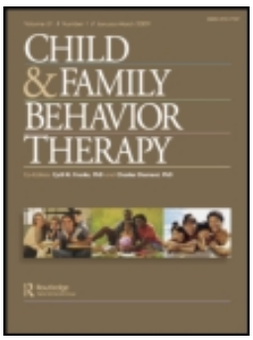

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# Teaching Social Interaction Skills Using Cool Versus Not Cool

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*We evaluated the cool versus not cool procedure to teach social behaviors to three children diagnosed with autism. The researchers demonstrated each targeted behavior four times (two appropriate and two inappropriate demonstrations). Each participant then had to discriminate and state why the demonstration was appropriate or inappropriate. This was followed by the participant role-playing the targeted behavior with the researchers. We utilized a multiple baseline design to evaluate the procedure and the results indicated that the procedure was effective in teaching each targeted social behavior.*

*KEYWORDS autism, cool versus not cool, demonstration, role-playing*



One of the core deficits for individuals diagnosed with an Autism Spectrum Disorder (ASD) are impairments in social behavior ranging from a failure to make eye contact (Mundy, Sigman, Ungerer, & Sherman, 1986) to a failure to develop meaningful relationships/friendships (Bauminger, Shulman, & Agam, 2003). The lack of social behavior can lead to negative outcomes for individuals diagnosed with ASD ranging from isolation (Bauminger & Kasari, 2000) to, in worst case scenarios, suicidal ideation (Mayes, Gorman, Hillwig-Garcia, & Syed, 2013). Thus, it is important for interventionists to

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address social behavior as part of a comprehensive treatment package. Today, there are several interventions that are being implemented to improve the social behavior for individuals diagnosed with ASD; these interventions include video modeling (Charlop & Milstein, 1989; Paterson & Arco, 2007; Rudy, Betz, Malone, Henry, & Chong, 2014), script fading (Krantz & McClannahan, 1998; Lee & Sturmey, 2014; Pollard, Betz, & Higbee, 2012), the teaching interaction procedure (Leaf, Dotson, Oppenheim, Sheldon, & Sherman, 2010), and behavioral skills training (Sarokoff & Sturmey, 2004). Although there are a variety of procedures implemented to increase social behaviors for individuals diagnosed with ASD, researchers and clinicians should strive for developing new procedures so that the most effective procedures can be determined.

One procedure that has been clinically implemented to hundreds of individuals diagnosed with ASD (Leaf et al., 2010), but has only one empirical study to date, is the cool versus not cool procedure (CNC; Leaf et al., 2012). CNC is a discrimination program utilized to teach learners to distinguish between appropriate (“cool”) and inappropriate (“not cool”) social behaviors. CNC starts with a teacher demonstrating the behavior (either the “cool” or “not cool” way) in front of the learner and then asking the learner to rate if the demonstration was cool or not cool. Next, the teacher asks the participant to state why the demonstration was “cool” or “not cool.” An additional optional component of the CNC procedure is the learner having the opportunity to role-play the behavior in front of the teacher (Leaf et al., 2012).

Thus, CNC heavily relies on demonstration and role-playing, which are core components of other procedures (e.g., teaching interaction procedure, video modeling, behavioral skills training) that have been utilized to teach social behaviors for individuals diagnosed with ASD (Leaf et al., 2010; Sarokoff & Sturmey, 2004). Although CNC is similar to other commonly implemented procedures, there are several key differences. CNC differs from behavioral skills training in that CNC involves a child discriminating between appropriate and inappropriate models, whereas behavioral skills training typically only includes an appropriate demonstration. CNC differs from the teaching interaction procedure in that no rationale is provided during CNC, whereas a rationale is always provided during the teaching interaction procedure. Finally, CNC differs from video modeling in that all demonstrations are done in vivo, as opposed to a videotape model.

Despite CNC being implemented clinically for children diagnosed with ASD for years, there has only been one empirical study published to date (Leaf et al., 2012). Leaf and colleagues (2012) were the first to examine CNC to teach three children diagnosed with ASD social behaviors in a clinical setting. The researchers first evaluated the CNC procedure without participant role-plays; if the participant was unable to reach mastery criterion, then a role-play component was added. Participants reached mastery criterion on 50% of skills with demonstration alone and reached mastery on an additional

38% of the skills when role-play was added. Thus, the results showed that participants were able to reach mastery criterion on a high percentage of skills. Still, the researchers stated that more research was warranted, in order to determine how effective the CNC procedure is for individuals diagnosed with ASD.

In addition to identifying novel procedures that may be effective in teaching social behaviors for individuals diagnosed with ASD, researchers and clinicians should evaluate new ways to determine what social behaviors to teach individuals diagnosed with ASD. In 2011, Taubman, Leaf, and McEachin wrote a book that described a social taxonomy for social behaviors which can be taught to individuals diagnosed with ASD. The social skills taxonomy consisted of five social domains: (a) social communication; (b) social relatedness; (c) social learning; (d) social awareness; and (e) social interaction; each domain included individual social behaviors ranging from beginning social behaviors (e.g., eye contact) to more advanced social behaviors (e.g., friendship development). Taubman and colleagues provided this taxonomy so that both clinicians and researchers can better select social behaviors to target as part of clinical practice and research projects.

The purpose of this study was to examine if the CNC procedure with addition of role-playing would be effective in teaching social behaviors under the social interaction domain of the social skills taxonomy (Taubman et al., 2011) to individuals diagnosed with autism. Although there has been one study looking at the effectiveness of the CNC procedure, CNC has yet to meet the standards of evidence based (Horner et al., 2005) and, therefore, more research is warranted. This study expands on the original CNC study (Leaf et al., 2012) in four ways. First, this study included role-playing as a mandatory component of intervention, as opposed to implementing role-playing only after participants were unable to reach mastery criterion. Second, this study evaluated the CNC procedure to a different group of participants. Third, the CNC procedure was utilized to teach different social behaviors. Finally, the researchers utilized the social skills taxonomy as a means of selecting social behaviors, as opposed to randomly selecting the social behaviors.



## METHODS

### Participants

Three participants (i.e., Sara, Brady, and Kennedy) diagnosed with a clinical diagnosis of Autistic Disorder (based on *DSM-IV*) participated in this study. Table 1 displays the participants' demographic characteristics. All three participants had deficits in social behaviors, which were resulting in a failure to develop meaningful friendships. All three participants were able to discriminate between cool versus not cool demonstrations and all three participants

**TABLE 1** Participant Demographics

| Name | Age | Gender | Wechsler Preschool and Primary Scale of Intelligence Full Scale IQ Score | Vineland Adaptive Behavior Scales Composite Score | Social Skills Improvement System-Parent Version Standard Score |
|---|---|---|---|---|---|
| Sara | 3 | Female | 125 | 81 | 81 (10th Percentile) |
| Brady | 4 | Male | 110 | 84 | 70 (4th Percentile) |
| Kennedy | 7 | Female | 85 | 83 | 92 (28th Percentile) |

had the language to state why a demonstration was cool or not cool. Each participant had been receiving intervention at a private agency that provided behavioral intervention to individuals diagnosed with ASD.

In addition to the three participants, the study utilized two confederate peers to help with the naturalistic probes (see below). The confederate peers were both individuals diagnosed with Autistic Disorder but who would be considered higher functioning. Both confederate peers were 5 years of age, had expressive language, and had no aberrant behaviors. The researchers trained both confederate peers, prior to the study, on the behaviors to display during naturalistic probes (see below).



## Setting

The study was conducted in small clinical rooms of a private agency that provides applied behavior analysis (ABA) intervention to individuals diagnosed with ASD. Naturalistic probes and teaching sessions were conducted in two different rooms (i.e., Room A was utilized for teaching sessions and Room B was utilized for naturalistic probes); all rooms had both adult and child furniture. This agency served as the primary school placement for each participant at the time of the study; thus, this setting could be considered part of each participant's natural environment.

## Targeted Skills

Each participant was taught one social skill from the social interaction domain of the social skills taxonomy (Taubman et al., 2011). The researchers first approached each participant's clinical supervisor (who was in charge of selecting target behaviors to teach the participant in clinical settings, helping design individualized education programs—IEPs, and training staff) to see if there was an identified need in social interaction. Next, the researcher and the clinical supervisor looked at the skills outlined in the social interaction domain of the social skills taxonomy to identify what skills each participant already had in his or her repertoire and what skills each participant did not have in his or her repertoire. Then, the clinical supervisor removed all skills that the participant had already received intervention on. The researcher and

clinician then agreed upon a social behavior that would be targeted by the research team and which the clinicians would not target during clinical sessions. The parents of the participants were made aware of each of the targets and all parents agreed that the targeted social behavior was important to teach their child. Finally, each of the selected social skills was broken down into smaller behavioral steps.

Sara was taught how to make a compromise in selecting which game to play with a peer; the steps included: (a) not verbally agreeing with what a peer wanted to play; (b) playing rock-paper-scissors (which she knew how to play) to decide what game to play; and (c) playing the game that was decided by rock-paper-scissors. This goal was selected because she always agreed with any suggestion from a peer and was never able to play games that she wanted to play; therefore, she was commonly taken advantage upon during playdates.

Brady was taught how to share his snack with a peer; the steps included: (a) asking the peer if he or she wanted some of his snack; (b) waiting for a response without interrupting; and (c) providing a portion of his snack to the peer. This was selected because he did not notice his peers during snack breaks; the clinical supervisor and parents wanted him to increase awareness of his peers and hoped that sharing his snack may lead to more interaction during snack breaks.

Kennedy was taught how to be assertive when a peer took a play item without asking; the steps included: (a) making a statement that the item was hers; (b) telling the peer to give back the item; and (c) reaching for the item to get it back. This targeted skill was selected because peers would frequently grab Kennedy's items and Kennedy would engage in negative behaviors (e.g., yelling, grabbing the item back, or crying). Thus, we wanted to teach Kennedy a functional appropriate alternative behavior.



## Naturalistic Probes

Skill acquisition was measured through naturalistic probes (NPS). The researcher, reliability taker, participant, and peer were present during NPS. NPS were opportunities for the participant to display the targeted skill; a trained confederate peer (another child diagnosed with ASD) engaged in a behavior that set the occasion for the participant to display the social behavior. No reinforcement or prompting occurred during NPS. For all skills, the researchers waited 10 s for the participant to display the first step of the targeted skill. After 10 s, if the participant did not begin to engage in the targeted skill or 10 s elapsed between any two steps, the data collection was terminated but the participant and peer remained until a natural break occurred. NPS were a degree of generalization from teaching, in that they were always conducted with a confederate peer (i.e., generalization across people) as

opposed to a teacher and were conducted in a different room from teaching (i.e., generalization across settings).

For the skill of compromising in selecting a game, Sara and the peer were brought into the room and told they could play a game. The peer asked Sara what game she wanted to play and then, after Sara stated a game, the peer stated a different game. The researcher trained the confederate peer (also diagnosed with ASD) to wait for Sara to state what game she wanted to play first; this way we could ensure that Sara would state her desired game first.

For the skill of sharing a snack, Brady and the peer sat at the snack table and the researcher provided only Brady with a snack. The researcher trained the confederate peer (also diagnosed with ASD) to look at Brady and make statements that he was hungry. For the skill of assertiveness, Kennedy and the peer were brought into the room and told to play a game; at some point, the peer took a piece out of Kennedy's hands. The confederate peer (also diagnosed with ASD) was trained to take the item and start playing with it immediately. This was identical to what was occurring at playdates and during social skills groups.



## Dependent Variables

The main measure was participant mastery of skills, which was determined during NPS. Mastery criterion was set as the participant displaying 100% of the skill steps across three consecutive NPS. The second measure was the percentage of correct responding during researcher demonstrations (i.e., discrimination and stating why the demonstration was "cool" or "not cool"). Third, the researchers measured the average number of role-plays required per session.

## Procedure

Research sessions ran 5 days a week; 1 session per day. The design consisted of three conditions: baseline, intervention, and maintenance. During the baseline and maintenance conditions, only a NPS was conducted. During the intervention conditions, both a NPS and teaching occurred. The NPS lasted approximately 1 minute in length and the teaching lasted approximately 5 minutes in length.

### Baseline

During the baseline condition the researcher removed the participant and the confederate peer from their clinical setting and told them they had to do something with the researcher for a minute. The researcher then conducted

one of the NPS (described above). A single NPS was conducted during each research session.

### Intervention

During the intervention condition the research session consisted of a NPS, a 10-minute break, and then implementation of CNC. The researcher first removed the participant and confederate peer from their clinical setting (identical to the baseline condition) and then conducted a NPS (described above). The researcher then returned the participant and peer to their clinical setting for 10-minutes; after 10-minutes the researcher took the participant to the "research room" for the implementation of the CNC procedure.

The CNC procedure began with the participant and the researcher sitting across from each other in one of the small clinical/"research" rooms. The researcher labeled the skill to be practiced for that session (e.g., "We are going to practice sharing a snack."). Next, the researcher demonstrated the target skill with a second adult. There were a total of four demonstrations (two "cool" and two "not cool" demonstrations); the order was randomly determined ahead of time. The demonstrations were set up similar to NPS, except that they were conducted in a different room and were done with a second adult as opposed to a confederate peer.

During demonstrations of correct performance ("cool"), the researcher displayed all of the steps of the targeted social behavior. For example, during correct demonstrations for the skill of assertiveness the second adult would take a toy from the researchers hand and the researcher would make a statement that the item was his or hers, ask for the adult to give it back, and then reach for the item back. During demonstrations of incorrect performance ("not cool"), the researcher either omitted one of the steps or demonstrated one of the steps incorrectly. For example, during incorrect demonstrations for the skill of assertiveness, the second adult would take a toy from the researcher's hand and the researcher would just grab the toy back without stating that it was their toy or asking for it back. The researchers demonstrated the skill inappropriately (e.g., agreeing to the game that the second researcher wanted to play without playing rock-paper-scissors) based upon how the participant performed during the NPS earlier in that session. For example, if during Kennedy's NPS on assertiveness she forgot to ask for the toy back, the researcher would forget to ask for the toy back during incorrect demonstrations. If the participant displayed 100% of the steps during the NPS, then the researchers demonstrated the skill inappropriately based upon a previous NPS.

After each demonstration, the researcher asked the participant if the demonstration was "cool" or "not cool." General praise was provided for correct responding (e.g., "great") and general corrective feedback (e.g., "Nope") was provided for incorrect responding. Next, the researcher asked

the participant to state one reason why the demonstration was either "cool" or "not cool." General praise was provided for correct responding. Incorrect responding resulted in the researcher providing corrective feedback and modeling the correct response.

After the four demonstration trials, the researcher had the participant practice the skill the "cool" way with the second adult. The researcher set up the role-plays identical to the demonstration, where the participant had to practice the targeted behavior with the second adult. After the role-play, the researcher asked the participant to evaluate his or her performance and provided either general praise or corrective feedback based upon his or her response and performance on the role-play. The researcher then asked the participant why the role-play was "cool" or "not cool" and provided general praise or feedback based upon their response. The participant role-played the skill until he or she demonstrated 100% of the steps during two consecutive role-plays. If the participant role-played the skill incorrectly on two consecutive role-plays, the researcher provided verbal prompts by stating the steps prior to the participant displaying them during the role-play.

### Maintenance

The maintenance condition was identical to the baseline condition. The researchers implemented the maintenance condition after a participant reached mastery criterion during the intervention condition.

## Design

A multiple baseline across participants design was utilized to evaluate the procedure. The design consisted of three conditions: baseline, intervention and maintenance. Each participant was taught a different social behavior; however, each social behavior fell under the same class (i.e., social interaction) of behaviors. Within this design, intervention is not implemented on the second or third participant until an increase of behavior is demonstrated by the previous participant; functional control is established when a change of behavior occurs when and only when the intervention is implemented.

## IOA and Treatment Fidelity

A primary observer scored each NPS and a secondary observer was utilized for interobserver agreement (IOA). IOA was collected on the primary dependent variable during 51.5% of probe sessions (range, 35–63.5% across participants). The reliability taker had 5 years of experience in the field of applied behavior analysis and had experience taking reliability on similar behaviors during previous research projects. The researchers provide training on how to take reliability prior to the baseline condition (described above). Training

consisted of didactic instruction plus role-playing opportunities. During the study, IOA was calculated by totaling the number of agreements on the scoring of each skill step divided by the total number of agreements plus disagreements. IOA for the primary dependent variable was 100% across all probes.

To assess treatment fidelity, an independent observer recorded planned researcher behaviors during 56.2% of teaching sessions (range, 25–100% across participants). Planned researcher behaviors were the researcher: (a) demonstrating the behavior correctly twice and incorrectly twice; (b) asking the participant to discriminate whether each role-play was "cool" or "not cool" and why; (c) providing appropriate feedback based upon participant responding during each demonstration trial; (d) having the participant role-play the behavior until the participant displayed the skill 100% correct across two consecutive probes; (e) asking the student to rate his or her own performance; (f) providing appropriate feedback after each role-play opportunity; and (g) providing prompting after two consecutive incorrect responses. Treatment fidelity was 100% across all sessions.



## RESULTS

### Skill Acquisition

Figure 1 displays the results of participant performance during NPS. During baseline, Sara displayed 0% of the steps across all probes; within 5 sessions Sara reached mastery criterion and she displayed 100% of the steps throughout maintenance. During baseline, Brady displayed 0% of the steps across all probes. Brady reached mastery criterion within 3 sessions of teaching and he displayed 100% of the steps throughout maintenance. During baseline, Kennedy displayed 0% of the steps during 8 of the 9 probes. Kennedy reached mastery criterion within 8 sessions and she displayed 100% of the steps throughout maintenance. It took Kennedy the most time to respond to the treatment as compared to the other two participants. Additionally, Kennedy went from never responding correctly during naturalistic probes as part of intervention to responding 100% correct for 3 consecutive sessions. It was hypothesized that it took longer for Kennedy to respond to the intervention as she had a longer behavioral history of not displaying the behavior correctly as compared to Sara and Brady. It is assumed that it took a few sessions for Kennedy to come in contact with enough reinforcement (during teaching) to change her behavior, which may be the reason why Kennedy went from not responding correctly to responding correctly 100% for the remainder of naturalistic probes. The results show that the procedure was effective in teaching social behaviors to all three participants diagnosed with ASD and the length of time to reach mastery criterion was within the range

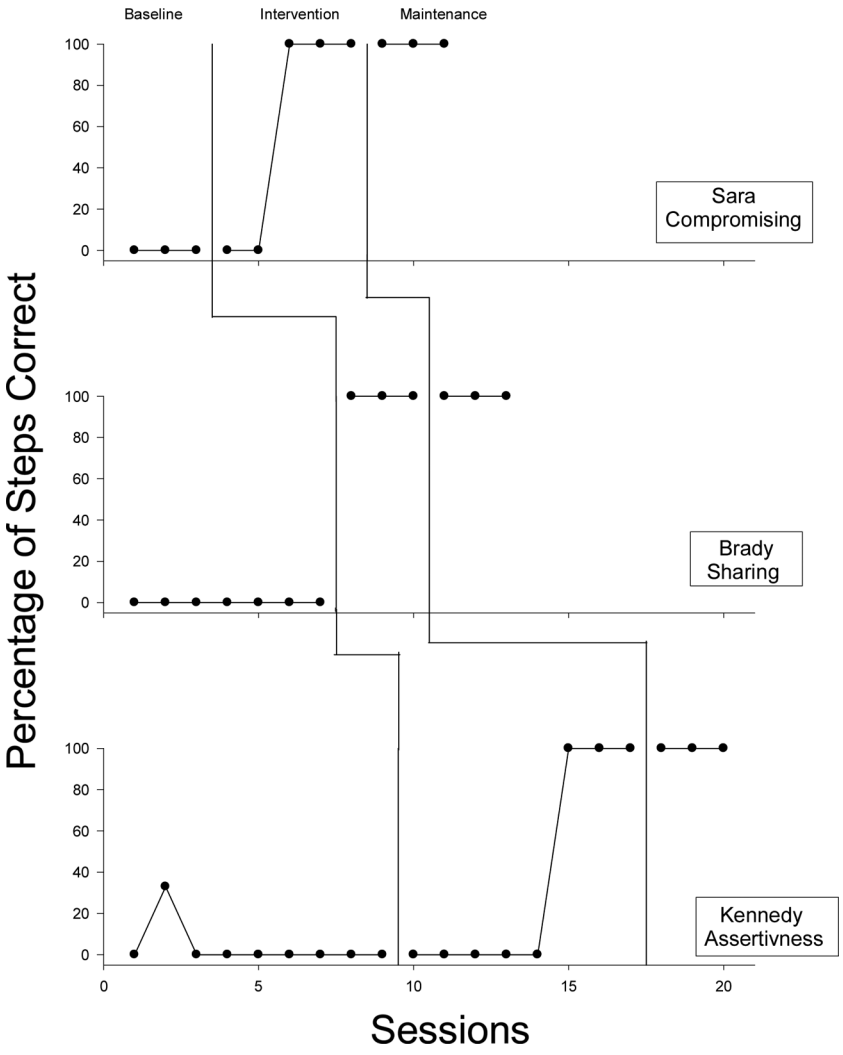


**FIGURE 1** Participant skill acquisition.

for other commonly implemented interventions (Leaf et al., 2010; Paterson & Arco, 2007).

## Demonstrations and Role-Plays

Throughout intervention, Sara had a total of 20 demonstration trials. Sara's average correct responding for appropriate discrimination was 90% across all sessions (range, 75–100% per session) and average correct responding for stating why the demonstration was "cool" or "not cool" was 95% (range, 75–100% per session). Brady had a total of 12 demonstration trials; Brady's

average correct responding for discrimination was 100% across all sessions and average correct responding for stating why the demonstration was "cool" or "not cool" was 91.6% (range, 75–100% per session). Kennedy had a total of 32 demonstration trials; Kennedy's correct responding for discrimination was 100% across all sessions and average correct responding for stating why the demonstration was "cool" or "not cool" was 96.9% (range, 75–100% per session). Therefore, the results showed that participants were able to discriminate and state why demonstrations were "cool" or "not cool" with a high degree of accuracy.

Across all teaching sessions, Sara averaged 2 role-plays per session; Brady averaged 2.3 role-plays per session (range, 2–3 per session); and Kennedy averaged 2.25 role-plays per session (range, 2–4 per session). Therefore, the results show that the participants required very minimal role-plays during each teaching session.



## DISCUSSION

The purpose of this study was first to evaluate if the CNC with role-play procedure was effective in teaching social behaviors to individuals diagnosed with ASD. The results indicated that all three participants were able to learn the behaviors taught to them, were able to generalize these behaviors to NPS, and were able to respond accurately during teaching. Second, this study attempted to expand upon the literature in four ways. First, the study utilized role-playing as a mandatory component. During the original CNC study (Leaf et al., 2012) participants were only able to reach mastery criterion on 50% of skills with demonstration alone. In this study, participants were able to reach mastery criterion on 100% of skills with demonstration plus role-playing. These results suggest that role-playing may be an important component in skill acquisition. This study also evaluated the CNC procedure with a different set of children while teaching a different set of skills and still found positive results. As suggested by Horner et al. (2005), for a procedure to be considered evidence based the procedure must be conducted across at least 5 different studies and 20 different participants. Therefore, this study assists in moving the CNC procedure toward becoming evidence based. Finally, we utilized the social skills taxonomy in selecting targeted social behaviors, as opposed to arbitrarily selecting the targeted behaviors as was done in the previous research on CNC.

The CNC procedure may be an effective method to teach social behaviors to individuals diagnosed with ASD for several reasons. One reason why the procedure may be effective is due to the researcher demonstrating both appropriate (e.g., "cool") and inappropriate (e.g., "not cool") behaviors. Other interventions that utilize demonstration typically demonstrate only the appropriate behaviors. Therefore, the participant may not be able

to observe what he or she is doing incorrectly in his or her natural environment. Having the participant observe incorrect demonstrations may lead to a change in his or her behavior, as he or she would be able to better discriminate their own behavior. This is an area that should be addressed by future researchers by comparing correct demonstration only versus correct and incorrect demonstrations, in order to identify which results in a better change of behavior.

The CNC procedure may also be effective because it has the participant role-play the behavior with the adult. Role-playing is an important component in several procedures (e.g., video modeling, the teaching interaction procedure, behavioral skills training) as it allows the participant to positively practice the behavior under more controlled settings. Having the participant practice with adults who can provide both positive reinforcement and punishment (i.e., corrective feedback) may lead to the participant better displaying the targeted social behavior.

Finally, the CNC procedure can be characterized as a train loosely approach that also utilizes multiple exemplars, both of which can result in higher levels of generalization (Stokes & Baer, 1977). During demonstrations and role-plays the teacher can systematically program different responses (e.g., taking the toy away with more force or less force, being more or less obvious when requesting a snack, or being more or less obvious in saying which game they want to play). The ability for the teacher to change the wording and role-playing per session could allow for better generalization during more natural conditions.

This study is not without its limitations. First, the study only taught three social skills across three participants; future researchers should examine a wider variety of skills with more students. Future researchers should also evaluate ways to implement the teaching procedure with more impaired students with ASD. As recommend by Horner et al. (2005), there needs to be a minimum of 5 studies, across at least 20 students, and across different research sites for a procedure to be considered evidence based. Thus, more research on the cool versus not cool procedure is justified.

Second, we utilized a multiple baseline design across students and skills, which may limit the functional control demonstrated. Typically, multiple baseline designs are utilized across either different participants with the same skills or across three different skills and replicated across participants. This study differs in that it was across three different participants and across three different skills; this was due to the fact that all skills were considered the same class of behavior. Nevertheless, future researchers may wish to evaluate the procedure using a more traditional single subject design.

Third, we did not teach any discrimination to the participants of when they should and should not display the targeted skills. The participants should not always share a snack, or not always ask for a toy back, or should not always have to compromise. However, these participants were engaging

in the behavior in the extreme (i.e., never sharing a snack, never asking for a toy back the appropriate way, or never compromising). Therefore, we wanted to teach how to engage in the appropriate behavior before teaching the participant how to respond under different conditions. As this was a preliminary analysis, we did not capture teaching under these different conditions. Future researchers may wish to explore how to teach children how to respond when different antecedents present themselves.

Fourth, this study only evaluated a slight degree of generalization for each participant. The NPS required generalization to a different person and setting, but they were not conducted in the participant's home or community. Additionally, the researcher was present in the room to score behavior; the researcher may have had stimulus control over participant responding. Future researchers should measure higher degrees of generalization (e.g., school, home, and community) without the presence of the teachers who were responsible for the teaching to determine how well the participants are able to generalize to other environments. Fifth, Kennedy did not start displaying the skill correctly until the sixth session of treatment. Therefore, she spent the majority of the intervention condition responding incorrectly during naturalistic probes. A final limitation is that although the social skills taxonomy was utilized to determine skills, there was no formal protocol in its usage. Future researchers may wish to examine how to more formally use the taxonomy to identify meaningful social behaviors.

Despite these limitations, this study showed that a CNC procedure utilizing the social taxonomy was effective in increasing social behaviors for three children diagnosed with ASD. Additionally, the study was able to expand upon the previous research. Future researchers should continue to evaluate the CNC procedure for teaching a wider range of social behaviors to a wider range of populations. If the procedure continues to show effective gains for individuals diagnosed with ASD, future researchers should start to compare CNC to other commonly implemented procedures (e.g., social stories, video modeling, teaching interaction procedure) to identify the most effective and efficient procedures to teach social skills to children with ASD.



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