



Published in final edited form as:

J Autism Dev Disord. 2014 May ; 44(5): 1055–1063. doi:10.1007/s10803-013-1956-y.

Using Self-Management to Improve the Reciprocal Social Conversation of Children with Autism Spectrum Disorder

Lynn Kern Koegel, Ph.D.,

Clinical Director, Koegel Autism Center, University of California, Santa Barbara

Mi Na Park, M.A., and

Clinical, Counseling, and School Psychology, Gevirtz Graduate School of Education, University of California, Santa Barbara

Robert L. Koegel, Ph.D

Director, Koegel Autism Center, Gevirtz Graduate School of Education, University of California, Santa Barbara

Abstract

Individuals with autism spectrum disorders (ASD) often exhibit difficulties with reciprocal social conversation, engaging in limited verbal exchanges, even when language structures are intact. This study employed a multiple baseline design to examine the effectiveness of a self-management intervention targeting (1) on-topic responsiveness to a conversational partner; (2) expansion of the conversational topic; and (3) on-topic question asking. Results demonstrated improved reciprocal social conversation through elaborated responses and on-topic question asking, which generalized and maintained. Social validity measures by naïve observers indicated that the intervention led to meaningful improvements during conversation, including interest, naturalness, and desirability as a conversational partner.

Keywords

Autism; Communication; Conversation; Self-Management; Intervention

Difficulties with pragmatics, or the ability to use language in a social manner, are common in the social communication of children with autism spectrum disorder (ASD) (Baltaxe, 1977; Fine, Bartolucci, Szatmari, & Ginsberg, 1994; Jones & Schwartz, 2009). A well-documented area of pragmatic difficulty for children with ASD is reciprocal social conversation (Landa, 1992; Paul et al., 2004). Specific challenges may relate to topic and information management (e.g., initiating and expanding on conversational topics) and reciprocity (i.e., establishing a reciprocal “to and fro” pattern of conversation and sustaining a conversational exchange) (Capps, Kehres, & Sigman, 1998; Chin & Bernard-Optiz, 2000; de Villiers, Fine, Ginsberg, Vaccarella, & Szatmari, 2007; Jones & Schwartz, 2009; Landa et al., 1992; Paul, Orlovski, Marcinko, & Volkmar, 2009), which may interfere with friendship development (Kasari, Rotheram-Fuller, Locke, & Gulsrud, 2012; Locke, Kasari, Rotheram-Fuller, Kretzmann, & Jacobs, 2013).

Correspondence concerning this article should be addressed to Dr. Lynn Kern Koegel, Koegel Autism Center, Clinical, Counseling, and School Psychology Department, Graduate School of Education, University of California, Santa Barbara, Santa Barbara, California, 93106-9490. lynnk@education.ucsb.edu.

Drs. Robert and Lynn Koegel are also partners in the private firm, Koegel Autism Consultants, LLC.

In typically developing children, a variety of conversation skills that help maintain reciprocity, such as question-asking, develop early in their preschool years. These skills become increasingly sophisticated throughout development and lead to various learning opportunities embedded in social contexts (Koegel, Camarata, Valdez-Menchaca, & Koegel, 1998). However, because the conversations of children with ASD are characterized by short responses, sporadic initiations, and infrequent sharing of new, relevant information, their opportunities to learn from and participate in social interactions are limited. These conversational deficits, in turn, are likely to increase the risk of social withdrawal and isolation (Koegel, Frea & Surratt, 1994).

In a review of the literature, Hughes et al. (2012) discussed a variety of instructional procedures that have been used to improve social conversation. These included social problem-solving instruction, wherein students practice identifying and evaluating a social context and responding appropriately in that setting. Often this is accomplished through practice or social stories. Peer networks have also been used extensively where peers (either trained or untrained) serve as interaction partners. However, generalization has been a reported problem in many of the studies, and very few strategies have been reported for specifically addressing reciprocal conversation in individuals with ASD.

One procedure shown to be effective in ameliorating social communication impairments is to teach conversational skills through self-management (Boettcher, 2004; Koegel, Koegel, Hurley, & Frea, 1992; Morrison, Kamps, Garcia, & Parker, 2001; Newman, Reinecke, & Meinberg, 2000; Palmen, Didden, & Arts, 2008; Strain, Kohler, Storey, & Danko, 1994). In addition to its demonstrated effectiveness, benefits of self-management include its ease of transportability and facilitation of generalization of newly acquired skills. This latter point is particularly important because self-management encourages children to self-regulate their own behaviors rather than relying on others for prompts or other external interventions (Lee, Simpson, & Shogren, 2007; McDougall, 1998). For example, Palmen, Didden, & Arts (2008) used self-management strategies as part of their small-group training to improve question-asking in adolescents with high-functioning ASD. Their results suggested that self-management was effective in increasing question-asking during conversation. Furthermore, these treatments gains were shown to have generalized across settings and maintained one month following intervention.

Previous research has suggested that adults can improve conversational interactions with behavioral interventions (Nuernberger, Rindahl, Vargo, Crumpecker, & Gunnarsson, 2013) using targeted parts of conversational speech; however, additional research targeting multiple communicative acts as a continued verbal interaction is warranted (Charlop-Christy & Kelso, 2003; Paul, 2008; Raghavendra, 2013). Further, self-management has been recommended to improve generalization and maintenance of targeted social areas (Hughes et al., 2012). Thus, this study attempted to further the research by using self-management for a series of speech acts, rather than single speech acts, such as initiating or responding to a conversational partner. It was hypothesized that this would facilitate the development of more in-depth social conversation, rather than simply improve social interaction. Therefore, the purpose of this study was to assess whether: 1) self-management procedures could improve sustained reciprocal social conversation in children with ASD by simultaneously targeting on-topic responsiveness, elaboration of responses, and on-topic question-asking; 2) treatment gains would maintain once intervention was faded; 3) treatment gains would generalize to new conversational partners once intervention was faded; and 4) the intervention would result in socially significant improvements in the children's social conversations.

Method

Participants

Two children and one adolescent with autism participated in this study. All participants were independently diagnosed with autism by a qualified professional from an outside agency according to DSM-IV-TR diagnostic criteria (APA, 2000). That is, they demonstrated the following characteristics: 1) qualitative impairment in social interaction, 2) delays in communication, and 3) restricted, repetitive and stereotyped patterns of behavior, interests, and activities. According to parent and clinician reports, all participants failed to demonstrate appropriate reciprocal social conversation skills.

Child 1—Child 1, of Asian and White descent, was 9 years and 6 months old at the start of the study. During baseline probes, he did not engage in social conversation with others. While he typically spoke in sentences of five words or greater, these utterances were generally used for the function of requesting, protesting, or to discuss his restricted interest (the color green). On the Expressive One-Word Picture Vocabulary Test (EOW-PVT), he received an age equivalence of 12 years 5 months. Despite having sufficient expressive vocabulary and language to carry on a conversation, his parents and clinicians reported a long history of difficulty maintaining conversation. His mother reported significant concerns about her son's lack of conversational interactions and that he had no peer interactions. The primary language spoken at home was English.

Child 2—Child 2, a Latino boy, was 14 years and 11 months old at the beginning of the study. His pragmatic difficulties included a lack of engaging in social conversation and the use of language primarily to request items or to respond to others' questions. His age equivalent score on the EOW-PVT was 11 years 5 months and he was able to produce sentences comprised of five to eight words; however his parents and clinicians reported that they struggled to sustain a conversation with him as he generally responded with only brief answers. Although some Spanish was spoken at home, English was the family's primary language.

Child 3—Child 3, of Asian and White descent, was 4 years and 10 months old at the start of the study. During baseline probes, he did not engage in social conversation, and primarily used his language to request items, protest, or respond briefly to questions. His age equivalence was 6 years 10 months on the EOW-PVT. He was able to create syntactically correct phrases and sentences consisting of five or more words, but more frequently used short utterances or was unresponsive. His parents and clinicians reported that he rarely expanded on his responses or the conversation topic at hand, failed to maintain the conversation, and demonstrated low responsiveness when asked open-ended questions.

Settings

All sessions were conducted in the children's homes. Children 1 and 2 lived with their mother and father and Child 3 lived with his father (his mother was deceased). Intervention took place in one room of the home and all generalization and maintenance probes were collected in a different room of the home where intervention had not taken place.

Design

A multiple baseline design across participants (Barlow, Nock, & Hersen, 2008) was employed to assess the effects of the self-management intervention on reciprocal social conversation skills. This across participant design with staggered baselines allowed for three demonstrations of experimental effect at three points in time. Baseline consisted of three probes for Child 1, five probes for Child 2, and seven probes for Child 3. Data were

collected approximately weekly throughout baseline, intervention and generalization phases of the study.

Dependent Measures

Dependent measures recorded in this study were related to the acquisition and generalization of the behaviors targeted for intervention, as well as to the social validity of the conversational interactions.

Elaboration of Response—The first dependent measure was the percent of elaborated responses following a conversational partner's question during the social conversation probes. An elaborated response was operationalized as providing an on-topic response to the conversational partner's question and expanding on the response by adding relevant, on-topic information. For the purposes of this study, the first 10 open-ended questions during the 10-minute conversation probe were analyzed.

Reciprocal Question-asking—The second dependent measure was reciprocal question-asking. This was operationalized as asking a question to the conversational partner that was related to their preceding response or to the conversational partner's initial question. For each data probe, frequency data were collected to assess the total number of reciprocal questions asked throughout the conversation probe. Only questions that were asked independently, without prompting or assistance from the conversational partner, were included in the frequency count.

Social Validity Measures—For the social validity measures, observers were recruited from a pool of undergraduate students. All observers were naïve to the experimental hypotheses of the study. Two 5-minute videotaped probes of each participant engaging in conversation from baseline and post-intervention phases (i.e., generalization probes for Child 1 and Child 2 and final intervention session for Child 3) of the study were presented in random order. None of the children were using the self-management scoring sheets during these sessions. Five-minute conversational probes were selected for scoring, as they contained a sufficient number of conversational exchanges (i.e., at least 10) to evaluate the child's overall social conversation.

Observers rated five areas using a 4-point Likert-type scale (1=disagree, 2=somewhat disagree, 3=somewhat agree, 4=agree). The five items rated were: 1) The child shows interest in the conversation; 2) I would like to talk to this child; 3) The child's conversation/speech sounds natural; 4) The child engages in sufficient reciprocal to-and-fro conversational exchanges; and 5) The child provides sufficient background information and elaborates on his responses.

Baseline—Baseline probes consisted of 10-minute interactions during which a young adult attempted to have a conversation with the participant. The conversational partner was a graduate student who was naïve to the purpose of the study. During baseline probes, the conversational partner was given a few general guidelines, which included a request to ask the participant at least 10 open-ended questions about neutral, age-appropriate topics. In addition, the conversational partner was asked to converse as normally as possible, making sure to allow adequate time for the child to respond. In the event that the participant initiated conversation with the conversational partner or responded to the conversational partner's question, the conversational partner was instructed to provide a short response and wait approximately 3–5 seconds to see if the participant would further elaborate before asking another question. All baseline probes for the three participants were collected in natural

environments (i.e., the child's home) and were videotaped using a small portable camera, which was set up well before the probe, for the purpose of coding the dependent measures.

Intervention: Self-management—As illustrated in Figure 1, the self-management schematic provided a visual framework of the targeted components of conversation designed to improve the reciprocal nature of the interaction. Also included on the sheet were boxes in which the child self-recorded their “conversation points” for successfully completing all three components. Self-management procedures were taught according to the manual, *How to Teach Self-Management to People with Severe Disabilities: A Training Manual* (Koegel, Koegel, & Parks, 1992). Specifically, the child was first asked to identify a highly preferred activity or item to exchange for “conversation points.” These highly preferred activities or items ranged from snacks, board games, video games, and videos. “Conversation points” were awarded when the child demonstrated “appropriate conversation,” which was defined as the consecutive execution of the following three responses: 1) answering the question or making an on-topic comment, 2) elaborating on their response, and 3) asking an on-topic question to the conversational partner. Additional criteria for earning a “conversation point” were to provide all three responses in the specified order in response to each question presented by the conversational partner. The children were required to adhere to the specified order of responses in an attempt to minimize an interview-like conversational exchange. Along with the self-management schematic, a more child-friendly definition of the targeted components of conversation was presented as “answer the question, add more information or tell me more, and ask a question back.” For the youngest participant (Child 3), the instruction was simplified to “answer the question, tell me more, then ask a question.”

During intervention, a graduate student clinician, who served as the conversational partner, then proceeded to converse with the child. During the first session with Child 1 and the first two sessions with Children 2 and 3, the clinician prompted the children to engage in the three steps of the framework and then to self-manage the use of the framework by marking points using pencils, pens, or markers on the self-management sheet. No additional prompting was required after these initial sessions. The number of points required to earn a reinforcer was increased based on the child's unprompted performance. The children received access to their chosen reinforcer immediately upon earning the predetermined number of conversation points. The self-management procedures were progressively faded when the child was able to demonstrate correct use of the target behaviors (i.e., consecutive execution of answering the question, elaborating on their response, and asking an on-topic question) and accurate self-monitoring for at least 75% of the conversational bids across two consecutive sessions. Over several sessions, prompts were faded as well as the number of verbal and gestural prompts to refer to the visual framework throughout practice. In the last stage of the fading procedures, the child was not prompted to earn “conversation points” prior to the conversational exchange and the self-management sheet was completely removed.

Consistent with the baseline phase, common (as opposed to child-preferred) and age-appropriate conversation topics, such as school events, weekend activities, vacations, food, pets, and holidays, were presented. These conversation topics as introduced by the clinician were held constant across sessions and expanded consistent with each child's responses during the reciprocal conversation.

Generalization and Follow-up—After the self-management program was completely faded, data were collected to assess for generalization to new conversational partners for Children 1 and 2 (Child 3 was not available for these measures due to an extended illness and the hospitalization of his father). Additionally, follow-up measures were collected for

Children 1 and 2 approximately one year after the end of intervention. These data were collected with novel conversational partners in novel settings using data collection procedures identical to those used during baseline.

Reliability

Interobserver agreement was calculated for 30% of the videotaped probes. Two observers independently rated the probes presented in a random order from baseline, intervention, and generalization phases. In order to control for chance agreement, Cohen's kappa was also calculated. Agreements between observers were defined as identical ratings with respect to the recording of elaborated responses and reciprocal question-asking. Agreements between observers on the social validity measure were defined as both raters either agreed or disagreed with the statement. Percent agreement was calculated by dividing the number of agreements by the total number of agreements plus disagreements for each dependent measure on each probe. The average percent agreement calculated across all three children was 95% (range: 80–100%) for elaboration of their initial response, 94% (range: 77–100%) for reciprocal question-asking, and 87% for social validity ratings (range: 60–100%). Cohen's kappa for elaborated responses and social validity questionnaire ratings were calculated at 0.85 and 0.80, respectively, suggesting high overall reliability for the measures.

Results

Elaborated Responses

The results for elaborated responses are presented in Figure 2. During baseline, Child 1 engaged in relatively low levels of elaborated responses; however, the rate of elaborated responses increased with intervention. Specifically, he provided elaborated responses for a mean of 25% across the three baseline probes, with his final point at 0%. Following the implementation of the self-management procedures, he rapidly increased his percentage of elaborated responses to near 100% of the opportunities. Further, he continued to demonstrate higher levels of elaborated responding (range of 90–100%) even after the visual framework and self-management were faded. During generalization probes, he engaged in elaborated responding with a mean of 50% (range: 40–60%). One year follow-up data show that he maintained these gains and continued to produce elaborated responses with a mean of 70%.

Child 2 also demonstrated low levels of elaborated responses prior to intervention. Throughout the five baseline probes, he exhibited elaborated responses at a mean of 28% (range: 20–40%) with a decreasing trend over the last four baseline sessions. After the start of the self-management intervention he increased his elaborated responses, with an overall mean of 85%. During the generalization phase he produced elaborated responses at a mean of 45% (range: 40–50%) and during the follow-up probe he produced elaborated responses at 80%.

Child 3 demonstrated a similar improving pattern, with increases in elaborated responding after the self-management intervention was implemented. During baseline, he infrequently produced elaborated responses with a mean of 14% of (range: 0–50%). His percent of elaborated responses increased after introducing the self-management procedures, with an increase to an average of 60% (range: 0–83%).

Reciprocal Question-asking

Results for reciprocal question-asking are presented in Figure 3. All three children demonstrated increases in reciprocal question-asking following the introduction of the self-management procedures. For example, Child 1's mean number of reciprocal questions asked

throughout the baseline phase was 1.3 during the 10-minute probes. With the use of self-management, the mean number of questions asked throughout the intervention phase increased, with an average of 10.1 per 10-minute probe. His question-asking increased rapidly following the completion of the prompting, from 2 unprompted questions during the first intervention probe, 11 unprompted questions during the second intervention probe, and 9 to 13 unprompted questions for the remainder of the intervention phase. During generalization probes, he continued to demonstrate unprompted reciprocal question-asking, averaging 4.5 questions to the novel conversation partner. At the one-year post-intervention probe he had increased well above both the baseline and the generalization probes, asking 8 unprompted questions during the follow-up conversation probe.

Child 2 demonstrated almost no reciprocal question-asking prior to the start of self-management. He asked a mean number of 0.2 questions during the five baseline conversation probes. By the second self-management session, however, increases in his unprompted reciprocal question-asking were evident. Like Child 1, Child 2's unprompted question-asking rapidly increased during the conversation probes, with 0, 4, 10, and 12 questions during the first 4 intervention probes. Overall, he asked a mean number of 9.4 unprompted questions to the conversational partner during the intervention phase. His generalization and follow-up data showed improvement in reciprocal question-asking over baseline, with results showing he asked an average of 4 unprompted questions during each generalization probe and 6 unprompted questions during follow-up.

Unprompted reciprocal question-asking data for Child 3 were similar to those presented for the first two participants. During baseline, he rarely demonstrated question-asking, as evidenced by a mean number of 0.4 unprompted questions, with no questions during the final five baseline probes. Following the introduction of self-management procedures, unprompted reciprocal question-asking increased, averaging 3.4 questions per conversation probe.

Social Validity Questionnaire

Table 1 presents the descriptive data (mode ratings, mean ratings, and standard deviations) for the social validation questionnaire items. Consistent with the other results, the post-intervention mode and mean ratings were substantially higher than baseline mode and mean ratings across all five items, suggesting naïve observers viewed the children as appearing more conversationally competent following intervention. Specifically, for Item 1 (interest), mean ratings increased from 1.67 at baseline to 3.60 at post-intervention and mode ratings increased from 1 at baseline to 4 at post-intervention. For Item 2 (desirability as a conversational partner), mean ratings increased from 2.10 at baseline to 3.53 at post-intervention and mode ratings increased from 2 at baseline to 4 at post-intervention. For Item 3 (naturalness of speech), mean ratings increased from 1.80 at baseline to 3.07 at post-intervention and mode ratings improved from 1 at baseline to 3 at post-intervention. For Item 4 (reciprocity), mean ratings increased from 1.27 at baseline to 3.40 at post-intervention and mode ratings increased from 1 at baseline and 4 at post-intervention. And for Item 5 (sufficient information), mean ratings increased from 1.53 at baseline to 3.60 at post-intervention and mode ratings improved from 1 at baseline and 4 at post-intervention. Thus, substantial gains were observed in overall conversational competence on social validity measures for all three children.

Effect Sizes and Percentage of Non-Overlapping Data

Effect size using (Cohen's *d*) was calculated using the standard mean difference method for all dependent measures and social validity ratings (Busk & Serlin, 1992). For the dependent measures, effect sizes were calculated across the baseline phase and the intervention

(including generalization probes) and follow-up phases (when available). Effect sizes for the social validity ratings were calculated across pre- and post-treatment probes for all three participants. Effect sizes of 0.2, 0.5, and 0.8 are representative of small, medium, and large effect sizes, respectively (Cohen, 1988). Large effect sizes occurred for all dependent measures and social validity ratings across all three children. Specifically, large effect sizes of $d = 2.5$ for Child 1, $d = 1.8$ for Child 2, and $d = 2.0$ for Child 3 were obtained for elaborated responses. Similarly, large effect sizes of $d = 3.7$ for Child 1, $d = 2.7$ for Child 2, and $d = 1.2$ for Child 3 were obtained for reciprocal question asking. Finally, large effect sizes were found across all five social validity questionnaire items (Item 1: $d = 2.5$, Item 2: $d = 1.9$, Item 3: $d = 1.5$, Item 4: $d = 3.2$, and Item 5: $d = 3.3$).

Percentage of non-overlapping data (PND; Scruggs, Mastropieri, & Casto, 1987) was also calculated for all three children in the intervention and follow-up phases (with their baselines) for elaborated responses and reciprocal question-asking. PND for elaborated responses was 89% for Child 1, 87% for Child 2, and 78% for Child 3. For Child 3, there were no overlapping points during the final 6 intervention sessions. PND for reciprocal question-asking was 95% for Child 1, 93% for Child 2, and 67% for Child 3. Again, for Child 3, there were no overlapping points during the final 6 intervention sessions.

Discussion

The data from this study demonstrated that the conversational framework and self-management procedures resulted in increases in elaborated responses and reciprocal question-asking during conversation. Furthermore, the intervention resulted in improved ratings of conversational competence on social validity questionnaire items rated by naïve observers. These findings have both theoretical and applied implications.

Some researchers have suggested that conversational challenges in individuals with ASD may be a performance deficit rather than a skill deficit (Koegel & Koegel, 2012; Palmen, Didden, & Arts, 2008; Schreibman, Stahmer, & Pierce, 1996). The results from this study support the performance deficit hypothesis, as the self-management procedures led to rapid and maintained improvements in elaborated responses and reciprocal question-asking that continued in the generalization and follow-up probes. Additionally, following the start of intervention, the children began to add an extensive, yet appropriate, amount of on-topic and relevant information during their conversational interactions. It may have been helpful that along with the self-management, a visual framework that did not rely on an external treatment provider to provide prompts was used, as this may have promoted the participants' behavior to come under the control of the covert rules.

While numerous studies have examined conversational impairments in individuals with ASD and have targeted specific parts of conversation such as question-asking, commenting, initiations, (Boettcher, 2004; Koegel, Camarata, Valdez-Menchaca, & Koegel, 1998; Palmen, Didden, & Arts, 2008; Sarokoff, Taylor & Harris, 1995; Taylor & Poulson, 2001), few studies have attempted to improve these conversational impairments by simultaneously addressing multiple conversational skills and conversations during ongoing interactions (Charlop-Kristy & Kelso, 2003) despite the fact that many researchers suggest a need for treatment in this area (Bang, Burns, & Nadag, 2013; Koegel, Kim, Koegel, & Schwartzman, 2013). The present study addressed basic conversation skills that, when paired together, might create an adequate amount of responding needed to maintain a reciprocal, sustained conversational interaction. The findings are encouraging, particularly because the children were scored as improving in reciprocity, interest, and naturalness during conversation by naïve observers. As well, all three children were scored as more desirable conversational partners following intervention.

Social communication in individuals with ASD would benefit from further research (Bang, Burns, & Nadig, 2013) assessing whether these treatment gains also generalized to peers, school, and other novel settings and, if so, the impact on the development and quality of peer relationships (Koegel, Vernon, Koegel, & Paullin, 2012). Also, it might be interesting to evaluate the conversation patterns of typically developing children of the same age of the participants used in this study to determine whether the intervention produced conversation patterns similar to those of neurotypical peers. Related, identifying ways in which typically developing peers can be integrated into the teaching situation may be a promising avenue for further research (DiSalvo & Oswald, 2002; McConnell, 2002; Odom, Brown, Frey, Karasu, Smith-Canter, & Strain, 2003; Rogers, 2000). In addition, social interventions at the earliest age possible may reduce the complicating effects of social dysfunction on development (Volkmar, 2013). Overall, the results from the present study are encouraging as they provide additional evidence that social communication can be improved and that targeted interventions can result in more sustained and meaningful social conversational exchanges for children with ASD.

Acknowledgments

This research and preparation of the manuscript were funded in part by NIH grant #DC010924 and generous donations from the Kelly Family Foundation, the Eli and Edythe L. Broad Center for Asperger's Research, and the Kind World Foundation. The authors would like to express our sincere appreciation to the families that participated in this research.

References

- American Psychiatric Association. Diagnostic and statistical manual of mental disorders. 4th ed., text revision. Washington, DC: American Psychiatric Association; 2000.
- Baltaxe C. Pragmatic deficits in the language of autistic adolescents. *Journal of Pediatric Psychology*. 1977; 2(4):176–180.
- Bang J, Burns J, Nadig A. Brief report: Conveying subjective experience in conversation: Production of mental state terms and personal narratives in individuals with high functioning autism. *Journal of Autism and Developmental Disorders*. 2013; 43(7):1732–1740. [PubMed: 23179342]
- Barlow, DH.; Nock, MK.; Hersen, M. *Single Case Experimental Designs: Strategies for Studying Behavior Change*. 3rd ed.. Needham Heights, MA: Allyn & Bacon; 2008.
- Boettcher, MA. Teaching social conversation skills to children with autism through self-management: An analysis of treatment gains and meaningful outcomes. Santa Barbara: Unpublished doctoral dissertation, University of California; 2004.
- Busk, PL.; Serlin, RC. Meta-analysis for single-case research. In: Kratochwill, TR.; Levin, JR., editors. *Single-case research designs and analysis: New directions for psychology and education*. Hillsdale, NJ: Lawrence Erlbaum Associates; 1992. p. 187-212.
- Capps L, Kehres J, Sigman M. Conversational abilities among children with autism and children with developmental delays. *Autism*. 1998; 2:325–344.
- Charlop-Christy MH, Kelso SE. Teaching children with autism conversational speech using a cue card/written script program. *Education and Treatment of Children*. 2003; 26:108–127.
- Chin HY, Bernard-Opitz V. Teaching conversational skills to children with autism: Effect on the development of a theory of mind. *Journal of Autism and Developmental Disorders*. 2000; 30:569–583. [PubMed: 11261468]
- Cohen, J. *Statistical power analysis for the behavioral sciences*. 2nd ed.. Hillsdale, NJ: Lawrence Earlbaum Associates; 1988.
- de Villiers J, Fine J, Ginsberg G, Vaccarella L, Szatmari P. Brief report: A scale for rating conversational impairment in autism spectrum disorder. *Journal of Autism and Developmental Disorders*. 2007; 37:1375–1380. [PubMed: 17082976]

- DiSalvo CA, Oswald DP. Peer-mediated interventions to increase the social interaction of children with autism: Consideration of peer expectancies. *Focus on Autism and Other Developmental Disabilities*. 2002; 17(4):198–207.
- Fine J, Bartolucci G, Szatmari P, Ginsberg G. Cohesive discourse in pervasive developmental disorders. *Journal of Autism and Developmental Disorders*. 1994; 24:315–329. [PubMed: 8050985]
- Hughes C, Kaplan L, Bernstein R, Boykin M, Reilly C, Brigham N, Cosgriff J, Heilingoetter J, Harvey M. Increasing social interaction skills of secondary school students with autism and/or intellectual disability: A review of interventions. *Research and Practice for Persons with Severe Disabilities*. 2012; 37(4):288–307.
- Jones CD, Schwartz IS. When asking questions is not enough: An observational study of social communication differences in high functioning children with autism. *Journal of Autism and Developmental Disorders*. 2009; 39:432–443. [PubMed: 18784993]
- Kasari C, Rotheram-Fuller E, Locke J, Gulsrud A. Making the connection: Randomized controlled trial of social skills at school for children with autism spectrum disorders. *Journal of Child Psychology and Psychiatry*. 2012; 53(4):431–439. [PubMed: 22118062]
- Koegel LK, Camarata SM, Valdez-Menchaca M, Koegel RL. Setting generalization of question-asking by children with autism. *American Journal on Mental Retardation*. 1998; 102:346–357. [PubMed: 9475943]
- Koegel, RL.; Frea, WD.; Surratt, AV. Self-management of problematic social behavior. In: Schopler, E.; Mesibov, GB., editors. *Behavioral issues in autism*. New York, NY, US: Plenum Press; 1994. p. 81-97.
- Koegel R, Kim S, Koegel L, Schwartzman B. Improving socialization for high school students with ASD by using their preferred interests. *Journal of Autism and Developmental Disorders*. 2013 doi:<http://dx.doi.org/10.1007/s10803-013-1765-3>.
- Koegel, RL.; Koegel, LK. *The PRT Pocket Guide*. Baltimore, MD: Brookes Publishing Co; 2012.
- Koegel LK, Koegel RL, Hurley C, Frea WD. Improving social skills and disruptive behavior in children with autism through self-management. *Journal of Applied Behavior Analysis*. 1992; 25:341–353. [PubMed: 1634427]
- Koegel, LK.; Koegel, RL.; Parks, DR. *How to teach self-management to people with severe disabilities: A training manual*. Santa Barbara: University of California; 1992.
- Koegel LK, Vernon TW, Koegel RL, Koegel BL, Paullin AW. Improving social engagement and initiations between children with autism spectrum disorder and their peers in inclusive settings. *Journal of Positive Behavior Interventions*. 2012; 14(4):220–227.
- Landa R, Piven J, Wzorek MM, Gayle JO, Chase GA, Folstein SE. Social language use in parents of autistic individuals. *Psychological Medicine: A Journal of Research in Psychiatry and Allied Sciences*. 1992; 22(1):245–254.
- Lee SH, Simpson RL, Shogren KA. Effects and implications of self-management for students with autism : A meta-analysis. *Focus on Autism and Other Developmental Disabilities*. 2007; 22(1):2–13.
- Locke J, Kasari C, Rotheram-Fuller M, Jacobs J. Social network changes over the school year among elementary school-aged children with and without an autism spectrum disorder. *School Mental Health*. 2013; 5(1):38–47.
- McConnell SR. Interventions to facilitate social interactions for young children with autism : Review of available research and recommendations for educational intervention and future research. *Journal of Autism and Developmental Disorders*. 2002; 32(5):351–372. [PubMed: 12463515]
- McDougall D. Research on self-management techniques used by students with disabilities in general education settings : A descriptive review. *Remedial and Special Education*. 1998; 19(5):310–320.
- Morrison L, Kamps K, Garcia J, Parker D. Peer mediation and monitoring strategies to improve initiations and social skills for students with autism. *Journal of Positive Behavior Intervention*. 2001; 3(4):237–250.
- Newman B, Reinecke DR, Meinberg DL. Self-management of varied responding in three students with autism. *Behavioral Interventions*. 2000; 1:145–151.

- Nuernberger JE, Ringdahl JE, Vargo KK, Crumpecker AC, Gunnarsson KF. Using a behavioral skills training package to teach conversation skills to young adults with autism spectrum disorders. *Research in Autism Spectrum Disorders*. 2013; 7(2):411–417.
- Odom SL, Brown WH, Frey T, Karasu N, Smith-Canter LL, Strain PS. Evidence-based practices for young children with autism: Contributions of single-subject design research. *Focus on Autism and Other Developmental Disabilities*. 2003; 18(3):166–175.
- Palmen A, Didden R, Arts M. Improving question asking in high-functioning adolescents with autism spectrum disorder: Effectiveness of small group training. *Autism*. 2008; 12(1):83–98. [PubMed: 18178598]
- Paul R. Interventions to improve communication in autism. *Child and adolescent psychiatric clinics*. 2008; 17:835–856.
- Paul R, Miles S, Cicchetti D, Sparrow S, Klin A, Volkmar F, Coflin M, Booker S. Adaptive behavior in autism and developmental pervasive development disorder – not otherwise specified: Microanalysis of scores on the Vineland Adaptive Behavior Scales. *Journal of Autism and Developmental Disorders*. 2004; 34(2):223–227. [PubMed: 15162940]
- Paul R, Orlovski SM, Marcinko HC, Volkmar F. Conversational behaviors in youth with high-functioning ASD and asperger syndrome. *Journal of Autism and Developmental Disorders*. 2009; 39(1):115–125. [PubMed: 18607708]
- Raghavendra P. Participation of children with disabilities: Measuring subjective and objective outcomes. *Child: Care, Health and Development*. 2013; 39(4):461–465.
- Rogers SJ. Interventions that facilitate socialization in children with autism. *Journal of Autism and Developmental Disorders*. 2000; 30:399–409. [PubMed: 11098875]
- Sarokoff RA, Taylor BA, Poulson CA. Teaching children with autism to engage in conversational exchanges: Script fading with embedded textual stimuli. *Journal of Applied Behavior Analysis*. 2001; 34(1):81–84. [PubMed: 11317993]
- Schreibman, L.; Stahmer, AC.; Pierce, KL. Alternative applications of pivotal response training: Teaching symbolic play and social interaction skills. In: Koegel, LK.; Koegel, RL.; Dunlap, G., editors. *Positive behavioral support: Including people with difficult behavior in the community*. Baltimore, MD: Paul H. Brookes Publishing; 1996. p. 353-371.
- Scruggs TE, Mastropieri MA, Casto G. The quantitative synthesis of single-subject research: Methodology and validation. *Remedial and Special Education*. 1987; 8(2):24–33.
- Strain PS, Kohler FW, Storey K, Danko CD. Teaching preschoolers with autism to self-monitor their social interactions: An analysis of results in home and school settings. *Journal of Emotional and Behavioral Disorders*. 1994; 2:78–88.
- Taylor BA, Harris SL. Teaching children with autism to seek information: Acquisition of novel information and generalization of responding. *Journal of Applied Behavior Analysis*. 1995; 28(1): 3–14. [PubMed: 7706148]
- Volkmar FR. Understanding the social brain in autism. *Developmental Psychobiology*. 2011; 53(5): 428–434. [PubMed: 21678390]

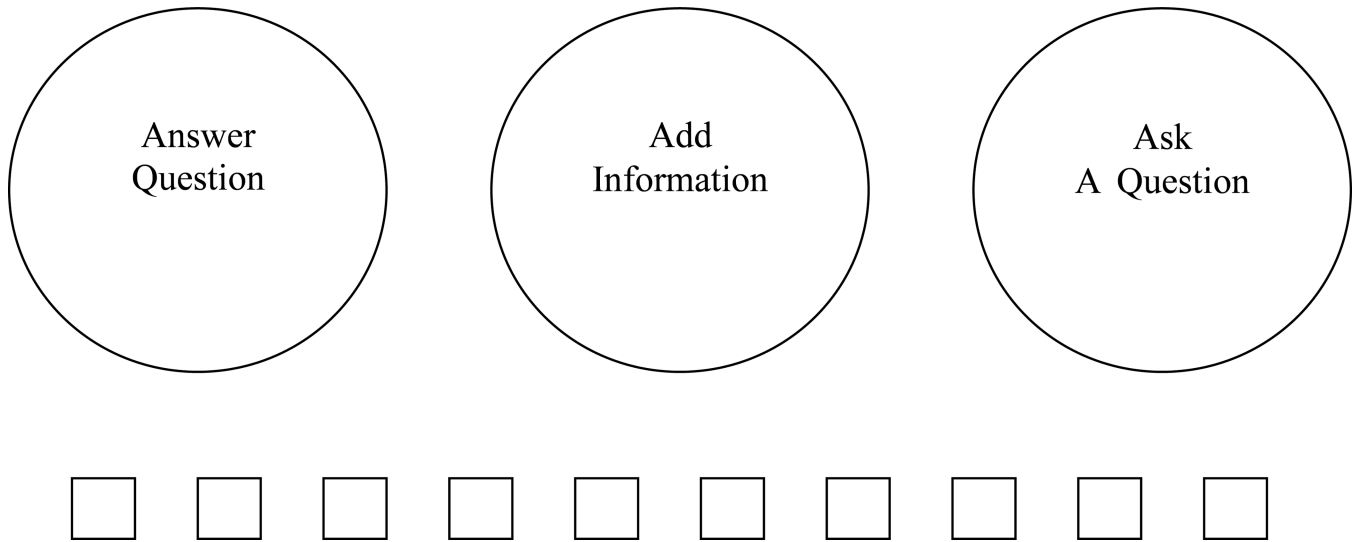


Figure 1.
Reciprocal social conversation framework with self-monitoring recording sheet.

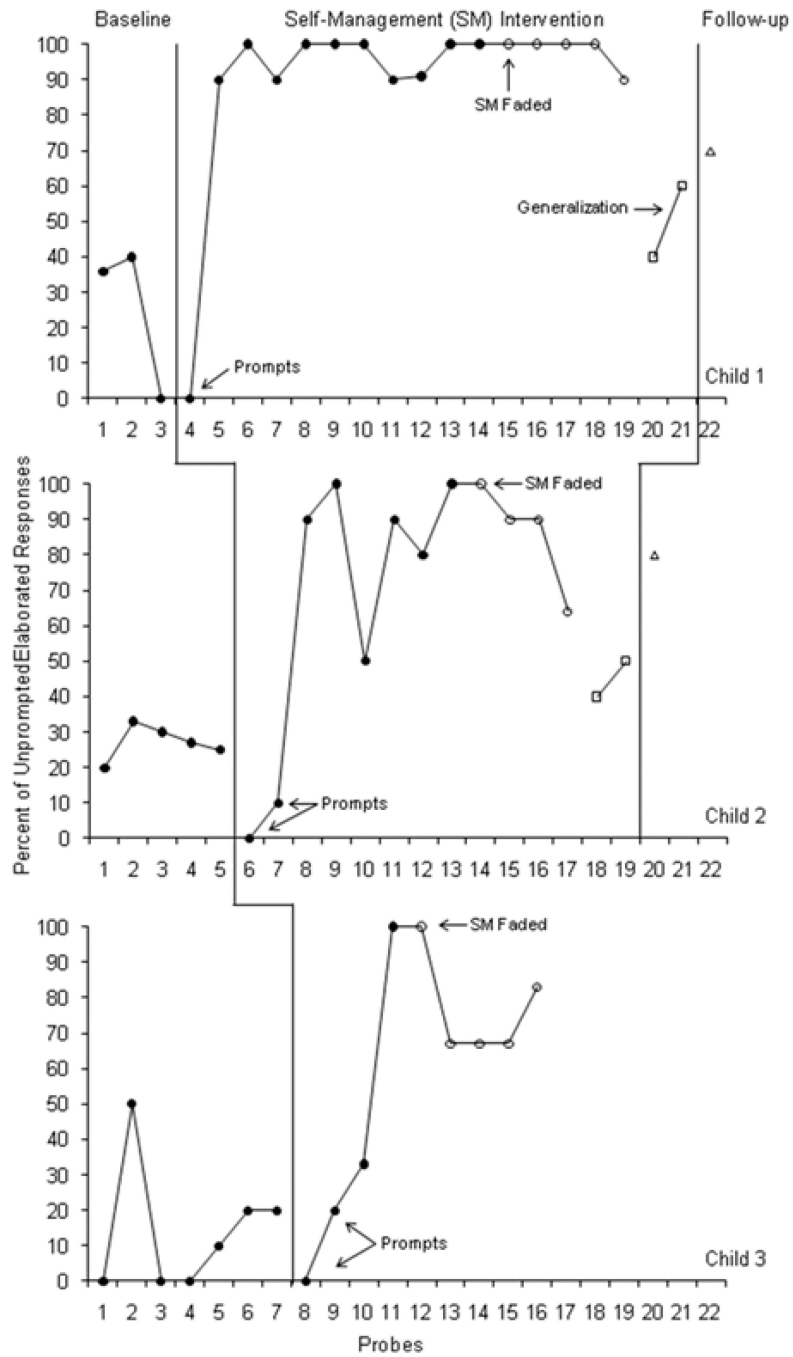


Figure 2. Percent of unprompted elaborated responses for Child 1, Child 2, and Child 3.

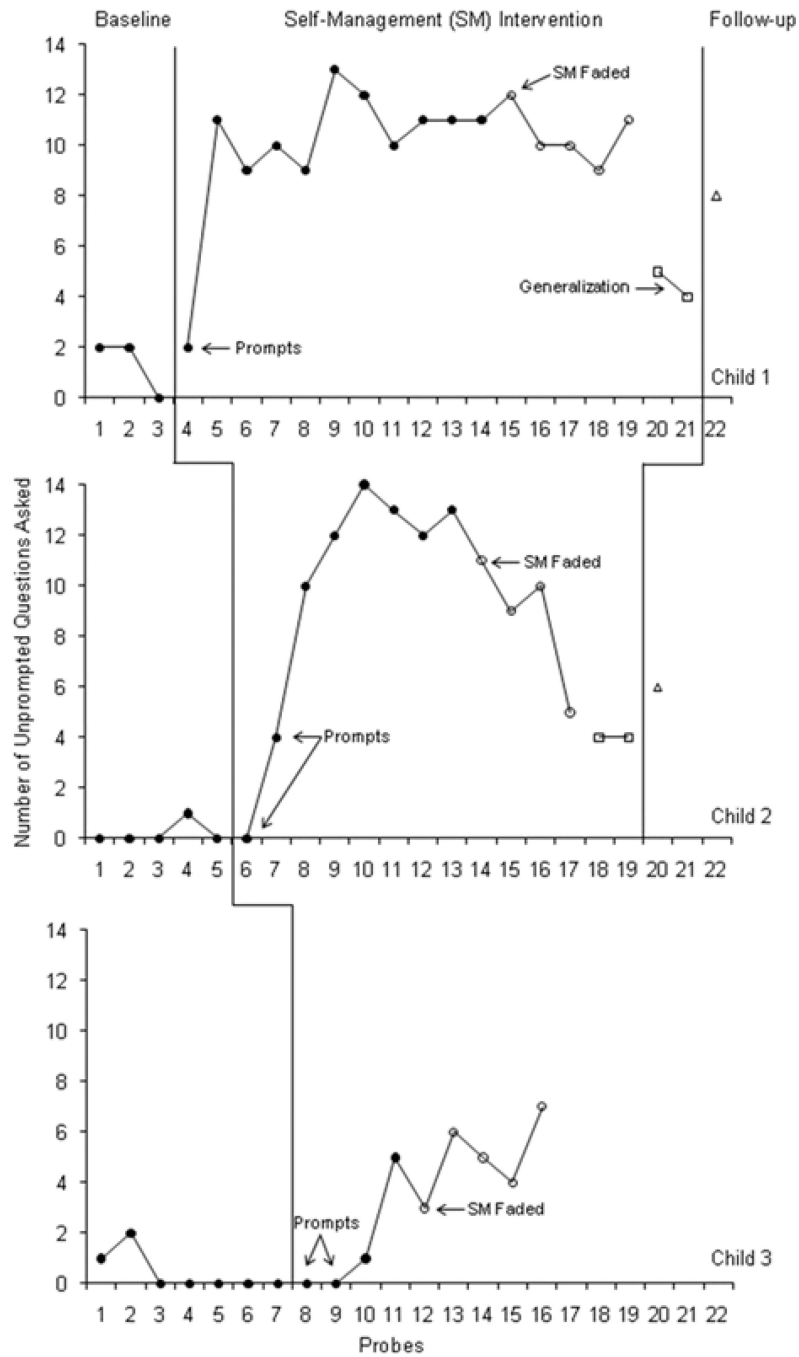


Figure 3. Total number of unprompted reciprocal questions asked by Child 1, Child 2, and Child 3.

Table 1

Mean (Standard Deviation) and Mode Ratings for Social Validation Questionnaire Items

Item	Mean		Mode	
	Pre	Post	Pre	Post
1. The child shows interest in the conversation.	1.67 (0.98)	3.60 (0.5)	1	4
2. I would like to talk to the child.	2.10 (0.88)	3.53 (0.64)	2	4
3. The child's conversation/speech sounds natural.	1.80 (0.86)	3.07 (0.80)	1	3
4. The child engages in sufficient reciprocal to-and-fro conversational exchanges.	1.27 (0.59)	3.40 (0.74)	1	4
5. The child provides sufficient background information and elaborates on their responses.	1.53 (0.74)	3.60 (0.51)	1	4