

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

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Abstract Individuals with autism spectrum disorders 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

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Introduction

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 et al. 1994; Jones and Schwartz 2009). A well-documented area of pragmatic difficulty for children with ASD is reciprocal social conversation (Landa et al. 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 et al. 1998; Chin and Bernard-Opitz 2000; de Villiers et al. 2007; Jones and Schwartz 2009; Landa et al. 1992; Paul et al. 2009), which may interfere with friendship development (Kasari et al. 2012; Locke et al. 2013).

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 et al. 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 et al. (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 instructions, 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 et al. 1992; Morrison et al. 2001; Newman et al. 2000; Palmen et al. 2008; Strain et al. 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 et al. 2007; McDougall 1998). For example, Palmen et al. (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 treatment gains were shown to have generalized across settings and maintained 1 month following intervention.

Previous research has suggested that adults can improve conversational interactions with behavioral interventions (Nuernberger et al. 2013) using targeted parts of conversational speech; however, additional research targeting multiple communicative acts as a continued verbal interaction is warranted (Charlop-Christy and 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.

Methods

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 (American Psychiatric Association 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 et al. 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-min 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-min 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-min 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-min 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

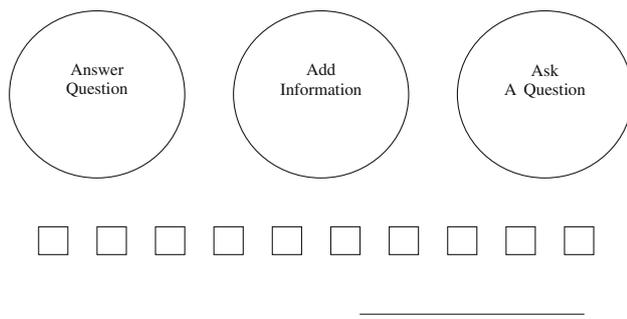


Fig. 1 Reciprocal social conversation framework with self-monitoring recording sheet

partner was instructed to provide a short response and wait approximately 3–5 s 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 Fig. 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 et al. 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 1 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

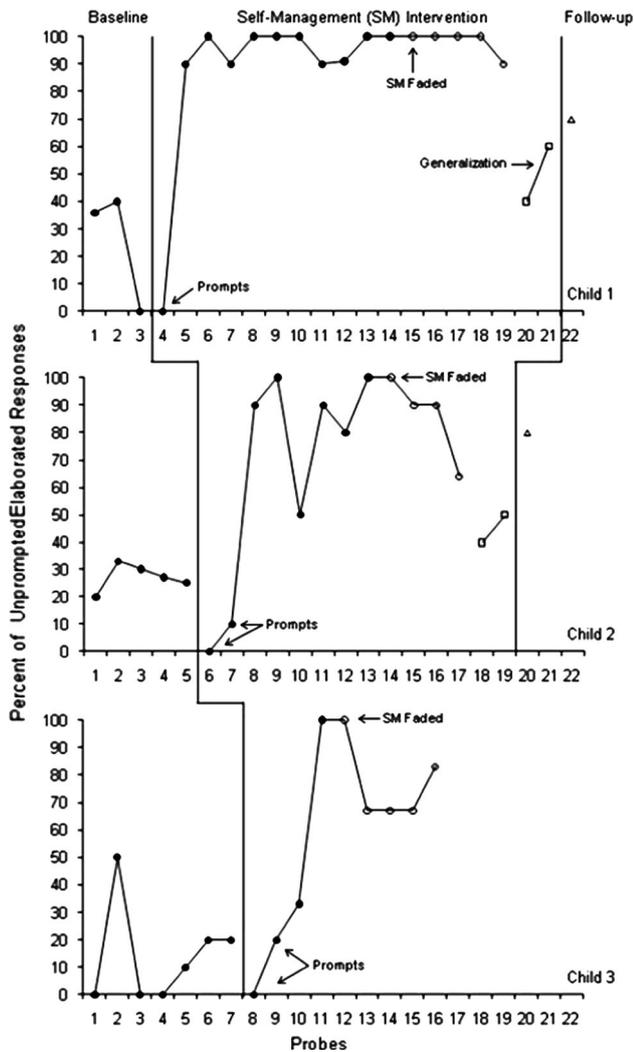


Fig. 2 Percent of unprompted elaborated responses for Child 1, Child 2, and Child 3

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 Fig. 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 Fig. 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-min probes. With the use of self-management, the mean number of questions asked throughout the intervention phase increased, with an

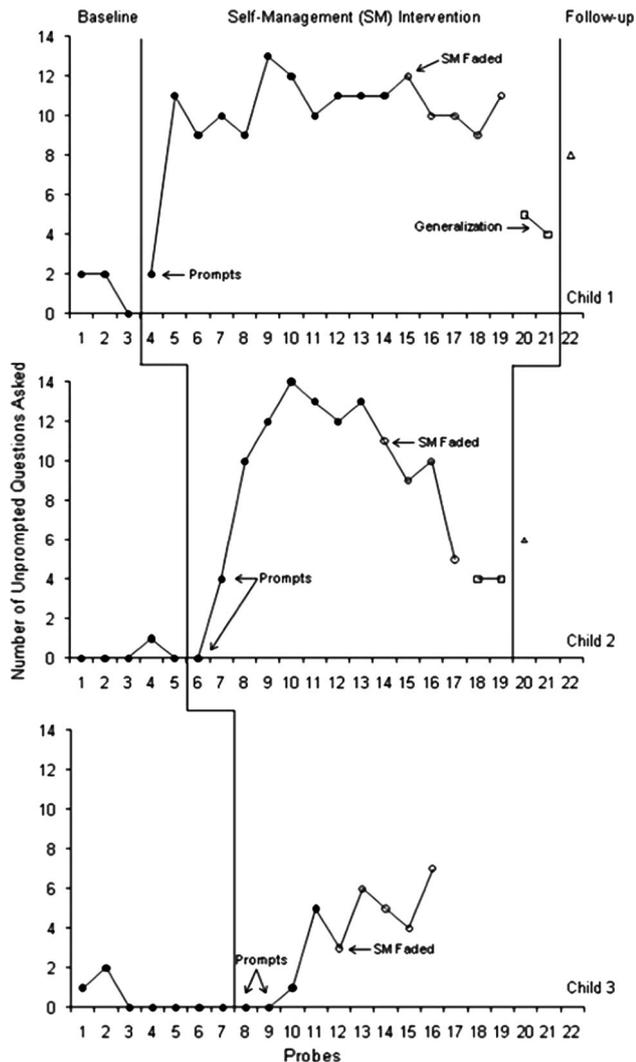


Fig. 3 Total number of unprompted reciprocal questions asked by Child 1, Child 2, and Child 3

average of 10.1 per 10-min 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 9–13 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 1 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

Table 1 Mean (standard deviation) and mode ratings for social validation questionnaire items

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

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 and 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 et al. 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 and Koegel 2012; Palmen et al. 2008; Schreibman et al. 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 et al. 1998; Palmen et al. 2008; Sarokoff et al. 2001; Taylor and Harris 1995), few studies have attempted to improve these conversational impairments by simultaneously addressing multiple conversational skills and conversations during ongoing interactions (Charlop-Christy and Kelso 2003) despite the fact that many researchers suggest a need for treatment in this area (Bang et al. 2013; Koegel et al. 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 et al. 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 et al. 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 and Oswald 2002; McConnell 2002; Odom et al. 2003; Rogers 2000). In addition, social interventions at the earliest age possible may reduce the complicating effects of social dysfunction on development (Volkmar 2011). 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.

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

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