Social Story Interventions for Young Children with Autism Spectrum Disorders

Hoa Kuoch and Pat Mirenda

This study examined the effectiveness of social story interventions for 3 young children diagnosed with autism spectrum disorders. For 2 participants, an ABA design was used, with a social story presented in the B phase. For the 3rd participant, an ACABA design was used, with the C phase serving as a book + reminder condition that was used to examine the impact of adult attention and the B phase consisting of a social story. Results confirmed previous research with regard to the effectiveness of this intervention for reducing the frequency of target behaviors. For the 3rd participant, the B phase was more effective than the C phase (book + reminder). In addition, target behaviors for all 3 participants remained at a low level, even after the social story interventions were discontinued. This suggests that irreversible learning of appropriate behaviors may have occurred during the course of the interventions.

Individuals with autism spectrum disorders experience social challenges that are pervasive and that present difficulties across the life span. Even the most capable individuals with autism often experience considerable difficulty in social situations. A lack of theory of mind, the ability to infer what other people think and feel, has been proposed to account for the social impairments experienced by people with autism (Baron-Cohen, Leslie, & Frith, 1985). Because a considerable amount of research has suggested that this population is indeed deficient in theory of mind skills (Baron-Cohen et al., 1985; Leekman & Perner, 1991; Leslie, 1987), this explanation seems to be plausible. The social story intervention (Gray, 1995, 2000; Gray & Garand, 1993) was designed to provide people with autism with the information they are missing (i.e., information about social situations and peoples' expectations in them) and thus help them foster both interpersonal understanding and appropriate behavior.

Social stories are often written to help an individual adjust to changes (i.e., in routines), to provide insight about what others are thinking or feeling, or to teach specific social skills as alternatives to problem behaviors. The construction of social stories has evolved over the years, based on the experiences of their originator, Carol Gray, and others. In an early description of social stories, Gray and Garand (1993) described three basic types of sentences that can be used: descriptive, directive, and perspective. *Descriptive sentences* provide information about specific social settings or situations and describe what happens and why. The following are all examples of descriptive sentences: "The bell rings when recess is finished. The children stand in line by the door. They wait for the teacher to come" (Gray & Garand, 1993, p. 3). *Directive sentences* provide information about what a person should do to be successful in the target situation, for example, "When the bell rings, I will try to stop what I am doing. I will stand in line. I will wait for my teacher." Finally, *perspective sentences* describe the internal states of other people, as well as information about their thoughts, feelings, or moods. The sentence "My teacher will be happy to see all the children in line" is an example of a perspective sentence (Gray & Garand, 1993). Gray and Garand (1993) suggested that most social stories should contain both descriptive and directive sentences and may also contain perspective sentences. They did not provide a recommendation about the proportion of each of type of sentence that should be used in a social story.

Over the next few years, Gray (1995, 1996) revised her notions regarding social story construction to include the suggestion that 2 to 5 descriptive and perspective sentences should be used for every 0 to 1 directive sentence. This "basic social story ratio" (Gray, 2000) is based on Gray's preferences rather than on specific theoretical or empirical rationales. In her most recent social story training materials, Gray (2000) identified three additional types of sentences that may also be used. *Affirmative sentences* enhance the meaning of surrounding statements and express commonly shared opinions. For example, the second sentence in this sequence is an affirmative sentence: "Many people wear bike hel-

mets. This is an intelligent thing to do" (Gray, 2000, p. 18). *Control sentences,* which are unique in that they are written by the focus individual (with assistance as needed), identify strategies that the person can use to recall the social story at an appropriate time and place. Gray (2000) provided this example: "When someone says 'I changed my mind,' I can think of an idea becoming better . . . like a caterpillar changing into a butterfly" (p. 33). Finally, *cooperative sentences* identify what other people will do to support the focus individual as he or she learns a new skill or behavior; for example, "My mom and dad will try to remain calm while I learn to use the toilet" (Gray, 2000, p. 34). In light of the addition of these new types of sentences, Gray (2000) changed the "complete social story ratio" to 2 to 5 descriptive, perspective, affirmative, and/ or cooperative sentences for every 0 to 1 directive or control sentence.

Gray has consistently emphasized that stories that do not conform to the suggested ratio are not properly constructed as social stories. Most recently, she also noted that sentences that appear to meet the criteria for sentence types that are on "opposite sides" of the social story ratio should probably be rewritten to clarify their meanings or intents (Gray, 2000). This is meant to ensure that each social story focuses on describing an event, concept, or skill that might be needed in a particular situation, rather than simply listing behaviors that the focus individual is expected to perform.

Ten case study or research reports on social stories have been published to date, all of which involved individuals with autism or Asperger syndrome, and seven of which were conducted in school settings. In the first study, Swaggart et al. (1995) described the impact of social stories combined with social skills training and response cost, using simple AB designs for three children. In the second study, Kuttler, Myles, and Carlson (1998) employed an ABAB design to examine the impact of social stories in addition to a visual schedule, token economy, and prompting on a single student. Hagiwara and Myles (1999) employed multiple-baseline designs across settings with three students and presented social stories on a computer, along with videotaped clips of the target behaviors. Norris and Dattilo (1999) employed an AB design to assess the impact of multiple social stories plus brainstormed examples of appropriate behavior on one student. Rowe (1999), Bäckman and Pilebro (1999), Chapman and Trowbridge (2000), and Rogers and Myles (2001) all used case study approaches to describe the impact of social stories on four individuals with Asperger syndrome. Bäckman and Pilebro combined a social story with demonstration of the instruments and steps for an upcoming dental procedure that was the impetus for the story, and Rogers and Myles combined social stories with "comic book conversations" (Gray, 1995). In the most ambitious and well-controlled study to date, Thiemann and Goldstein (2001) combined social stories with videotaped feedback to teach peer interaction skills to five students with autism in integrated elementary school classrooms. They used five replicated multiple-baseline designs across behaviors that included securing attention, initiating comments and requests, and making contingent responses. Finally, Lorimer, Simpson, Myles, and Ganz (2002) used two social stories in the context of an ABAB design to reduce a young child's tantrums and other problem behaviors at home.

Several limitations exist with regard to many of the social story studies published to date. First, although the authors of all 10 studies concluded that the story or stories under investigation resulted in significant changes in target behaviors, only one research study (i.e., Lorimer et al., 2002) and two case studies (i.e., Chapman & Trowbridge, 2000; Rowe, 1999) used social stories as the sole intervention; all of the others combined social stories in multielement treatment "packages." Second, the stories used in several studies failed to conform to the ratio suggested by Gray (1995, 2000) by using too many directive sentences relative to other types of sentences. Third, many of the existing reports were based on AB designs, case study reports, or flawed experimental designs (Schlosser & Blischak, 2001) that permitted only tentative conclusions as to the treatment's influence. Table 1 provides a summary of the existing studies in terms of the composition of the social stories provided and the designs used. Fewer than half of the published studies to date (i.e., Kuttler et al., 1998; Lorimer et al., 2002; Thiemann & Goldstein, 2001) used robust experimental designs (e.g., withdrawl or multiple-baseline designs; Barlow & Hersen, 1984) to investigate the impact of social stories that were written according to published guidelines (Gray, 1995, 2000). Finally, none of these studies included a condition designed to control for the possibility that extra adult attention delivered when the social story was read—rather than the social story itself—was responsible for any behavior change that occurred.

The purpose of this study was to contribute three additional research examples that were designed to remediate some of the problems in many of the existing social story studies. First, all three examples used social stories as the sole intervention. Second, two of the examples used withdrawal (ABA) designs to investigate the impact of the intervention and to document maintenance. In addition, one example incorporated an additional control condition (ACABA) to investigate the effects of adult attention alone on the behaviors of concern. Finally, all three examples used social stories that conformed to the guidelines provided by Gray (2000).

Method

Participants

Three young boys with autism spectrum disorders were selected for participation. Andrew was 3 years 10 months old when the study commenced. He had been diagnosed with autism at the age of 2 years by a hospital-based multidisciplinary assessment team and was the middle child in a middle-class, Italian Canadian family. On the *Peabody Picture Vocabulary Test–Revised,* Form L (PPVT-R; Dunn & Dunn, 1981), which was administered

TABLE 1
Composition of Social Stories in Research to Date

Study	Ratio of directive to other types of sentences	Conformed to applicable social story guidelines?	Research designs
Swaggart et al., 1995	4:1, 2:1, 1:3, 1:2.3	no, no, yes, yes	AB
Kuttler et al., 1998	1:5, 1:1	yes, no	ABAB
Bäckman & Pilebro, 1999	Story not provided	—	Case study
Hagiwara & Myles, 1999	8:1 (example story only)	no	Multiple baseline
Norris & Dattilo, 1999	1:6, 1:2.5, 1:2.7	yes, yes, yes	AB
Rowe, 1999	1:3.3	yes	Case study
Chapman & Trowbridge, 2000	2.5:1 (example story only)	no	Case study
Rogers & Myles, 2001	2:1, 1.7:1	no, no	Case study
Thiemann & Goldstein, 2001	1:4 (example story only)	yes	Multiple baseline
Lorimer et al., 2002	1:2.8, 1:2.7	yes, yes	ABAB

by a registered speech–language pathologist for the purpose of this study, Andrew achieved a standard score of 95 and an age-equivalent score of 3 years 7 months. For 1.5 years prior to the study, and during the study, Andrew received home-based, one-on-one discrete trial instruction within an applied behavior analytic intervention model for approximately 30 hours per week (Smith, 2001). At the time of the study, Andrew also attended a Montessori preschool 1 day per week for 3 hours. He had no previous experience with social stories. Andrew's target behaviors were aggression, crying, and yelling when he was asked to share toys or other possessions with his older brother.

Henry was a Caucasian/First Nations boy who was 5 years 9 months old and lived with his parents and older sister at the time of the study. On the PPVT-R, he achieved a standard score of 44 and an age-equivalent score of 2 years 7 months. However, the speech–language pathologist who administered the PPVT-R noted that changes in Henry's usual routine prior to test administration caused him to have difficulty attending to the test stimuli and that she was thus not confident that the score reflected his true ability. Shortly after receiving a diagnosis of autism at the age of 2 years, Henry began to receive home-based, one-on-

one discrete trial instruction within an applied behavior analytic intervention model for approximately 15 to 30 hours per week. Prior to the study, he had attended an inclusive preschool classroom in which he also received one-on-one discrete trial teaching for part of the day. With the help of a full-time aide, Henry had completed a regular kindergarten curriculum and was planning to enter first grade in the subsequent school year. Prior to this study, social stories had been written for Henry to manage behavior problems such as those related to his intense interest in trains. The social story for the study addressed eating problems that occurred at summer school; during snack time and lunch time, Henry often made sounds (e.g., screamed, squealed, cried), threw up food, and put his hand(s) inside his pants or on his genital area.

Neil, the only child in a middle-class, Chinese Canadian family, was 6 years 4 months old at the onset of the study. Shortly after his second birthday, he was diagnosed with pervasive developmental disorder not otherwise specified (PDDNOS) by a multidisciplinary team. His standard score on the PPVT-R was 107, with an age-equivalent score of 6 years 8 months. Prior to this study, he had attended preschool 5 days per week for 5 to 6 hours per day and had also

completed kindergarten successfully with the help of a classroom assistant. At home, Neil had received discrete trial instruction on a one-on-one basis for approximately 15 hours per week since the age of 3 years. In the past, a number of social stories had been written for him at home and at school to address various behavioral issues. For the present study, a social story was written to address problem behaviors that arose when he played games with his peers, including cheating, moving another player's game piece, touching another player's hand or arm, and making negative comments about losing.

Settings and Interventionists

Andrew's intervention took place at his home and was implemented by his mother, who was also a teacher. Data were collected in either the living room or a toy room while Andrew sat on the floor or at a table playing with his brother. The toys that Andrew was expected to share varied from day to day but included, for example, playdough, jungle animals, and a garage set.

Henry's intervention occurred during both lunch time (12:00 p.m.) and snack time (3:00 p.m.) in his summer preschool program. Two female staff members with early childhood education

certificates from community college programs implemented the intervention. The interventionists had known Henry for less than 1 year when the study commenced. On most days, the study took place in a 20 ft by 20 ft room used for both snack and lunch times, with up to six children and one adult seated at a table. On a few occasions, the study took place during community outings in which Henry and 30 classmates participated.

For Neil, the study was conducted in a summer school program by three early childhood interventionists who had known him for almost 1 year. The program took place in a portable classroom (approximately 30 ft by 30 ft) in which Neil and 20 other children played games either on the floor or at a table. Neil usually played in a small group ranging from three to five other children, none of whom had disabilities. The games included both board games such as Junior Monopoly and Frustration and card games such as Go Fish and Memory.

Dependent Measures and Data Collection

The dependent measures for each child consisted of specific problem behaviors that occurred in the intervention context. For Andrew, these included aggression, yelling, and crying when asked to share toys or other materials with his brother. Aggression was generically defined as any behavior directed toward another that could potentially cause pain. Specific forms of aggression included hitting, pinching, and kicking. Yelling was defined as talking in a voice louder than that usually used for conversation. Crying was defined as sobbing noises accompanied by tears.

For Henry, the behaviors of concern included hands in pants, making sounds, and throwing up. Hands in pants occurred when Henry put one or both hands inside of his pants or on his genital area outside of his pants. Making sounds consisted of screaming, squealing, or crying. Throwing up was defined as removing or spitting chewed food from the mouth.

Neil's target behaviors included cheating, moving game pieces, touching, and making negative comments while playing games with peers. Cheating was defined as making up new rules or changing the existing rules of a game. Moving game pieces consisted of picking up and changing the placement of another player's card or game piece. Touching peers consisted of making physical contact with another player's hand or arm during a game. Finally, negative comments consisted of any verbalization about losing the game, whether or not it was directed at another player (e.g., "You're going to lose this game," "I don't want to lose").

During training sessions in which the procedural and data-collection protocols were simulated, the interventionists were trained by the experimenter to record all instances of a participant's target behaviors to a criterion of at least 90% accuracy. A large digital clock with a display of large (1⅝ ft by ¾ ft) numbers and a tally sheet were used to record the frequency of the target behaviors. The interventionists were instructed to mark the time on the digital clock (i.e., the exact hour and minute) of each occurrence of a target behavior and to note which behavior(s) occurred on the tally sheet. Data were collected during each session across phases for all participants. Although the total amount of time the interventionists spent collecting data varied from session to session, the total frequency of the target behaviors for each session was converted to rate per minute so that the data could be compared across participants.

Interrater Reliability. Reliability checks occurred randomly during both baseline and intervention conditions for each participant across a mean of 23.5% of all sessions (range = 20%–27.9%). Interrater reliability was calculated by employing Tawney and Gast's (1984) formula: agreements divided by the total number of agreements and disagreements, multiplied by 100. The interrater agreement ranged from 86.9% to 100% across participants, with a mean of 97.9%.

Procedural Reliability. The experimenter gathered procedural reliability data during the same observational sessions used for interrater reliability, using a checklist of the experimental procedures. Procedural reliability was calculated by dividing the number of correct steps by the total number of correct and incorrect steps and multiplying by 100. Across all three participants, the procedural reliability mean was 98.4% (range = 91%–100%). Any deviations from the prescribed procedures were brought to the interventionist's attention, and a review of the procedural protocol followed.

Research Design

For both Andrew and Henry, ABA designs comparing a baseline/no social story condition (A) and a social story condition (B) were used, with the final A phase intended as a reversal. For Neil, an ACABA design was employed to compare baseline (A) and two conditions: a social story condition (B) and a book + reminder condition (C); again, the intention was to assess treatment reversal during the final A phase.

Procedures

Preintervention Assessment. Prior to the intervention, two factors, recognition of basic facial expressions and interest in books, were assessed.

Recognition of basic facial expressions. Identification of pictures of basic facial expressions was considered to be necessary for the intervention because social stories often include simple perspective sentences that refer to how other people feel. Picture Communication Symbols (PCS; Johnson, 1994) were used to assess the participants' understanding of basic facial expressions. The experimenter placed two symbols (a happy face and a sad face) on a table and the participant was asked to "point to" or "give" the one that was named. This procedure was repeated across eight trials for each participant (four trials per symbol, placed randomly in the left and right positions). All of the participants completed this task with 100% accuracy.

Interest in books. Interest in books was assessed via a simple checklist that

was completed by the parent or caregiver of each participant. The checklist included the following statements:

1. The child usually looks at books right-side up.
2. The child turns pages, starting from the beginning of the book to the end.
3. The child enjoys looking at pictures in books.
4. The child can pay attention to a story for 5 minutes with an adult.

The parents or caregivers of the three participants answered affirmatively to all four questions.

Phase A: Baseline and Maintenance. Baseline and maintenance data were recorded in the target setting identified for each participant, during relevant activities (i.e., sharing, eating, and playing a game with peers). If a target behavior occurred, interventionists provided relevant corrective, verbal feedback (e.g., "No cheating," "Don't hit your brother"). No other interventions were included during this phase.

Phase B: Social Story. All three children participated in this phase of the study.

Materials. Individual social story books were written and produced by the experimenter to reflect each participant's target behaviors, interests, and abilities. As summarized in Table 2, all of the stories followed Gray's (2000) basic social story guidelines regarding the proportion of 2 to 5 descriptive, perspective, affirmative, and/or cooperative sentences for every 0 to 1 directive or control sentence. Two adjunctive procedures were also used to maximize the appropriateness of the social stories for each participant. First, drafts of each story were presented to participants' parents and interventionists for feedback and modifications prior to final production. All of the collaborators (including those for Henry, who had a relatively low PPVT-R score) agreed that participants' stories were within their comprehension abilities with regard to length and use of language.

Second, the developmental appropriateness of the stories was determined by examining books written for children of similar chronological ages and eliciting input from each participant's preschool/day care worker.

The social story books were produced on a computer and consisted of 8 in. by 10 in. binders holding several pages of printed text in black, 20-point, Times New Roman font. Cartoon pictures that were downloaded from the Internet or were PCSs related to the text appeared on each page of the story. Both Andrew's and Henry's social stories consisted of one concept per page, whereas Neil's story was longer and complex because his receptive language skills were more advanced. Thus, Neil's story had more than one concept presented on each page and was more detailed. The text of the three social stories is contained in the Appendix.

Intervention. The social stories were read directly to each participant prior to the situations in which the target behavior(s) typically occurred. For instance, the social story written to address Henry's problem behaviors at mealtime was read immediately before he and his classmates sat down to eat a snack or lunch. The experimenter trained the interventionists to implement the social story intervention by sitting next to and slightly behind each participant, as recommended by Gray and Garand (1993). The interventionist read each story over a 3- to 4-minute period and provided a brief commentary related to the accompanying pictures (e.g., "Look, there's a picture of Andrew playing," "See, Henry is eating his lunch"). After the social

story, interventionists were instructed to respond to any occurrences of the problem behaviors in the target context by providing relevant corrective, verbal feedback in a manner identical to the baseline condition.

Phase C: Book + Reminder. Only one child, Neil, participated in this phase of the study.

Materials. A children's storybook, *Barry's Big Bread* (World Books, 1989), was chosen for use during this phase. The book was similar in complexity and length to Neil's social story and was appropriate for his interests.

Intervention. Immediately prior to the activity in which target behaviors typically occurred, the interventionist read the book to Neil in a manner identical to that described in Phase B. Thus, each reading occurred over a 3- to 4-minute period and included a brief commentary related to the pictures in the book. In addition, when the story was completed, the interventionist verbally reminded Neil about appropriate behaviors in the target situation (e.g., "Remember to play nicely with the other kids—keep your hands to yourself, talk nicely, and no cheating!"). The interventionist responded to any occurrences of target behaviors in the same manner as during baseline and Phase B (i.e., by providing appropriate corrective, verbal feedback).

Results

Andrew

As indicated in Figure 1, during Andrew's baseline phase, his problem be-

TABLE 2
Composition of Social Stories Used in the Study

Participant	No. of directive + control sentences	No. of other types of sentences	Ratio of directive + control to other
Andrew	2	18	1:9
Henry	4	18	1:4.5
Neil	6	27	1:4.5

havior increased. When the social story was introduced, there was an immediate decrease in the rate of problem behaviors. The data also became less variable and the mean level in this phase was lower than during baseline. When the social story intervention was withdrawn, reversal of the effect of treatment did not occur, and the rate of problem behavior remained low. Anecdotal reports from Andrew's mother over 4 subsequent weeks suggest that the low rate of problem behavior was maintained and that generalization of sharing behavior also occurred. In addition to sharing with his brother, Andrew reportedly shared food and toys with his family and home workers as well.

Henry

As is evident in Figure 2, Henry's data showed high variability and a decreasing trend during the initial baseline phase. When the social story was implemented, there was an immediate decrease in the rate of the target behaviors and the data became less variable. When the social story was discontinued, treatment reversal did not occur; Henry's rate of responding was maintained at 0.08 behaviors per minute over a 2-week period. Anecdotal reports from Henry's mother suggest that eating difficulties continued to be a problem in the home setting, even after the intervention was implemented at his preschool.

Neil

Figure 3 displays the results for Neil. Neil's initial baseline data (first A phase) indicated a mean level of 1.14 behaviors per minute. When the book + reminder was introduced (C), the mean level remained at 1.14 behaviors per minute, suggesting that this condition had no effect on Neil's target behaviors. The mean for the second A phase was 0.93 behaviors per minute, a rate similar to baseline. When the social story was introduced (B), there was a marked decrease in both the variability of his performance and the mean rate of problem behavior. As was the case with Andrew and Henry, when the intervention was withdrawn during the subsequent A phase, treatment reversal did not occur—Neil's problem behaviors remained low. Four weeks after the end of the study, a follow-up session at Neil's summer school suggested that the reduction in his problem behaviors had been maintained during this time without additional intervention. In addition, Neil's mother and other people working with him at home reported that losing a game was no longer contentious and that Neil's target behaviors no longer occurred in this context.

Discussion

All three participants immediately reduced their rate of problem behaviors when the social story was implemented. Other patterns that emerged from the data included less behavioral variability and short-term maintenance of behavioral reduction once the social stories were discontinued. With regard to Andrew, the rate of target behaviors decreased from a mean of 0.3 behaviors per minute (bpm) during baseline to a mean of 0.07 bpm during the B phase and 0.04 bpm during the second A phase. In addition, it is important to note that despite the decreasing trend in bpm during baseline, there were changes in both the level and the variability of Henry's behavior during the B phase. Henry's mean rate during baseline (A) was 0.77 bpm, which decreased to 0.09 bpm during the B phase and remained at 0.08 bpm during the second A phase. This suggests that the social story intervention contributed to a reduction in rate and in less erratic rates of responding for both boys.

In addition, the data from the C phase for Neil provide the first empirical evidence to support the contention that the social story itself—not merely the extra adult attention that accompanies it—is responsible for subsequent reductions in problem behaviors. This is particularly important in that Neil's intervention, like Andrew's and Henry's, did not include additional elements such as prompting, response cost, or other procedures used in previous research. The sole intervention for all three boys— aside from the relevant corrective, verbal feedback that was provided across all phases when target behaviors occurred— was a social story that was written according to the basic guidelines provided by Gray (2000). The fact that behavior reduction was maintained following only a few exposures to "true" social stories provides evidence of the potential power of this intervention.

It is interesting to note that this is only the second study to provide evidence that the effects of a social story may be maintained over time. In fact, in two previous studies (i.e., Kuttler et al., 1998; Lorimer et al., 2002), the frequency of target behaviors returned to baseline levels immediately after social story interventions were withdrawn. In contrast, Thiemann and Goldstein (2001) documented maintenance of most of the newly acquired social skills taught to five
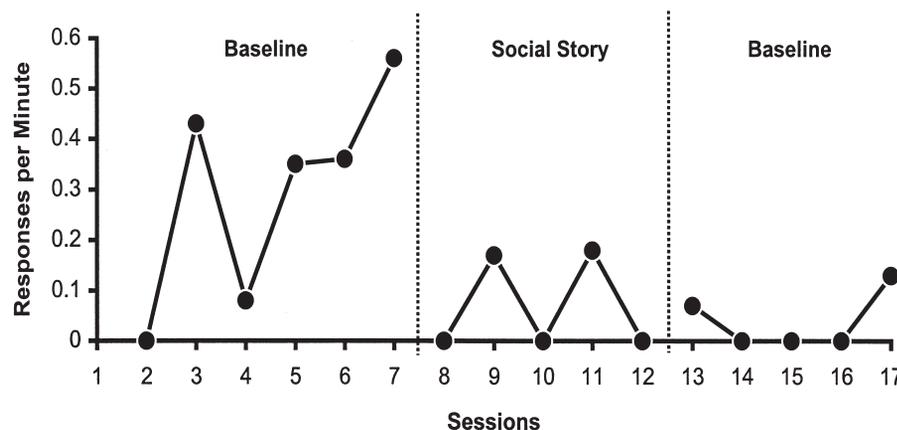

FIGURE 1. Results of a social story intervention for Andrew.

participants in their multielement study that included social stories. Indeed, research on theory of mind, upon which social story interventions are at least loosely based, suggests that maintenance after treatment withdrawal should occur more often than not because of irreversible learning that occurs as a result of the social story. Research has shown that theory-of-mind abilities develop as early as 18 months of age (Leslie, 1988) and become increasingly sophisticated as a child ages (Astington & Gopnik, 1991); associated skills appear to remain intact once they are acquired (Wimmer & Perner, 1983). Given the possibility that social stories may result in irreversible learning, future researchers should consider using multiple-baseline, rather than withdrawal, designs to demonstrate experimental control.

This study is one of the few to provide evidence that young children with autism or PDDNOS (ages 3–6 years) can benefit from social story interventions (cf. Lorimer et al., 2002; Thiemann & Goldstein, 2001). In addition, participants' PPVT-R scores did not appear to be related to the effectiveness of the social story intervention; Andrew scored in the low average range, Henry had an extremely low score, and Neil scored at or above age level, yet all three appeared to benefit from the social story intervention. This finding is inconsistent with Gray and Garand's (1993) suggestion that children with higher intellectual functioning may be the best candidates for social stories.

Educationally, the use of social stories is appealing for a number of reasons. First, these stories are inexpensive and are relatively easy to produce. Second, the process of writing a story is not overly time-consuming, and excellent training materials are now available to assist teachers and others in this regard (e.g., Gray, 2000). Third, as noted previously, there is growing evidence for the usefulness of social stories across settings and interventionists (e.g., Bäckman & Pilebro, 1999; Lorimer et al., 2002) to address a variety of problem behaviors or behavioral deficits. Finally, the results of this study suggest that changes in problem behaviors following social story interventions may occur quite quickly and may be robust.
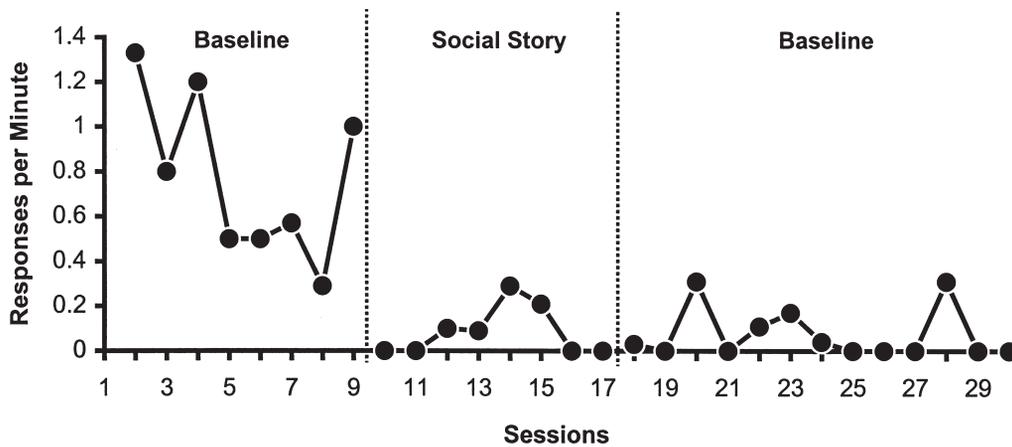

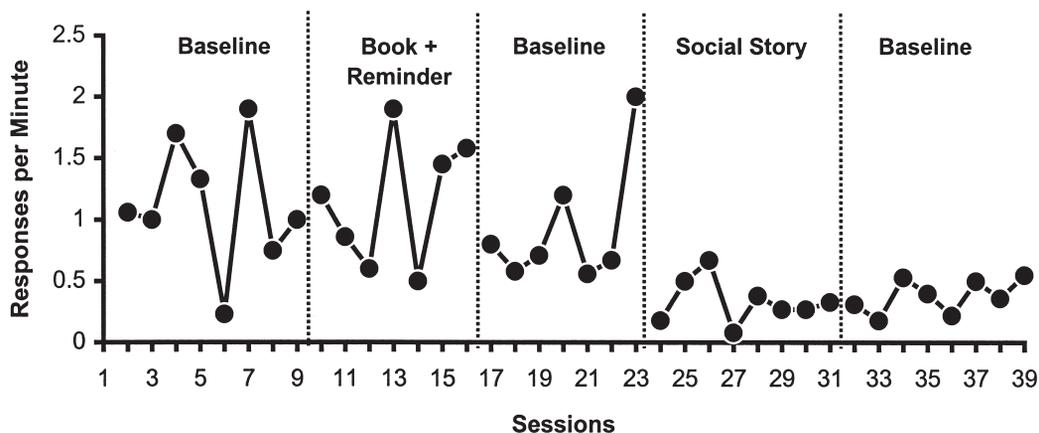FIGURE 2. Results of a social story intervention for Henry.

FIGURE 3. Results of a book + reminder intervention and a social story intervention for Neil.

Limitations and Future Research

There are several limitations to this study that merit future research. Prior to the start of the study, the participants had all received 1.5 to 3.5 years of one-on-one discrete trial teaching (Smith, 2001), using the methods of applied behavior analysis. It is not clear whether or to what extent this influenced their ability to benefit from the interventions, and additional research is needed to explore the issue of "readiness skills" with regard to social story effectiveness. In addition, the social stories used in this study were designed to address problem behaviors that occurred in specific routines or contexts. It is unclear how effective the interventions would have been for problem behaviors that were more diffuse (i.e., that occurred throughout the day), and future studies are needed to investigate this issue. In addition, unlike in previous studies, the social stories written for Henry and Neil incorporated their special interests. Henry was fascinated with trains, so his social story provided Thomas the Tank Engine as a model for appropriate behaviors. Neil enjoyed Pokemon cartoon characters, so his social story included them to promote desired responses. Because it is not clear whether the inclusion of special interests influences social story effectiveness by enhancing motivation, future studies are needed to examine this issue. Finally, future research should include data collection in novel environments and with untreated behaviors, to determine the generalized impact of social story interventions.

Conclusions

This study contributes to the existing empirical data on social studies and extends previous findings in a number of ways. Unlike many previous studies, the social stories used in this research conformed to the guidelines provided by Gray (2000), and the interventions did not combine social stories with other procedures. For one participant, the inclusion of a condition to control for adult attention provided evidence that the social story alone was responsible for reductions in target behaviors. Finally, the results indicated that behavior reduction continued when the intervention was discontinued, which suggests that learning of appropriate social behaviors occurred during the course of the intervention. Social story interventions appear to hold promise for assisting individuals with autism in handling social situations by providing social information they may be lacking. Further research is necessary to extend these findings within the context of multiple-baseline designs, as well as to extend the current knowledge base regarding factors that influence the success of this intervention.

ABOUT THE AUTHORS

Hoa Kuoch, MA, works as a behavioral consultant for young children with autism in Vancouver, British Columbia, Canada. *Pat Mirenda,* PhD, is an associate professor in the Department of Educational Counselling Psychology and Special Education at the University of British Columbia and does research in the areas of augmentative communication, positive behavioral support, and the impact of early intervention on children with autism. Address: Pat Mirenda, Faculty of Education, University of British Columbia, 2125 Main Mall, Vancouver, BC V6T 1Z4 Canada; e-mail: pat.mirenda@ubc.ca

REFERENCES

Astington, J. W., & Gopnik, A. (1991). Theoretical explanations of children's understanding of mind. *British Journal of Developmental Psychology, 9*(1), 7–31.

Bäckman, B., & Pilebro, O. C. (1999). Augmentative communication in dental treatment of a nine-year-old boy with Asperger syndrome. *Journal of Dentistry for Children,* 419–420.

Barlow, D. H., & Hersen, M. (1984). *Single case experimental designs: Strategies for studying behavior change.* Boston: Allyn & Bacon.

Baron-Cohen, S., Leslie, A. M., & Frith, U. (1985). Does the autistic child have a "theory of mind"? *Cognition, 21*(1), 37–46.

Chapman, L., & Trowbridge, M. (2000). Social stories for reducing fear in the outdoors. *Horizons, 11*(3), 39–40.

Dunn, L. M., & Dunn, L. M. (1981). *Peabody Picture Vocabulary Test–Revised manual for forms L and M.* Circle Pines, MN: American Guidance Service.

Gray, C. (1995). Teaching children with autism to "read" social situations. In K. Quill (Ed.), *Teaching children with autism: Strategies to enhance communication and socialization* (pp. 219–241). Albany, NY: Delmar.

Gray, C. (1996). *Social stories and comic strip conversations: Unique methods to improve social understanding* [Videotape]. Arlington, TX: Future Horizons.

Gray, C. A. (2000). *Writing social stories with Carol Gray* [Videotape and workbook]. Arlington, TX: Future Horizons.

Gray, C. A., & Garand, J. D. (1993). Social stories: Improving responses of students with autism with accurate social information. *Focus on Autistic Behavior, 8,* 1–10.

Hagiwara, T., & Myles, B. S. (1999). A multimedia social story intervention: Teaching skills to children with autism. *Focus on Autism and Other Developmental Disabilities, 14,* 82–96.

Johnson, R. M. (1994). *The Picture Communication Symbols combination book.* Solano Beach, CA: Mayer-Johnson.

Kuttler, S., Myles, B. S., & Carlson, J. K. (1998). The use of social stories to reduce precursors to tantrum behaviors in a student with autism. *Focus on Autism and Other Developmental Disabilities, 13,* 176–182.

Leekman, S., & Perner, J. (1991). Does the autistic child have a metarepresentational deficit? *Cognition, 40,* 203–218.

Leslie, A. M. (1987). Pretense and representation: The origins of "theory of mind." *Psychological Review, 94,* 412–426.

Leslie, A. M. (1988). Some implications of pretense for mechanisms underlying the child's theory of mind. In J. W. Astington, P. L. Harris, & D. R. Olson (Eds.), *Developing theories of mind* (pp. 19–46). New York: Cambridge University Press.

Lorimer, P., Simpson, R., Myles, B. S., & Ganz, J. (2002). The use of social stories as a preventative behavioral intervention in a home setting with a child with autism. *Journal of Positive Behavior Interventions, 4,* 53–60.

Norris, C., & Dattilo, J. (1999). Evaluating effects of a social story intervention on a young girl with autism. *Focus on Autism and Other Developmental Disabilities, 14,* 180–186.

Rogers, M., & Myles, B. S. (2001). Using social stories and comic strip conversations to interpret social situations for an adolescent with Asperger syndrome. *Intervention in School and Clinic, 36,* 310–313.

Rowe, C. (1999). Do social stories benefit children with autism in mainstream primary school? *British Journal of Special Education, 26*(1), 12–14.

Schlosser, R., & Blischak, D. (2001). Is there a role for speech output in interventions for persons with autism? A review. *Focus on Autism and Other Developmental Disabilities, 16,* 170–178.

Smith, T. (2001). Discrete trial training in the treatment of autism. *Focus on Autism and Other Developmental Disabilities, 16,* 86–92.

Swaggart, B. L., Gagnon, E., Bock, S. J., Earles, T. L., Quinn, C., Myles, B. S., & Simpson, R. L. (1995). Using social stories to teach social and behavioral skills to children with autism. *Focus on Autistic Behavior, 10,* 1–16.

Tawney, J. W., & Gast, D. L. (1984). *Single subject research in special education.* Columbus, OH: Merrill.

Thiemann, K. S., & Goldstein, H. (2001). Social stories, written text cues, and video feedback: Effects on social communication of children with autism. *Journal of Applied Behavior Analysis, 34,* 425–446.

Wimmer, H., & Perner, J. (1983). Beliefs about beliefs: Representation and constraining function of wrong beliefs in young children's understanding of deception. *Cognition, 13,* 103–128.

World Books. (1989). *Barry's big bread.* New York: Author.

APPENDIX

Sharing: Andrew's Social Story

Sometimes Andrew plays alone. Sometimes Andrew plays with other people. Playing with other people can be fun. When people play together, they can share. Sharing is good. Lots of people share. Mommy and Papa share. (Name) and (name) share. (Name) and (name) share, too. Sharing makes lots of people feel happy. Sometimes Andrew doesn't feel like sharing. Sometimes Andrew hurts people when they touch his toys. This is not okay. It makes people very sad when Andrew doesn't share. Andrew can still play with the toys if he shares. Sharing means taking turns with a toy. Sharing also means giving half of something to the other person. Andrew will try to take turns. Andrew will try to give half to another person. The other person will feel very happy.

Time to Eat: Henry's Social Story

Everyone gets hungry sometimes. Thomas the Tank Engine gets hungry. When Thomas is hungry, he gets his lunch box. The lunch box has food inside. Thomas eats all the food. Eating the food makes Thomas big and strong. Thomas can go fast along the tracks after he eats. Henry also gets hungry. When Henry feels hungry, Henry needs to eat food. Eating food will make Henry big and strong like Thomas. Henry usually eats lunch and snack at (summer school name). Everyone takes out their lunch boxes when it is time to eat. Henry will take out his lunch box, too. Mom packs food in Henry's lunch box. Sometimes Henry likes the food in his lunch box. Sometimes Henry doesn't like the food in his lunch box. This is okay. Henry will try to eat the food. Henry needs to take a bite, chew, and swallow his food. Mom will be happy if Henry eats the food. (Interventionist) will be happy, too. Eating lunch and snack can be fun.

Playing Games: Neil's Social Story

Sometimes kids like to play games. Playing games can be lots of fun. During the game, we all take turns. Sometimes it is my turn. When it is my turn, I can move my game piece. Sometimes it is another player's turn. He or she will move his or her game piece. It is not my turn when someone else is moving his or her game piece. I need to leave the other players' pieces alone. The other players will like this a lot. During the game, it is okay to give gentle reminders about the game rules. It is not okay to change the rules during the game. It is not okay to make up new rules, either. This will confuse the other players. I will try my best to play by the rules of the game. Sometimes I am ahead in the game. Sometimes I am behind the other players. If I am behind, I can tell myself to keep trying my best. If another player is behind, I can tell him to keep trying, too. This is a very nice thing to do. It is called being a good sport. Most of the time, there will be one winner at the end of the game. Sometimes I will win. Sometimes someone else will win. This is okay. No one wins all the time. Even Pokemons lose sometimes. Pikachu loses, Ash loses, and Jigglypuff loses sometimes. I may feel sad about not winning. This is okay. I will try to remember that winning is not the most important thing. What is important is having fun during the game. (Interventionists) will be very happy to see everyone playing games and having fun.