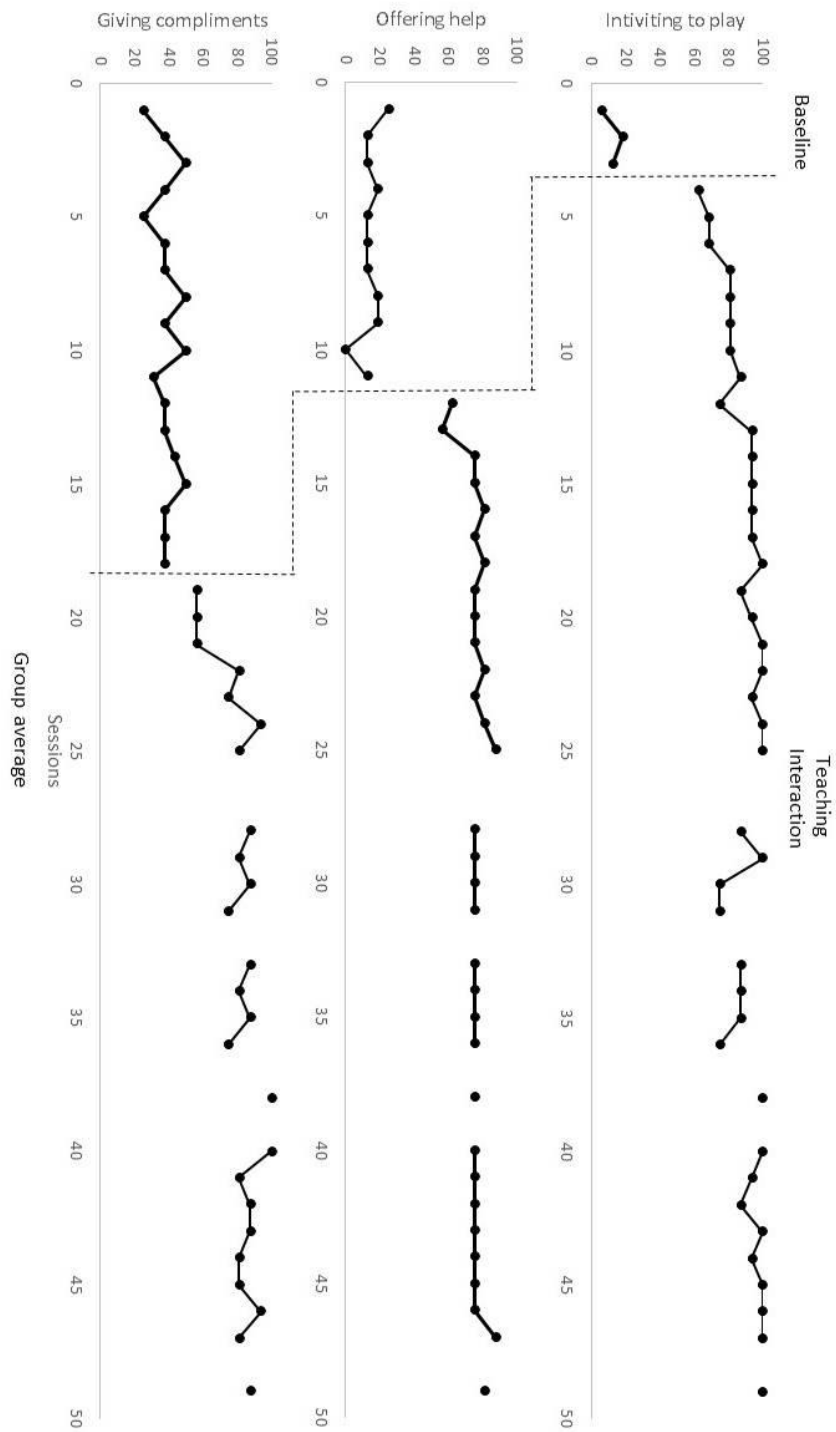


Figure 6. Group Average of Correct Steps for Barry, James, and Kacey During Baseline and Intervention Phase