

12-2016

Teaching Joint Attention and Social Communication Using the Cool Versus Not Cool in a Large Group Setting

Christine Milne

St. Cloud State University, christine.m.milne@gmail.com

Follow this and additional works at: https://repository.stcloudstate.edu/cpcf_etds



Part of the [Applied Behavior Analysis Commons](#)

Recommended Citation

Milne, Christine, "Teaching Joint Attention and Social Communication Using the Cool Versus Not Cool in a Large Group Setting" (2016). *Culminating Projects in Community Psychology, Counseling and Family Therapy*. 33.
https://repository.stcloudstate.edu/cpcf_etds/33

This Thesis is brought to you for free and open access by the Department of Community Psychology, Counseling and Family Therapy at theRepository at St. Cloud State. It has been accepted for inclusion in Culminating Projects in Community Psychology, Counseling and Family Therapy by an authorized administrator of theRepository at St. Cloud State. For more information, please contact rswexelbaum@stcloudstate.edu.

**Teaching Joint Attention and Social Communication Using the Cool Versus Not
Cool in a Large Group Setting**

by

Christine Milne

A Thesis

Submitted to the Graduate Faculty of

St. Cloud State University

in Partial Fulfillment of the Requirements

for the Degree of

Master of Science

in Applied Behavior Analysis

December, 2016

Thesis Committee:
Eric Rudrud, Chairperson
Justin Leaf
Kimberly Schulze

Abstract

This study evaluated the implementation of the cool versus not cool procedure to teach sixteen children all diagnosed with autism spectrum disorder how to initiate or respond to bids for joint attention and how to increase social communication to their peers. The cool versus not cool procedure consisted of the teacher modeling the targeted social behaviors both the cool (i.e., appropriate) and not cool (i.e., inappropriate) way, having the participants discriminate if the model was cool or not cool, having the participants state reasons why the model was cool or not cool, and having the participants role-play the targeted social behavior. All instruction was provided in a group instructional format. Using a non-concurrent multiple baseline design across skills and participants the results showed that the cool versus not cool procedure was successful in most of the participants acquiring the two social behaviors and maintaining these behaviors after intervention had concluded.

Keywords: cool versus not cool; discrimination; joint attention; modeling; role-playing; social communication

Table of Contents

	Page
List of Tables	5
List of Figures	6
Chapter	
I. Introduction and Review of Literature.....	7
II. Method	12
Participants.....	12
Setting	14
Targeted Social Skills	14
Dependent Measures, Naturalistic Probes, and Mastery Criterion	15
Social Validity	19
Reinforcement System	19
Interobserver Agreement and Treatment Fidelity.....	19
Experimental Design.....	20
III. Results.....	22
Alexander and Andy	22
Dane, Joseph, and Hailey.....	24
Cindy, Gabe, Eddie, and John.....	26
Sal, Ryan, Cody, and Jordan.....	28
George, Ben, and Jason.....	30
Social Validity	32

	4
IV. Discussion.....	33
References.....	36

List of Tables

Table	Page
1. Participant Demographics.....	13
2. Social Validity	32

List of Figures

Figure	Page
1. Results for Alexander and Andy.....	23
2. Results for Dane, Joseph, and Hailey	25
3. Results for Cindy, Gabe, Eddie, and John.....	27
4. Results for Sal, Ryan, Body, and Jordan	29
5. Results for George, Ben, and Jason	31

Chapter I: Introduction and Review of Literature

Individuals diagnosed with Autism Spectrum Disorder (ASD) often display social skill deficits including, but not limited to, joint attention and social communication (Mundy & Acra, 2006). Joint attention has been defined as two individuals sharing attention on a singular activity or antecedent event (Mundy, Sigman, & Kasari, 1994; Pollard, Betz, & Higbee, 2012). For example, as a mother and child are walking outside and a plane flies by, the child points to the plane and looks at his mother while saying, “Look at the plane.” Joint attention is considered a pivotal skill for social development because joint attention can lead to changes in a variety of additional social and language skills (Mundy & Crowson, 1997).

Joint attention is usually separated into two categories. First, the person *initiating* joint attention between another person and an object or event (Jones & Carr, 2004). Second, the individual *responding* to another person’s initiation of joint attention (Jones & Carr, 2004). Deficits in joint attention can be detected with children at a young age by assessing gaze shifting or gesturing to initiate interest between a person and an object or event (Charman et al., 1997). Compared to typically developing children, children diagnosed with ASD are less likely to respond to or initiate joint attention bids, as well as engage in gaze shifting from a familiar adult to an object or event (Charman et al., 1997; MacDonald et al., 2006).

Although joint attention is a pivotal skill and a common deficit for many individuals diagnosed with ASD, research evaluating behavior analytic approaches to improve joint attention remains limited (White et al., 2011). In one of the few examples, Taylor and Hoch (2008) used least-to-most prompting and social reinforcement to increase responsiveness to joint attention bids for three children diagnosed with ASD. The researchers evaluated the three participants initiating joint attention to unusual events occurring in the environment (e.g., a doll hanging from

the ceiling). The authors implemented a least-to-most prompting system using physical and gestural prompts combined with reinforcement to improve initiation of joint attention. The results of a multiple baseline design showed that while there was an increase looking at the event and commenting, variability was observed in shifting gaze back to the adult.

In a more recent study, Jones and Feely (2009) used discrete trial instructions and pivotal response training to increase joint attention to toys that made noises or that lit up for three individuals diagnosed with ASD. Parents of the participants served as the interventionists throughout the study. Prior to intervention, all participants engaged in low levels of responding to and initiating joint attention bids. Following the intervention, improvements were observed on the bids and response of joint attention displayed by each of the participants. Furthermore, the skills were demonstrated to novel toys.

In another example, Pollard et al. (2012) used script fading to teach joint attention skills with three individuals diagnosed with ASD. The script fading procedure consisted of a printed script of what the participants should say which was gradually faded across the intervention. Additionally, the researchers used a most-to-least prompting system with the researcher prompting from behind. The results of a multiple baseline design indicated improvements for all the participants and the skills generalized across stimuli, people, and environments.

Another deficit commonly displayed by individuals diagnosed with ASD is social communication sometimes referred to as pragmatics (Prizant & Wetherby, 1998). Taubman, Leaf, McEachin, and Driscoll (2011) defined social communication as the

area [that] is concerned with social aspects of communication. It involves all areas of social communication-for example, verbal and nonverbal expression, what is said and how it said; direct and implied conversation; figurative and literal speech; serious, sarcastic, and humorous statements; and tone, inflection, emphasis and style. (p. 97)

Social communication skills can range from basic conversation skills to inferring from subtle social cues. Deficits in social communication can lead to stigmatizing individuals which could ultimately jeopardize peer relationships or jobs (Bishop, Bishop, & Leonard, 2000; Landa, Klin, Volkmar, & Sparrow 2000).

There have been several studies which have evaluated teaching social communication to individuals diagnosed with ASD. For instance, Aldred, Green, and Adams (2004) utilized a randomized control trial design to examine the effectiveness of psychosocial treatments to improve social communication. The study consisted of 28 young children all diagnosed with ASD; 14 of which were randomly assigned to a treatment condition and 14 of which were randomly assigned to the control condition. The authors used a psychoeducational approach which consisted of focusing the participants, decreasing intrusive demands, modeling appropriate language, establishing predictable routines, and adding variations and expansions of responses during play. Significant improvements were observed for children in the treatment group when compared to children assigned to the control condition.

In a more recent study, Ingersoll and Wainer (2013) evaluated the use of Project ImPACT for improving social communication skills for eight young children diagnosed with ASD. Parents of the eight participants served as the interventionists in the study. The researchers first worked collaboratively with the parents to determine goals. Next, Ingersoll and Wainer implemented a teaching interaction procedure (TIP) (Leaf, Townley-Cochran, Taubman et al., 2015) to train parents how to increase bids for joint attention. Results showed improvements on the parents' fidelity on components of Project ImPACT (e.g., making play interactive, pace of interactions, and increasing the complexity of initiations) and improvements in the use of spontaneous language for six of the eight participants.

One procedure that may be effective to improve upon joint attention is the cool versus not cool procedure (CNC). CNC is a discrimination program that has demonstrated effectiveness (e.g., Leaf et al., 2012; Leaf, Taubman, Leaf et al., 2015; Au et al., 2016; Leaf, Leaf, Milne, Townley-Cochran et al., 2016; Leaf, Taubman, Milne et al., 2016) teaching a wide variety of behavior ranging from language skills, social behaviors, to reducing aberrant behaviors (Taubman et al., 2011). CNC consist of (a) labeling the behavior, (b) modeling the behavior the cool way (i.e., appropriate) or not cool way (i.e., inappropriate) in a semi-random order, (c) providing the learner with opportunities to label if the model was cool or not cool and why the model was cool or not cool, (d) providing the learner with opportunities to role-play the cool way, and (e) providing reinforcement or corrective feedback based upon learner responding.

Leaf et al. (2012) were the first to empirically evaluate the CNC procedure to teach wide variety of social behaviors (e.g., changing the conversation when someone was bored, abduction avoidance, and attending) to three individuals diagnosed with ASD. The researchers began the implementation of the CNC procedure without role-playing with the participants. Following ten sessions without reaching the mastery criterion, the researchers included role-playing as part of the CNC procedure. The results showed that all participants reached the mastery criterion for 50% of all targeted skills without role-playing. With the addition of role-playing, participants master an additional 37.5% of targeted skills.

In a follow-up study, Leaf, Taubman, Leaf et al. (2015) evaluated the effectiveness of the CNC procedure to teach social interaction skills to three children diagnosed with ASD. The researchers utilized a multiple-baseline design across participants to evaluate the effects of the CNC procedure. Each participant was taught one social interaction skill (i.e., compromising, sharing, and assertiveness) taken from Taubman and colleagues' (2011) Social Taxonomy. Each

of the skills were tasked analyzed into smaller components, which the researchers measured in naturalistic probes to determine mastery. Leaf, Taubman, Leaf et al. (2015) included role-playing throughout the course of intervention. Prior to intervention, each of the participants engaged in a low number of steps correctly. Following intervention all participants reached the mastery criterion within eight sessions and the skills were maintained on 100% of opportunities during the maintenance condition.

More recently Leaf, Leaf, Milne, Townley-Cochran et al. (2016) evaluated the effectiveness of the CNC procedure, implemented in a group instructional format, to teach eight individuals diagnosed with ASD how to play three different social games (i.e., sleeping game, fruit salad, and mouse trap). Similar to Leaf, Taubman, Leaf et al. (2015), role-plays were included from the beginning of intervention. The results showed the CNC procedure was effective at teaching the participants how to play the various games within the context of a social skills group for individuals diagnosed with ASD.

Given the research demonstrating that CNC procedure as effective for improving social behavior for individuals diagnosed with ASD, that the majority of research on CNC has been conducted in a one-to-one instructional format, and the need for research continue to evaluate ways to teach joint attention and social communication using procedures under a behavioral framework the purpose of this study is to evaluate CNC implemented in a group instructional format to teach both joint attention and social communication.

Chapter II: Method

Participants

Sixteen children, each independently diagnosed with an ASD, participated in this study. Each child had to meet the following criteria to be included in this study: (a) have an independent diagnosis of an ASD confirmed by standard assessment procedures (i.e., ADOS or ADI-R); (b) be between the age of 3- to 7-years-old; (c) have standard full IQ score above 75 (d) have expressive language in the normal range as determined by the Expressive One Word Picture Vocabulary Test-Fourth Edition; (e) have receptive language in the normal range as determined by the Peabody Picture Vocabulary Test (f) have had no previous history with the CNC procedure; and (g) have parental consent.

Prior to starting the social skills group (i.e., prior to the baseline condition), a formal observation was conducted to determine if the children met the criterion described above. The formal observation consisted of talking to the children's parents, talking to the children, having a researcher and/or another child play with each child, and collecting formal assessments. For two of the children, an IQ score was not provided during the initial interview; therefore, the researchers had to decide whether to accept the two children into the group before the formal IQ score was determined. Bill was the only participant with an IQ below 75, but was included in the study because the researchers felt it would have been unethical to not allow participation within the group.

The participants were randomly assigned into one of two groups. Nine participants started in the treatment group (i.e., Group A) and seven in a waitlist control group (i.e., Group B). Table 1 provides detailed information about each of the participants in both groups.

Table 1

Participant Demographics

Participant	Age	Group	IQ	Vineland	SSIS	SSRS	Exp One Word	Peabody
Alexander	5.07	A	101	85	90	72	110	107
				Adequate	23%	Moderate	75%	68%
Gabe	5.11	A	100	75	84	70	105	94
				Mod low	13%	Moderate	63%	34%
George	4.05	A	119	77	93	73	106	102
				Mod	30%	Moderate	66%	55%
				Low				
Dane	4.11	A	107	111	82	92	117	118
				Adequate	12%	Severe	87%	88%
Sal	5.01	A	92	94	81	70	103	91
				Adequate	11%	Moderate	58%	27%
Ryan	3.06	A	110	77	81	65	110	99
				Mod low	11%	Mild	75%	47%
Joseph	3.06	A	91	77	67	73	98	100
				Mod low	3%	Moderate	45%	50%
Cindy	5.03	A	91	75	81	92	121	123
				Mod low	11%	Severe	92%	94%
Ben	5.11	A	67	68	55	98	83	78
				Low	<1%	Severe	13%	7%
Andy	5.07	B	97	132	77	70	108	99
				High	6%	Moderate	70%	47%
Jordan	5.03	B	112	65	57	82	96	105
				Low	<1%	Severe	39%	63%
John	3.06	B	105	62	63	75	107	116
				Low	2%	Moderate	68%	86%
Eddie	4.05	B	117	83	90	77	108	85
				Mod low	22%	Severe	70%	16%
Hailey	4.11	B	109	91	88	71	121	130
				Adequate	20%	Moderate	92%	98%
Jason	4.07	B	85	75	99	70	124	112
				Mod low	45%	Moderate	95%	79%
Cody	5.07	B	115	72	87	78	100	113
				Mod low	18%	severe	50%	81%

Note: Vineland Adaptive Behavior Score, Social Skills Improvement System, Social Skills Rating System, Expressive One-Word Picture Vocabulary Test, 4th Edition, Peabody Picture Vocabulary Test.

Setting

This study conducted as a component of a randomized control trial (RCT) evaluating the effectiveness of a behaviorally based social skills group, The RCT consisted of a total of 32 sessions of intervention. Sessions were conducted twice per week with each session lasting two hours. Both groups received a total of 32 sessions (i.e., 64 hours of intervention). During each session, this study was implemented taking approximately 20 minutes per session.

This study took place in a private clinic that provides behavioral intervention for children diagnosed with ASDs. Sessions were conducted in a large clinic room which was designed to resemble a kindergarten classroom. The room measured 7.6 by 10.7 m and had two connecting rooms, a toy storage closet, and a bathroom. The classroom was separated into four distinct areas: instructional, table work, open play, and imaginary play. Within the instructional area, materials included a researcher's chair, carpet for the participants to sit on, an easel used for instructional and reinforcement purposes, and a small book shelf with a variety of children books. In the table work area, materials included a kidney bean table and five to six child-sized chairs. The materials in the imaginary play area included a store and kitchen play set, small square table with four chairs, and toys such as a cash register, food, pots, pans, and other cooking materials. The open play area contained one large circular area rug. Sessions occurred within two different areas within room. Naturalistic probes (described below) occurred in the open play and instructional area, while teaching sessions only occurred in the instructional area.

Targeted Social Skills

Two social skills were targeted: joint attention and social communication. These skills were determined through direct observations prior to the study and interviews with each participant's parents. Joint attention was task analyzed into the following steps: (a) orienting

gaze toward the event (described below), (b) redirecting gaze back to any peer within the group, (c) gaining a peer's attention appropriately by tapping his/her shoulder and/or saying the peer's name, and (d) making a comment about the event. Social communication was task analyzed into the following steps: (a) moving within 2 feet of a peer, (b) looking directly at the peer, (c) making eye contact with a peer, and (d) making at least one statement to the peer. The statement could be an initiation (e.g., the participant making the first statement) or a response (i.e., the participant making a statement in response to another peer's initiation). Responses were only counted if they were on-topic with the initiation.

Dependent Measures, Naturalistic Probes, and Mastery Criterion

The main dependent variable was the percentage of steps the participants engaged in correctly during naturalistic probes. Percentages were calculated by dividing the number of steps completed correctly by the number of total steps and multiplying by 100. Naturalistic probes were opportunities the researchers arranged to set the occasion for the participant to engage in the targeted behavior. No priming, prompting, or programmed reinforcement was provided during naturalistic probes regardless of participant performance. Naturalistic probes occurred prior to teaching (i.e., baseline), during intervention, and following intervention (i.e., maintenance).

A naturalistic probe for joint attention consisted of the researcher arranging three different events which set the occasion for each participant to engage in joint attention. The event occurred as all participants were engaged in a large group activity such as the researcher reading a book or leading a felt piece activity. At some point during the activity a novel or unusual event would occur. For example, a therapist would enter the room wearing Hulk Hands while yelling, "Hulk smash," and then tipping over the chairs in the table work areas for about 5 s. The

participants were provided with 5 s to begin to engage in the aforementioned task analysis for joint attention. After 5 s, the researcher would resume the activity and provide no programmed consequences. There was approximately a 3- to 5-min break before the next event occurred. This continued until a total of three events were occurred.

A naturalistic probe for social communication consisted of the researcher setting the occasion for the participants to engage in the aforementioned steps of social communication. To begin a naturalistic probe for social communication, the researcher would lead a large group activity in the instructional area (like joint attention probes). Another researcher in the room would then call for the researcher (e.g., “Hey Christine, come look at this”). The researcher would leave the instructional area, while the participants remained on the rug in the instructional area. The researchers would engage in a private conversation for about 10 s before the researcher returned. Once the researcher returned, the activity would proceed as usual. No programmed consequences were provided regardless of the accuracy of responding.

Naturalistic probes were used to determine percentage of correct responding during baseline, intervention, and maintenance. Additionally, naturalistic probes were used to determine mastery criterion during the intervention condition. For joint attention, the mastery criterion was a participant displaying all the steps correctly for all three events within a session across three consecutive sessions. For social communication, the mastery criterion was a participant displaying 100% of the steps correctly across three consecutive sessions. If a participant met the mastery criterion, the teaching continued until most of the participants met mastery criterion as all teaching was conducted in a large group setting.

Naturalistic probes for joint attention and for social communication occurred during baseline, intervention, and following intervention (maintenance). The order of naturalistic probes

for each skill was randomly determined. Baseline and maintenance conditions consisted of only naturalistic probes, and the intervention condition consisted of naturalistic probes and intervention.

Baseline. During the baseline condition the researcher conducted one of the naturalistic probes for joint attention or social communication followed by a short break during which the participants engaged in other activities related to the RCT social skills group but not this study. Following the break, the researchers implemented a naturalistic probe for whichever skill was not probed first, followed by another short break. During baseline, the researchers implemented two naturalistic probes for each skill per group with an hour between each probe.

Intervention. Intervention occurred following naturalistic probes for each skill and consisted of the cool versus not cool procedure (CNC) implemented in a large group instructional format. The CNC procedure consists of several steps. First, the researcher introduced the targeted skill (e.g., “Today we are going to talk about talking to your friends”). Second, the researcher described the steps of the targeted skill. Third, the researcher then would ask participants, in a semi-random order, to state what they were working on and to state the steps of the targeted skill. If the participant stated the skill correctly and/or stated one of the steps correctly, the researcher provided reinforcement (described below). If a participant stated the skill incorrectly and/or stated one of the steps incorrectly, the researcher provided corrective and informative feedback (e.g., “That is not it. We are working on talking to your friend.”).

Following the description of the skill, two researchers conducted four demonstrations of the targeted skill. Two of which the researcher demonstrated the targeted skill correctly (i.e., displaying all steps of the task analysis), and two of which the researcher demonstrated the targeted skill incorrectly (e.g., not demonstrating all the steps of the task analysis or

demonstrating one of the steps incorrectly). The order was randomly determined prior to each session. To begin the demonstration, the researcher instructed the participants to watch to see if the researcher was performing the skill correctly and a cue that the demonstration was beginning (e.g., “Action!!”). Incorrect demonstrations were modeled based on steps the participants displayed incorrectly during naturalistic probes. After each demonstration (e.g., the researcher saying, “Cut”) the researcher gave the participants an opportunity to label the demonstration as cool or not cool. Labeling was done via a thumbs-up for cool and a thumbs-down for not cool. The researcher provided reinforcement for the participants that chorally responded accurately and provided no consequence for participants who did not respond correctly. Next the researcher asked the participants to explain why the demonstration was cool or not cool. Correct responses included stating a step that was done correctly or stating the step(s) that were done incorrectly. The researcher provided reinforcement for correct responses and corrective feedback for incorrect responses.

Following demonstrations, the participants were provided with opportunities to role-play the targeted skill. There was a total of five role-play trials per session. Role-plays were similar to naturalistic probes with the exception that the researcher could provide feedback. The role-play began with the researcher setting up events identical to naturalistic probes (e.g., walking away from the circle or having another researcher engage in a novel behavior). After each role-play the researcher provided reinforcement, praise (e.g., “Yes! That’s it!”), and response specific praise for the steps displayed correctly. For steps displayed incorrectly, the researcher provided general (e.g., “That is not it”) and specific corrective feedback (e.g., “You forgot to do . . .”). If a participant missed any of the steps across two consecutive role-plays, the therapists prompted the correct steps in the next role-play (e.g., whispering in his/her ear the correct steps).

Maintenance. During the maintenance condition the researcher conducted a naturalistic probe for one of the targeted skills followed by a short break. Following the break, the researchers implemented another naturalistic probe for the second skill.

Social Validity

Additionally, each participant's parent filled out an anonymous social validity survey (Wolf, 1978). The social validity survey consisted of 8 questions about the parent's satisfaction with the group and progress they felt their son or daughter made within the group. Each question used a 7 point Likert scale. It should be noted that the social validity data comes from the larger study on the effectiveness of the social skills group (Leaf et al., In Press).

Reinforcement System

A level system (Cooper, Heron, Heward, 2007; referred to by the participants and the researchers as a super kid chart), was used throughout intervention sessions. The chart included 5 parts: (from the top) Super Kid, Awesome, OK, Warning, Miss a fun activity. Each participant had his or her own clip on the chart and started each session at OK. This system was used throughout the entire session (i.e., not just during this study). Throughout each session, the participants could move up the chart for engaging in desirable behavior and move down the chart for engaging in undesirable social behavior. At the end of each day, participants that were on Super Kid could go to a treasure box and take home a small toy. With respect to the present study, the participants could move up the chart for correct responding and role-playing and move down the chart for incorrect responding or incorrect role-playing.

Interobserver Agreement and Treatment Fidelity

One researcher scored naturalistic probes for joint attention and social communication across all sessions. A second independent observer scored 34.5% of naturalistic probes for joint

attention and 33.3% of probes for social communication. Inter-observer agreement (IOA) was calculated by dividing the number of agreements divided by the number of agreements plus disagreements and multiplying by 100. Agreements for joint attention were trials both observers scored that the participant displayed the game correctly or incorrectly. Agreements for social communication occurred when both observers scored that the behavior occurred or did not occur. IOA for joint attention IOA was 97.5% (range, 85.1 to 100% per session) and 99.3% (range, 88.8 to 100% per session) for social communication.

To assess treatment fidelity, an independent observer recorded planned researcher behavior during 30.6% of all teaching sessions. Planned researcher behavior consisted of: (a) labeling the targeted skill, (b) having at least two students label the targeted skill, (c) providing a cue to start each researcher demonstration, (d) implementing at least two cool demonstrations, (e) implementing at least two not cool demonstrations, (f) providing a cue to end each researcher demonstration, (g) having all of the participants label if the demonstration was cool or not cool, (i) having at least two participants state why the demonstration was cool or not cool, (j) having all of the participants role-play the behavior, and (k) providing correct feedback based upon participant performance during the role-play. Treatment fidelity was calculated by dividing the number of sessions in which the researcher demonstrated all the behaviors correctly by the total number of sessions. Total treatment fidelity was 97.7% (range 81 to 100% of steps displayed correctly across sessions).

Experimental Design

To measure the effects of the CNC procedure on teaching joint attention and social communication, the researchers utilized a multiple baseline design across behaviors and across participants (Watson & Workman, 1981). The design consisted of three conditions: baseline,

intervention, and maintenance. Within this design, intervention was not implemented on the second, third, or fourth skill until: (a) there was stable responding in baseline levels for the entire group, and (b) there was an increase in the number of participants engaging in the appropriate target behavior for the previous social behavior. Thus, there were periods of times in which both skills were being taught simultaneously.

Chapter III: Results

Alexander and Andy

Figure 1 displays the results for Alexander and Andy for joint attention and social communication. During baseline, the percentage of steps Alexander performed correctly remained low for both skills (range, 0 to 33%, across all probes and both skills). Alexander reached the mastery criterion (i.e., 100% of steps correct across three consecutive sessions) within six sessions for joint attention and five for social communication. During the assessment of maintenance, Alexander engaged in high rates of correct responding during maintenance for both skills averaging 77% (range, 33 to 100%) across all sessions and 100% correct across all sessions for communication. Across both skills, Andy did not complete any of the steps correctly across all sessions during baseline. Andy reached the mastery criterion within nine and three sessions for joint attention and social communication, respectively. During the assessment of maintenance, Andy engaged in variable levels of correct responding for joint attention (range, 33 to 100%) and 100% correct responding across all sessions for social attention.

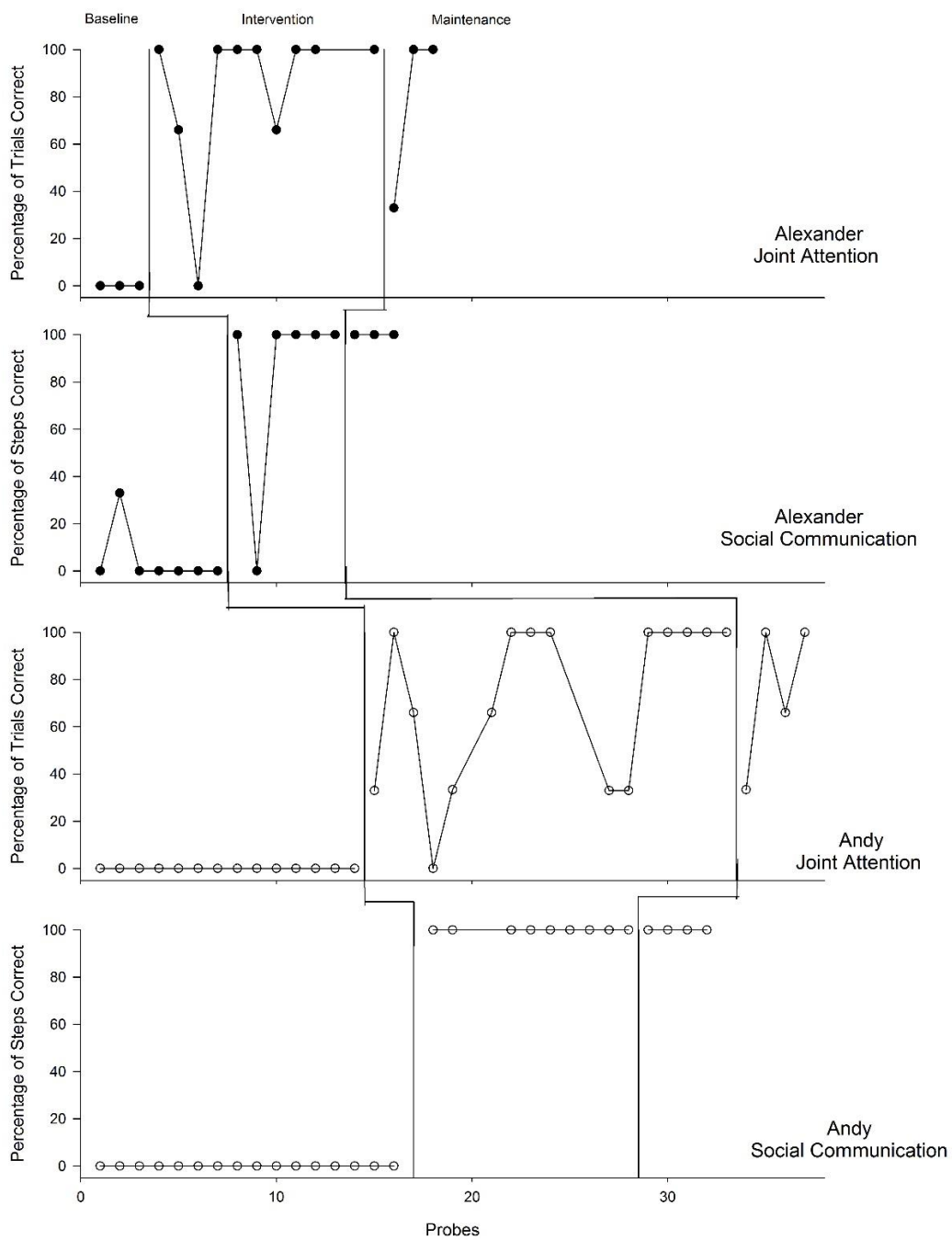


Figure 1. Results for Alexander and Andy.

Dane, Joseph, and Hailey

Figure 2 displays the results for Dane, Joseph, and Hailey. Dane and Joseph's data are displayed on the same panel with Dane's data represented by closed circles and Joseph's data are represented by open squares. For joint attention, Dane did not engage in any correct responses during baseline. Dane reached the mastery criterion for joint attention within six sessions. During the assessment of maintenance for joint attention, there was a high percentage of correct responding across sessions (range, 66 to 100%). Dane did not engage in any correct responses during the baseline for social communication except for one probe in which he displayed 66% of the steps correctly. During intervention, Dane met the mastery criterion within three sessions, which maintained across all probes during the assessment of maintenance.

For joint attention and social communication, Joseph did not engage in any correct responses during baseline. Joseph reached mastery criterion for joint attention within 10 sessions and averaged 88% correct responding (range, 33 to 100%) across all maintenance sessions. For social communication, Joseph did not reach the mastery criterion. However, during the assessment of maintenance, his average percentage of correct responding was 77% (range, 33 to 100%).

Hailey did not engage in any correct responses during baseline across both skills. Hailey reached mastery criterion in four sessions and three sessions for joint and social communication, respectively. During the assessment of maintenance, Hailey's average percentage of correct responding was 91.6% (range, 66 to 100%) for joint attention and 100% for social communication.

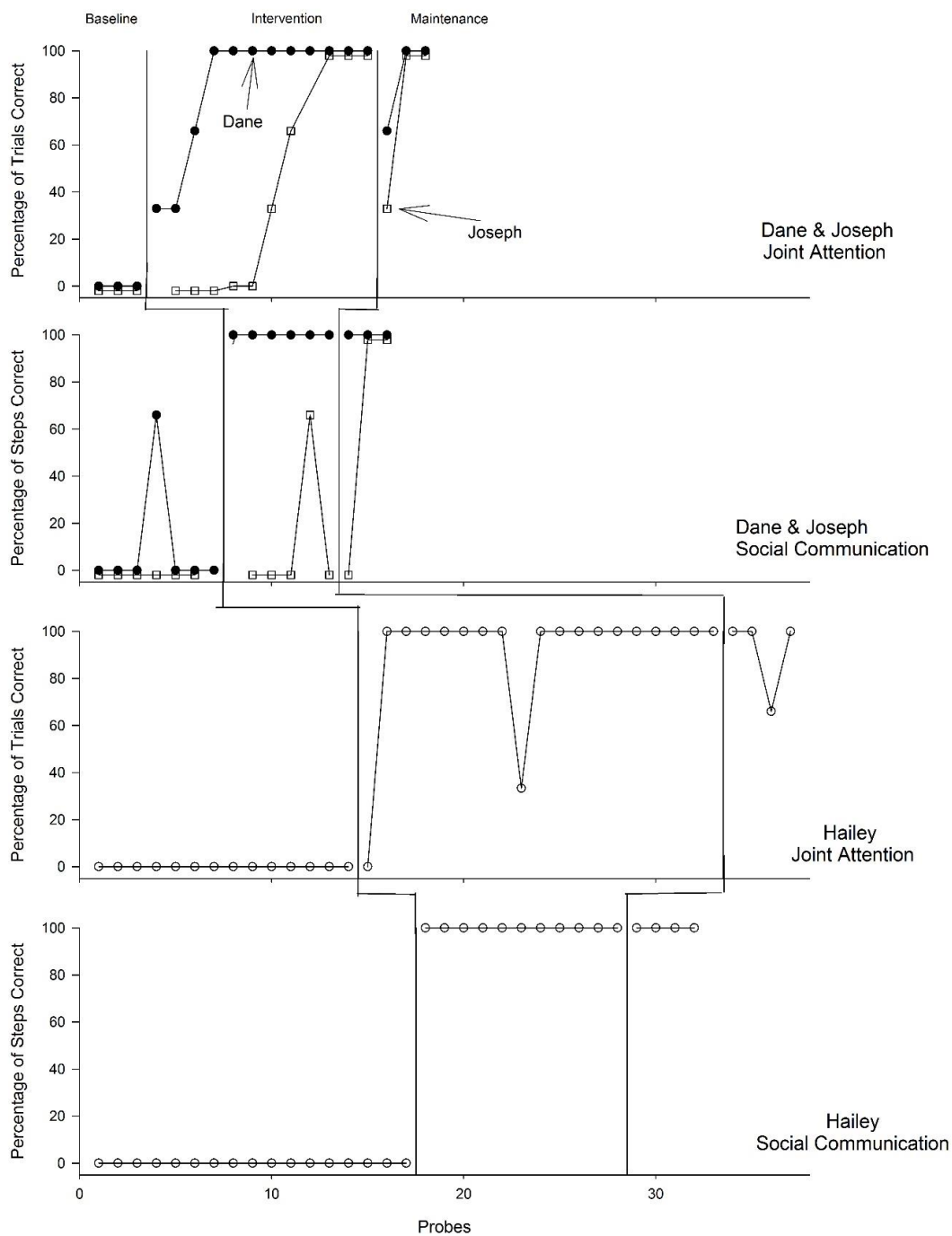


Figure 2. Results for Dane, Joseph, and Hailey.

Cindy, Gabe, Eddie, and John

Figure 3 displays the results for Cindy, Gabe, Eddie, and John. Cindy's data are displayed with closed circles, Gabe's with open squares, Eddie's with open circles, and John's with closed squares. During baseline, Cindy did not engage in any correct responses across both skills. Cindy reached the mastery criterion within 12 and three sessions for joint attention and social communication, respectively. During the assessment of maintenance for Cindy, the average percent of correct responding per session across both skills was 100%.

Gary did not engage in any correct responses during baseline for joint attention. Once intervention began, Gary met the mastery criterion in seven sessions and engaged in 100% correct responding across all sessions in maintenance. For social communication, Gary engaged in variable levels of correct responding (range, 0 to 100%) during baseline. Gary met the mastery criterion within three sessions of intervention, which maintained during the assessment of maintenance.

Eddie did not engage in any correct responses across both skills during baseline. Eddie reached the mastery criterion within four and three sessions for joint attention and social communication, respectively. During the assessment of maintenance, Eddie's average percentage of correct responding for joint attention was 88% (range, 66 to 100%) and 100% for social communication.

John did not engage in any correct responses across both skills during baseline. John reached the mastery criterion within four and six sessions for joint attention and social communication, respectively. During the assessment of maintenance, the average percentage of John's correct responding for joint attention was 67% (range, 33 to 100%) and 100% for social communication.

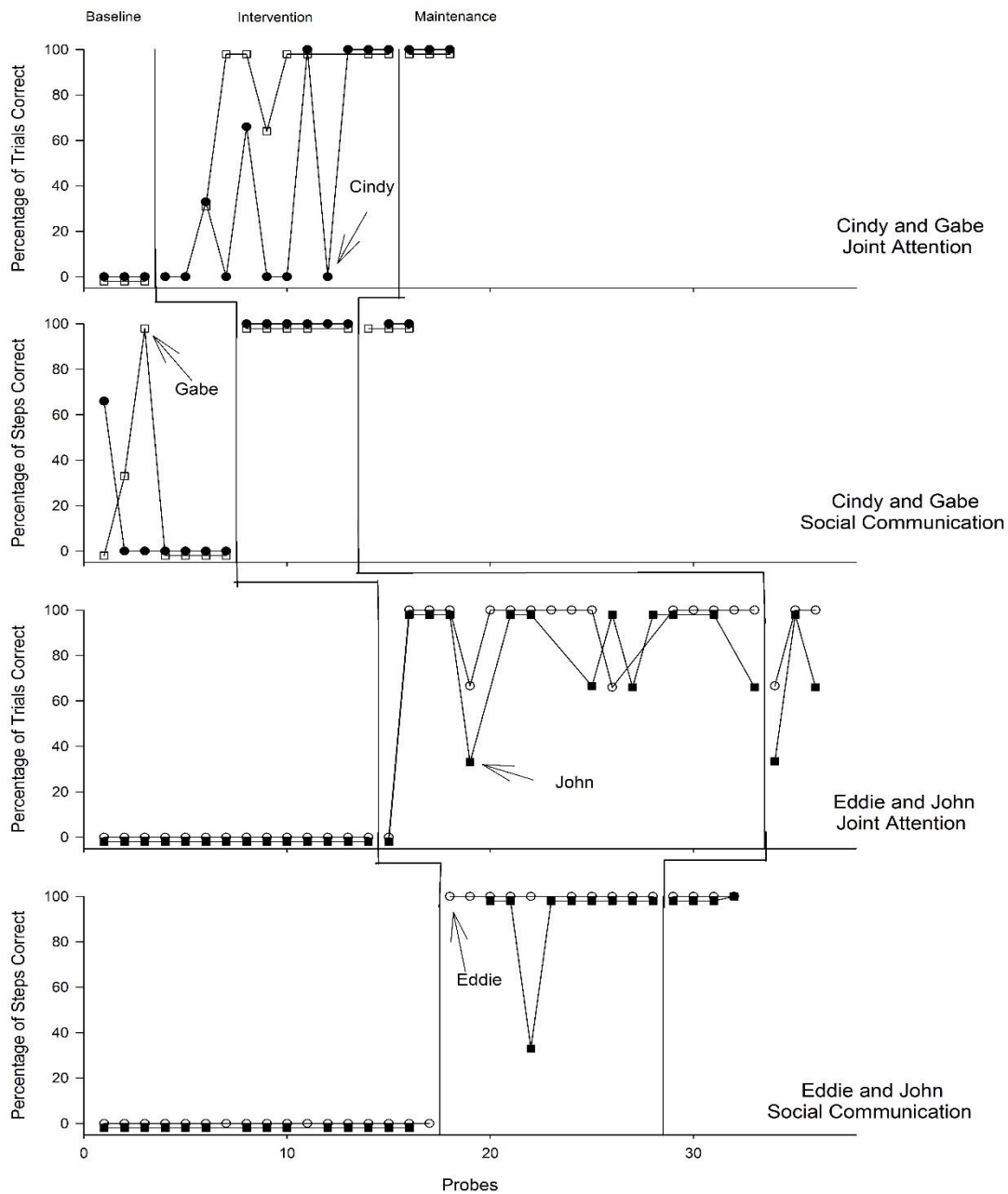


Figure 3. Results for Cindy, Gabe, Eddie, and John.

Sal, Ryan, Cody, and Jordan

Sal, Ryan, Cody, and Jordan's results are found in Figure 4. Sal's data are displayed with closed circles, Ryan's with open squares, Cody's with open circles, and Jordan's with closed squares. Sal did not engage in any correct joint attention responses during baseline. Following intervention, he met the mastery criterion within 6 sessions and averaged was 88.7% (range, 66 to 100%) correct responding during maintenance. For social communication, Sam engaged in variable levels of correct responding (range, 0 to 67%) during baseline. He reached the mastery criterion within five sessions, and maintained 100% of the steps correctly in the assessment of maintenance.

Ryan did not engage in any correct responses across both skills during baseline. Ryan did not reach the mastery criterion for joint attention but did show an improvement from baseline in most of the sessions during intervention and displayed 100% of the steps correctly across all sessions during maintenance. Ryan reached mastery criterion for social communication within five sessions and which maintained across all sessions in the maintenance condition.

Cody did not engage in any correct responses across both skills during baseline. Cody reached the mastery criterion in four and three sessions for joint attention to social communication, respectively. During the assessment of maintenance, Cody averaged 91% (range, 66 to 100%) correct responding for joint attention and 100% correct for social communication.

Jordan did not engage in any correct responses across both skills during baseline. Following intervention, Jordan reached mastery criterion for joint attention within seven sessions which maintained across all sessions during the assessment of maintenance. Jordan did not reach

the mastery criterion for social communication. During the assessment of maintenance, Jordan averaged 85% (range, 50 to 100%) correct responding.

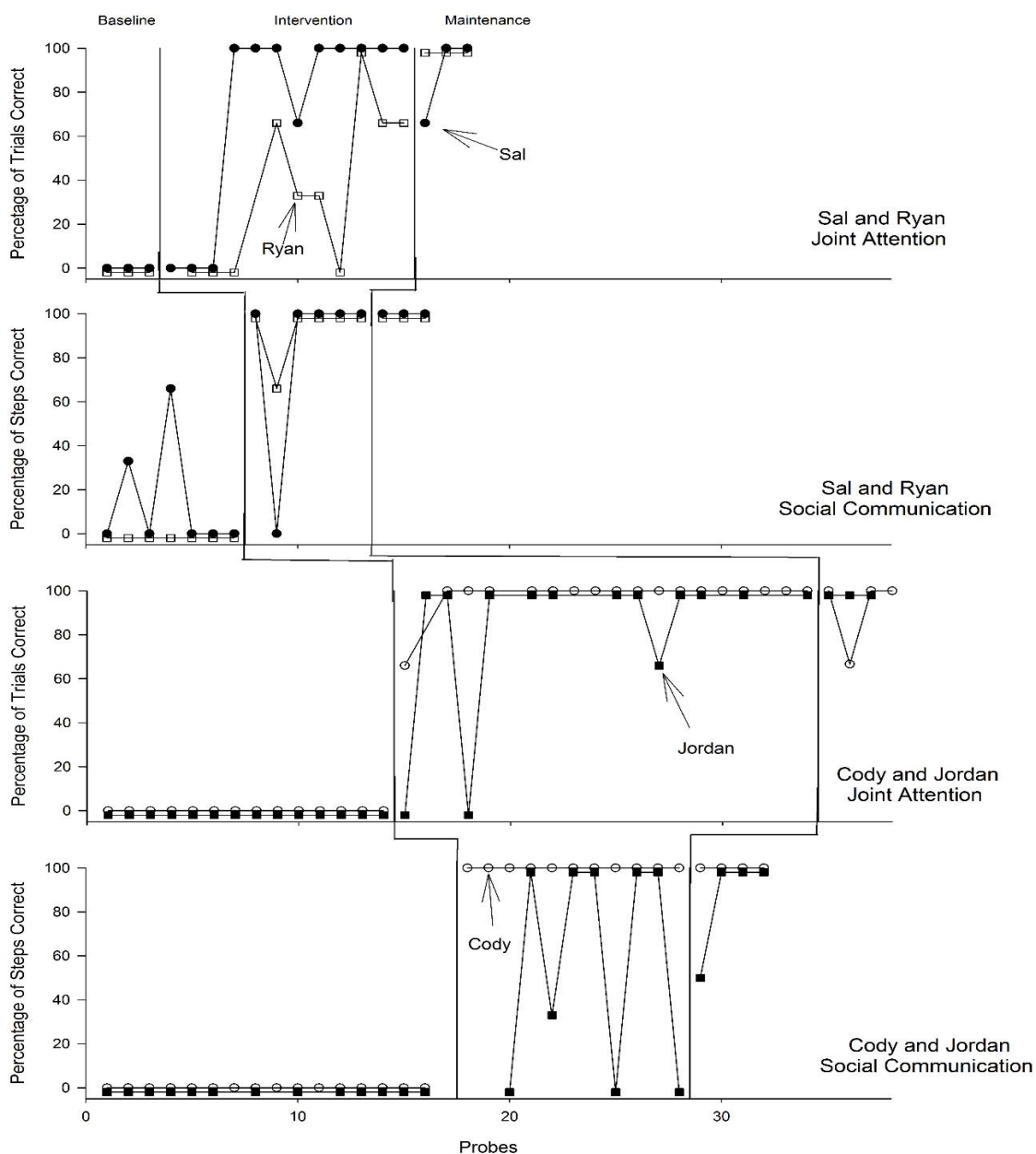


Figure 4. Results for Sal, Ryan, Body, and Jordan.

George, Ben, and Jason

George, Ben, and Jason's results are displayed in Figure 5. During the baseline condition for joint attention, George did not engage in any correct responses across all sessions. George reached the mastery criterion within six sessions and averaged 88% (range, 66 to 100%) correct responding across all sessions during the maintenance condition. During the baseline condition, for social communication for George, there were variable levels of the percent of correct responding. George reached the mastery criterion in three sessions and maintained correct responding at 100% across all maintenance sessions.

Ben did not engage in any correct responses across both skills during baseline. Ben reached the mastery criterion within seven and three sessions for joint attention and social communication, respectively. Both skills were maintained at 100% correct responding across all maintenance sessions.

Jason did not engage in any correct responses across both skills during baseline. Jason did not reach the mastery criterion for joint attention but improvements from baseline levels were observed. However, during the assessment of maintenance, Jason averaged 91% (range, 66 to 100%) correct responding. Jason reached the mastery criterion within three sessions for social communication, which was maintained at 100% correct responding across all sessions in the maintenance condition.

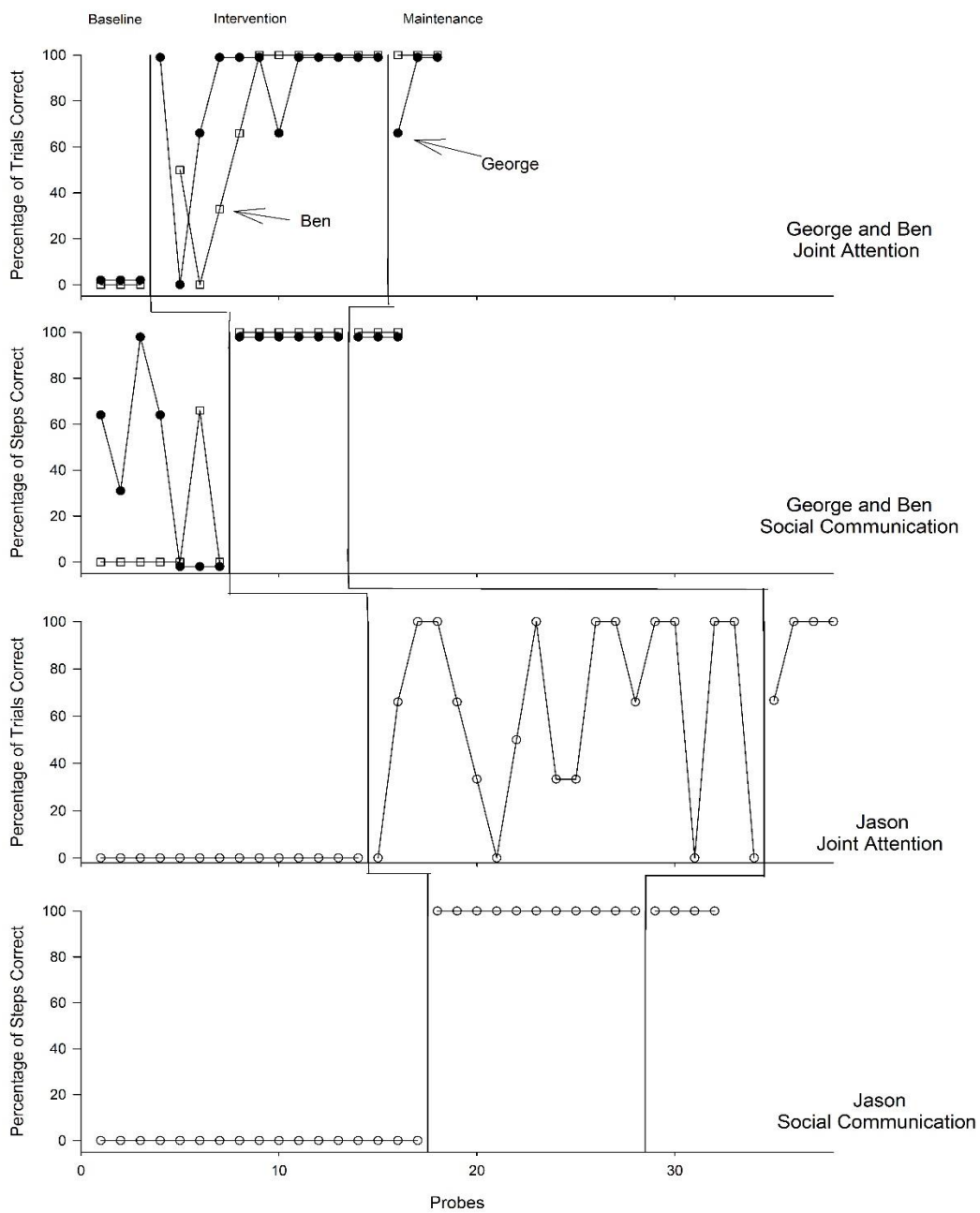


Figure 5. Results for George, Ben, and Jason.

Social Validity

Table 2 reports the average scores for the social validity questionnaire provided to parents. The scores are reported to parents of Group A, parents of Group B, and a combined average for both groups. Social validity results indicate that parents across both groups were satisfied with the outcomes, the procedures, the skills taught, and with the teachers.

Table 2

Social Validity

Question	Average Score Group A	Average Score Group B	Average Score Across Both Group A and B
Overall how satisfied are you with the social skills group?	6.4	7	6.7
How satisfied are you with your child's ability to learn social skills during the social skills group?	5.8	6.5	6.1
Overall how satisfied are you with the teachers who have run the social skills group?	6.2	7	6.6
How satisfied are you with the teachers' ability to connect with your child?	6.4	6.8	6.6
How satisfied are you with the teaching procedures utilized within the social skills group?	6	6.8	6.3
How much improvement do you feel your child has made with his or her social skills?	5.8	6.8	6.3
How much improvement do you feel your child has made in his or her ability to participate in group activities?	5.6	6.5	6
How much do you feel your child has been able to generalize the skills taught in the social skills group to other environments (e.g., school or home)?	5	6	5.4

Chapter IV: Discussion

The purpose of this study was to evaluate the effectiveness of the CNC procedure implemented within a social skills group to improve joint attention and social communication skills for 16 participants diagnosed with ASD. Fourteen participants met the mastery criterion for joint attention and social communication. Although two participants did not reach the mastery criterion for joint attention (i.e., Jason and Ryan) and social communication (Joseph and Jordan), there was a demonstrated improvement in either in the intervention condition and/or the maintenance condition. Thus, the results showed the CNC procedure was successful in improving pivotal social behaviors for individuals diagnosed with ASD.

There are several implications from this study for clinicians and researchers working with individuals diagnosed with ASD. First, this study provides further support to the effectiveness of the cool versus not cool procedure. Although, there has been a growing number of research studies evaluating CNC (e.g., Leaf et al., 2012; Leaf, Leaf, Taubman et al., 2015; Au et al., 2016; Leaf, Leaf, Milne, Townley-Cochran et al., 2016; Leaf, Taubman, Milne et al., 2016); there has been limited evaluations of implementing CNC in a group instructional format (e.g., Au et al., 2016; Leaf et al., 2016). This study further demonstrates the effectiveness of the CNC procedure implemented within a group instructional format. Implementation of the CNC procedure in a group instructional format can help with efficiency of learning for the teacher and the learners. That is, it allows the teacher to target a skill across multiple learners, and the learner has the potential to learn through observational learning. Given that many children diagnosed with ASD receive instruction in group instructional formats (e.g., teaching conducted within classroom settings) the CNC procedure could be another procedure which is can be implemented within these contexts.

Second, joint attention and social communication are common deficits displayed by individuals diagnosed with ASD, are critical to overall development, and often require direct intervention. Despite the importance of teaching these social behaviors to individuals diagnosed with ASD the behavior analytic research has remained somewhat limited (White et al., 2011). Thus, this study provides clinicians with a behavior analytic approach to teaching pivotal skills that can help foster overall social development.

Third, in most of the studies that evaluated teaching joint attention, the antecedent event is either an unusual event that the participant would not commonly come across in his or her environment (e.g., a stuffed animal hanging from the ceiling fan) (Taylor & Hoch, 2008) or the antecedent event is related to an object (e.g. a toy that lights up). In this study, the joint attention event was always an adult engaging in an unusual behavior (e.g., getting hulk hands and smashing bricks, tripping and falling, or coming out of a closet as a ghost). Thus, this study provides ways to increase joint attention in which the participants must attend to other individuals within their environment.

This study did not go without its limitations that could be addressed in future studies. First, some of the participants displayed variability in their responding during the baseline condition. The variability during baseline makes it difficult to determine if participants could display the skill prior to intervention or if intervention was required. Additionally, variable data during baseline could minimize experimental control; however, intervention did not occur until the behavior stabilized to low percentages of correct responding to improve certainty of functional control.

A second limitation is that there was also some variability of correct responding during the maintenance condition. This variability could indicate that for some participants once

intervention had ended, participants no longer maintained the targeted skills. The intervention was not faded gradually, but, rather, immediately stopped intervention for both skills. This may have resulted in variable responding within the maintenance condition. Future researchers should examine if fading the intervention components would result in higher rates of maintenance of the skills targeted following intervention.

A third limitation is a lack of generalization measures in more natural environments (e.g., school or the home setting). Thus, it remains unknown if these skills generalized to more natural settings. Future researchers could evaluate if skills, targeted in a similar manner, generalize to more natural environments. Finally, this study was a small component of a larger social skills group. Within the social skills group a variety of behaviors (e.g. sharing, turn taking, indoor games), not associated with this study, were taught simultaneously (Leaf et al., In Press). Although, joint attention and social communication were not targeted outside of this specific study, it is possible that the skills targeted in the social skills group affected acquisition within this study. Future researchers may wish to evaluate the CNC procedure to teach joint attention and social communication in the absence of intervention for other social behaviors. Despite these limitations, the results showed positive improvements in two important social behaviors for 16 individuals diagnosed with ASD, providing clinicians with another empirically based, behavioral approach to teaching pivotal social skills.

References

- Aldred, C., Green, J., & Adams, C. (2004). A new social communication intervention for children with autism: pilot randomised controlled treatment study suggesting effectiveness. *Journal of Child Psychology and Psychiatry*, *45*(8), 1420-1430.
- Au, A., Mountjoy, T., Leaf, J. B., Leaf, R., Taubman, M., McEachin, J., & Tsuji, K. (2016). Teaching social behaviour to individuals diagnosed with autism spectrum disorder using the cool versus not cool procedure in a small group instructional format. *Journal of Intellectual and Developmental Disability*, *41*(2), 115-124.
- Bishop, D. V., Bishop, D. V. M., & Leonard, L. B. (2000). Pragmatic language impairment: A correlate of SLI, a distinct subgroup, or part of the autistic continuum. In D. V. M. Bishop & L. B. Leonard (Eds.), *Speech and Language Impairments in Children: Causes, Characteristics, Intervention and Outcome* (pp. 99-113). Hove, UK: Psychology Press.
- Charman, T., Swettenham, J., Baron-Cohen, S., Cox, A., Baird, G., & Drew, A. (1997). Infants with autism: An investigation of empathy, pretend play, joint attention, and imitation. *Developmental Psychology*, *5*, 781-789.
- Cooper, J. O., Heron, T. E., & Heward, W. L. (2007) *Applied Behavior Analysis* (2nd Ed.). Upper Saddle River, NJ: Pearson.
- Dunn, L. M., Dunn, L. M., Bulheller, S., & Häcker, H. (1965). *Peabody picture vocabulary test*. Circle Pines, MN: American Guidance Service.
- Ingersoll, B., & Wainer, A. (2013). Initial efficacy of project ImPACT: A parent-mediated social communication intervention for young children with ASD. *Journal of Autism and Developmental Disorders*, *43*, 2943-2952.

- Jones, E. A., & Carr, E. G. (2004). Joint attention in children with autism: Theory and intervention. *Focus on Autism and Other Developmental Disabilities, 19* (1), 13-26.
- Jones, E. A., & Feely, K. M. (2009). Parent implemented joint attention intervention for preschoolers with autism. *Best of JSLP-ABA, 4*, 74-89.
- Landa, R., Klin, A., Volkmar, F., & Sparrow, S. (2000). Social language use in Asperger syndrome and high-functioning autism. In A. Klin, F. R. Volkmar, & S. S. Sparrow (Eds.), *Asperger Syndrome* (pp. 125-155). New York, NY: The Guilford Press.
- Leaf, J. A., Leaf, J. B., Milne, C., Townley-Cochran, D., Oppenheim-Leaf, M. L., Cihon, J. H., . . . & Leaf, R. (2016). The effects of the cool versus not cool procedure to teach social game play to individuals diagnosed with autism spectrum disorder. *Behavior Analysis in Practice, 9*(1), 34-49.
- Leaf, J. B., Leaf, J. A., Milne, C., Taubman, M., Oppenheim-Leaf, M., Torress, N., Townley-Cochran, Leaf, R., McEachin, J., & Yoder, P. (In Press). An evaluation of a behaviorally based social skills group for individuals diagnosed with autism spectrum disorder. *Journal of Autism and Developmental Disorders*.
- Leaf, J. B., Taubman, M., Leaf, J., Dale, S., Tsuji, K., Kassardjian, A., . . . & McEachin, J. (2015). Teaching social interaction skills using cool versus not cool. *Child & Family Behavior Therapy, 37*, 321-334.
- Leaf, J. B., Taubman, M., Milne, C., Dale, S., Leaf, J., Townley-Cochran, D., . . . & McEachin, J. (2016). Teaching social communication skills using a cool versus not cool procedure plus role-playing and a social skills taxonomy. *Education and Treatment of Children, 39*(1), 44-63.

- Leaf, J. B., Townley-Cochran, D., Taubman, M., Cihon, J. H., Oppenheim-Leaf, M. L., Kassardjian, A., et al. (2015). The teaching interaction procedure and behavioral skills training for individuals diagnosed with autism spectrum disorder: A review and commentary. *Review Journal of Autism and Developmental Disorders*, 2(4), 402–413.
- Leaf, J. B., Tsuji, K. H., Griggs, B., Edwards, A., Taubman, M., McEachin, J., Leaf, R., & Oppenheim-Leaf, M. L. (2012). Teaching social skills to children with autism using the cool versus not cool procedure. *Education and Training in Autism and Developmental Disabilities*, 47, 165-175.
- Leaf, R. B., Taubman, M. T., McEachin, J. J., Leaf, J. B., & Tsuji, K. H. (2011). A program description of a community-based intensive behavioral intervention program for individuals with autism spectrum disorders. *Education and Treatment of Children*, 34, 259-285.
- Macdonald, R., Anderson, J., Dube, W., Geckeler, A., Green, G., Holcomb, W., Mansfield, R., & Sanchez, J. (2006). Behavioral assessment of joint attention: A methodological report. *Research in Developmental Disabilities*, 27(2), 138-150.
- Mundy, P., & Acra, C. F. (2006). Joint attention, social engagement, and the development of social competence: *The development of social engagement: Neurobiological perspectives*. New York, NY: Oxford University Press, Inc.
- Mundy, P., & Crowson, M. (1997). Joint attention and early social communication: Implications for research on intervention with autism. *Journal of Autism and Developmental Disorders*, 27, 653-676.
- Mundy, P., Sigman, M., & Kasari, C. (1994). Joint attention, developmental level, and symptom presentation in autism. *Development and Psychopathology*, 6 (3), 389-401.

- Pollard, J. S., Betz, A. M., & Higbee, T. S. (2012). Script fading to promote unscripted bids for joint attention in children with autism. *Journal of Applied Behavior Analysis, 45*, 387-393.
- Prizant, B. M., & Wetherby, A. W. (1998). Understanding the continuum of discrete trial traditional behavioral to social-pragmatic developmental approaches in communication enhancement for young children with autism/PDD. *Seminars, in Speech Language, 19*, 329-353.
- Taubman, M. T., Leaf, R. B., McEachin, J., & Driscoll, M. (2011). *Crafting connections: Contemporary applied behavior analysis for enriching the social lives of persons with autism spectrum disorder*. New York, NY: DRL Books.
- Taylor, B. A., & Hoch, H. (2008). Teaching children with autism to respond to and initiate bids for joint attention. *Journal of Applied Behavior Analysis, 41*, 377-391.
- Watson, P. J., & Workman, E. A. (1981). The non-current multiple baseline design across-individuals design: An extension of the traditional multiple baseline design. *Journal of Behavior Therapy and Experimental Psychiatry, 12*(3), 257-259.
- White, P. J., O'Reilly, M., Streusand, W., Levine, A., Sigafos, J., Lancioni, G., Fragale, C., Pierce, N., & Aguilar, J. (2011) Best practices for teaching joint attention: A systematic review of the intervention literature. *Research in Autism Spectrum Disorders, 5*(4), 1283-1295.
- Wolf, M. M. (1978). Social validity: The case for subjective measurement or how applied behavior analysis is finding its heart. *Journal of applied behavior analysis, 11*(2), 203-214.