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Effects of Peer Training and Written Text Cueing on Social Communication of School-Age Children With Pervasive Developmental Disorder

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This study consecutively examined the effects of 2 social interventions—peer training and written text treatment—on the social communication of 5 elementary students with pervasive developmental disorder. Each child with autism was paired with 2 peers without disabilities to form 5 triads. In Intervention 1 (peer training), peers were taught to use 5 facilitative social skills over 5 days. After peer training, 4 children with autism increased or used more stable rates of initiations and contingent responses overall. However, all children continued to demonstrate deficits in specific social-communication skills. Once Intervention 2 (direct instruction using written text cues) was implemented, increased use of 3 different communication skills was observed across all 5 participants. In addition, social validity outcomes revealed improved quality of child–peer interactions, 2 teacher reports of improved social skill development, and improved acceptance and friendship ratings for the children with autism. Results support the use of written text cues to improve children's social communication with peers, and suggest that combining approaches may be necessary to improve the quality of children's relationships.

KEY WORDS: autism/pervasive developmental disorder (PDD), social communication, written-text cues, peer training, treatment

For elementary students with pervasive developmental disorder (PDD), meeting daily social expectations of inclusive education is an ongoing struggle. At the crux of this lifelong developmental disorder is a qualitative impairment in reciprocal social interaction skills that precludes effortless social exchanges (American Psychiatric Association, 1994). In the higher grades, the social competency gap between children with and without autism widens (Loveland & Tunali-Kotoski, 1997). Three primary approaches documented to improve child–peer interactions and reduce this divergent social path are (a) peer mediation (e.g., training facilitative social skills), (b) adult mediation (e.g., direct instruction using modeling, prompting, and reinforcement), and (c) structured social environments (e.g., including high status or "well-liked" peers, teaching social skills in small groups, including child-preferred play themes; Baker, Koegel, & Koegel, 1998; Kamps, Kravits, & Ross, 2002; Sasso, Peck, & Garrison-Harrell, 1998).

Teaching peers to use facilitative social skills (e.g., comment, keep talking, and respond) has resulted in peers learning skills to engage in interactions with children with autism and other classmates, and enjoyment in helping others (Garrison-Harrell, Kamps, & Kravitz, 1997; Goldstein, English, Shafer, & Kaczmarek, 1997; Kamps, Gonzalez-Lopez, Potucek, & Garrison-Harrell, 1998). Benefits for children with autism include increased social initiations and responses, fewer inappropriate behaviors, and improved quality of interactions (Kamps et al., 1992; Kamps, Potucek, Lopez, Kravitz, & Kemmerer, 1997; Oke & Schreibman, 1990). Empirically validated adult-mediated strategies include prompting appropriate play and social skills, reinforcing skill use, and providing feedback (Goldstein et al., 1997; Kamps et al., 1997; Pierce & Schreibman, 1995). Prompting children with autism to attend to social rules and play materials, such as those in structured recess games or integrated playgroups, can result in improved behaviors such as active participation and cooperative play skills (Baker et al., 1998; Wolfberg & Shuler, 1993).

Social intervention models that integrate evidence-based practices, without viewing various approaches as mutually exclusive, are recommended (National Research Council, 2001; Prizant & Wetherby, 1998). For preschoolers with autism, the benefits of integrating established social intervention techniques have been well documented (Goldstein et al., 1997; Kohler, Strain, Hoyson, & Jamieson, 1997; McConnell, Sisson, Cort, & Strain, 1991; Sainato, Goldstein, & Strain, 1992). Fewer data are available for elementary school-age children, however. In a recent study, Garrison-Harrell et al. (1997) evaluated an intervention that included social skill instruction, peer networks, and teaching students to use an augmentative communication system. Findings revealed increased functional language skills, fewer unintelligible utterances, and improved friendship ratings for students with autism.

It is well known that young students with PDD have a significantly restricted range of language skills necessary to successfully engage in reciprocal interactions. Same-age peers without social deficits can typically gain a listener's attention, initiate topics, acknowledge and maintain topics, express ideas on a variety of topics, and avoid inappropriate topics (Brinton & Fujiki, 1984; Prutting & Kirchner, 1987). For children with autism, initiations are reported to be extremely difficult, regardless of cognitive and language abilities or age (Stone & Caro-Martinez, 1990). To improve communication skills with peers, a recent addition to multicomponent interventions has been the use of printed, photographic, or picture cues (Garrison-Harrell et al., 1997; Parker, Kamps, & Setser, 1999; Thiemann & Goldstein, 2001). For example, Garrison-Harrell and

colleagues (1997) taught peers and students with autism to use pictures and word cards on a communication board to initiate topics during lunch. Parker and colleagues (1999) reported improved language skills during restaurant, game, and cooking activities following an intervention that combined peer training and written, activity-related social scripts. The success of using visual cues to improve social behaviors has been explained by the possibility of child limitations in processing "transient" information or recalling sequences of verbal information (Grandin, 1995; Hodgdon, 1995; Quill, 1997). Currently, books and therapy resources offering recommendations for using visual cues (e.g., Gray, 1995; Hodgdon, 1995; Kelly, 1996) outnumber empirical data.

To determine the effects of different visual cues on improving communication without peer training, Thiemann and Goldstein (2001) combined social stories, pictures, and written text cues with supplemental video feedback into one visual support treatment package. Two peers participated as conversational partners for each child with autism. Peers attended one orientation session and were prompted to be responsive to their classmates. Because of the technical requirements of video feedback, intervention occurred in the school library. Results revealed increased initiations to comment, request, and gain attention; decreased inappropriate utterances; and improved topic maintenance skills. The findings add empirical support for using visual cues to teach communication skills; however, it was difficult to conclude which strategies were most beneficial. The authors suggested that providing access to a written script—related to a target skill—throughout the social activity allowed for multiple practice opportunities. Although the peer mediation training was brief and unlikely to be sufficient for peers to teach children with autism specific initiation strategies, Thiemann and Goldstein acknowledged that their analysis did not allow one to rule out potential confounding effects of peer modeling and reinforcement. Likewise, it is not clear what components of the visual support treatment package were important. In the present study, the authors sought to differentiate the effects of peer participation and the effects of one of the visual supports from the 2001 visual support "package" (i.e., written scripts) on children's social communicative initiations.

Investigators of social-communication interventions for children with disabilities have begun to emphasize the importance of multiple outcomes, measures that not only assess changes in isolated skills, but also evaluate peer group membership and friendships (Kennedy & Shukla, 1995; Schwartz, 2000). Interventions designed to increase children's social competence may bring about greater levels of peer acceptance, which may provide a

foundation for relationship and friendship development (Goldstein & Morgan, 2002). Researchers are increasingly reporting social validity outcomes and measures of social acceptance, such as peer nominations, friendship ratings, and sociometric status ratings (Baker et al., 1998; Garrison-Harrell et al., 1997; Thiemann & Goldstein, 2001). Thus, this study measured indirect effects of the intervention on peer responsiveness and acceptance (from both trained and untrained peers), teacher perception of social progress, and social validity of outcomes.

To date, a primary goal of peer-mediated social interventions has been to maximize opportunities for longer and improved-quality child–peer social interactions. Within this literature, reported outcomes have typically included observed changes in overall duration and rates of interactions (e.g., total initiations, initiation-response sequences) as opposed to changes in specific social-communication skills (Goldstein et al., 1997; Kamps, Barbetta, Leonard, & Delquadri, 1994; Kamps et al., 1997). In this study, two intervention approaches, peer training and systematic instruction using written text cues, were examined to assess the effectiveness of each approach on the general improvement of social interactions, as well as specific improvement of social-communication skills in children with PDD. Consistent with previous research, expected outcomes of peer training included more responsive social situations and improved rates of interactions between the focus children and their trained peers. Based on a reported need for adding a component to peer-mediated interventions that involves teaching specific social skills to children with autism (e.g., Kamps et al., 1997), we hypothesized that peer training alone may not be sufficient to improve specific verbal initiations (e.g., requests, comments, and compliments) to peers. Following peer training and observation, we proposed that a systematic visually cued instruction component would be effective in increasing targeted social-communication skills of children with PDD. Based on our earlier findings, written text cues were chosen as the primary visual support component, and treatment was provided in regular classrooms when possible. Specifically, the following questions were addressed:

1. Does a social intervention program consisting of peer training and written text treatment (WTT) affect specific social-communication skills of elementary students with PDD?

2. What are the collateral effects of the intervention on peer responsiveness and peer acceptance of students with PDD among trained and untrained peers?

3. Do naïve judges perceive changes in the quality of the children's interactions after treatment and do

teachers perceive changes in frequencies of social behaviors?

Method
Participants

Five students with a pervasive developmental disorder (PDD) and 10 peers without social deficits, drawn from five elementary schools, participated in the study. Five triads were formed consisting of 1 student with PDD and 2 normally developing peers from the same classroom. The 5 students with PDD were boys, ranging in age from 6;8 to 9;1 (years;months) and enrolled in 1st or 2nd grade. These children were diagnosed with autism or Asperger's syndrome using *Diagnostic and Statistical Manual of Mental Disorders–Fourth Edition* (American Psychological Association, 1994) criteria by a licensed school or clinical psychologist, or based on ratings from the Childhood Autism Rating Scale (CARS; Schopler, Reichler, & Rochen-Renner, 1988) administered at the start of this study. Standardized test results are summarized in Table 1. Students were selected based on (a) teacher report of delayed social skills and limited peer interactions, (b) parent report of delayed social skills on the Socialization Domain of the Vineland Adaptive Behavior Scales (Sparrow, Balla, & Cicchetti, 1984), (c) functional verbal communication using simple sentences, (d) full or partial inclusion in regular education, and (e) emerging or acquired word identification skills. Reading ability was confirmed by standard scores within normal limits on the Woodcock Reading Mastery Tests–Revised (Woodcock, 1998), and 85% or greater performance on an informal reading measure that included 10 single words and 10 two or three word phrases selected from Fry's 300 Instant Sight Words (Fry, Kress, & Fountoukidis, 2000), with 80% of words from the First Hundred list.

Shane, age 7 years, attended a 1st grade classroom with a part-time aid for all academic subjects. A preschool psychological evaluation revealed characteristics of Asperger's syndrome. A score of 30.5 on the CARS placed him in the mild–moderate range of autism. He communicated using sentences and had significant vocabulary deficits. He decoded early sight words; paragraph comprehension was delayed. He responded to peers; however, initiations were rare. Chase, age 9;1, was fully included in 2nd grade with a full-time aide. He was diagnosed at age 4 and scored in the severe range of autism (score: 45.5) on the CARS. Chase communicated using simple sentences and delayed echolalia. Word identification skills were at grade level on the Wechsler Individual Achievement Test (Wechsler, 1991), which was administered 6 months before the study. Chase's interactions typically involved teasing and verbal outbursts. Allan,

Table 1. Participants' test performance.

Test performance	Participants				
	Shane	Chase	Allan	Greg	Gary
Rating on CARS	Mild–Moderate	Severe	Mild–Moderate	Mild	Mild–Moderate
PPVT-R	3P 72SS	<1P <40SS	<1P 60SS	87P 117SS	47P 99SS
TONI-2, Form B	37P	4P	50P	90P	94P
WRMT-R Subtests					
Word Identification	58P 103SS	—	73P 109SS	61P 104SS	96P 126SS
Passage Comprehension	31P 93SS	—	63P 105SS	62P 104SS	89P 119SS
Informal reading test	90%	100%	100%	100%	100%
Oral peripheral exam	WNL	WNL	WNL	WNL	WNL
SSRS Teacher Report					
Social Skills subtest					
Pre-	32P 93SS	8P 79SS	9P 80SS	10P 81SS	4P 74SS
Post-	30P 92SS	19P 87SS	34P 94SS	12P 82SS	3P 72SS
Vineland					
Communication	2P 70SS	<1P 46SS	30P 92SS	42P 97SS	12P 82SS
Daily Living Skills	4P 73SS	<1P 30SS	1P 67SS	2P 69SS	1P 66SS
Socialization	1P 64SS	<1P 49SS	2P 57SS	1P 67SS	1P 66SS
Adaptive Composite	4P 74SS	2P 57SS	9P 80SS	27P 91SS	4P 73SS
IQ test results					
Full Scale IQ	—	Stanford-Binet:[a] 47 Admin: 1/99	Leiter-R:[b] 92 Admin: 7/99	WISC-III:[c] 117 Admin: 7/98	—

Note.   With the exception of IQ tests, all standardized tests were administered just prior to baseline. Dashes indicate that data were not available. P = percentile; SS = standard score; WNL = within normal limits; CARS = Childhood Autism Rating Scale (Schopler, Reichler, & Rochen-Renner, 1988); PPVT-R = Peabody Picture Vocabulary Test–Revised (Dunn & Dunn, 1981); TONI-2 = Test of Nonverbal Intelligence–Second Edition (Brown, Sherbenou, & Johnsen, 1990); WRMT-R = Woodcock Reading Mastery Tests–Revised (Woodcock, 1998); SSRS = Social Skills Rating System (Gresham & Elliott, 1990); Vineland = Vineland Adaptive Behavior Scales (Sparrow, Balla, & Cicchetti 1984).

[a]Stanford-Binet Intelligence Scale–Fourth Edition (Thorndike, Hagen, & Sattler, 1986).   [b]Leiter International Performance Scale–Revised (Roid & Miller, 1997).   [c]WISC-III = Wechsler Intelligence Scale for Children–Third Edition (Wechsler, 1991).

age 7;6, split his time between a 2nd grade classroom and a resource room. He scored in the mild–moderate range of autism (score: 32.5) on the CARS. Allan communicated using complete sentences, with delayed grammar and vocabulary. Word identification and passage comprehension were age-appropriate. He rarely initiated interactions with peers. Greg, age 7;7, attended a 1st grade classroom full-time. He was diagnosed with Asperger's syndrome and scored in the borderline–mild range (score: 30) on the CARS. Greg communicated using complete sentences and had a large vocabulary for topics of personal interest. Word identification and passage comprehension were age-appropriate. Social initiations were inappropriate and often rejected by peers. Gary, age 6;8, was fully included in 1st grade and received pullout services for language arts and speech therapy for a mild articulation delay. He scored in the mild–moderate range of autism (score: 30) on the CARS. Word identification and passage comprehension were age-appropriate. He used complex sentences for different communicative purposes and directed initiations mainly to adults.

The 10 peers without disabilities ranged in age from 7 to 9 years. They were selected based on (a) teacher recommendations of children who placed in the top 30th percentile (i.e., high status) following classwide sociometric ratings, (b) age-appropriate social skills, and (c) willingness to participate. Two peers from one classroom received resource room support for a learning disability; their scores on the Social Skills Rating System (SSRS; Gresham & Elliott, 1990) were age-appropriate.

Settings and Sessions

For four triads, experimental sessions took place in an integrated elementary classroom during activities organized by the teacher and/or investigator. Because of scheduling difficulties, one triad (Allan's group) met in a resource classroom that provided support to 8–10 children with learning disabilities. Classroom social activities included academic tasks (e.g., related to calendar, time, money, language arts, science, art), simple board games, and clinician-created activities designed

to match the curriculum and classroom theme when possible. Typical activities and games (e.g., flashcards, memory) were included, with some modifications to incorporate child interests (e.g., Pokémon®, Disney characters). Each triad met 3–4 times per week for 10 min baseline social activities and 25 min for WTT (i.e., 10 min of instruction using written text cues, 10 min engaged in a social activity, and 5 min of adult feedback). For all experimental sessions, the investigator embedded environmental supports and stimuli consistent with joint action routines (Snyder-McLean, Solomonson, McLean, & Sack, 1984). For example, prior to beginning the social activity, children were given a written session agenda and a list of "jobs to do" or exchangeable roles. Materials for each job were placed in separate containers, and a special clock (i.e., where a colored portion decreased as time elapsed) was set to signal the beginning and end of the 10 min social activity.

Dependent Measures and Data Collection

Sessions were audiotaped using a high-quality Sony TCM-459V Clear Voice cassette recorder and videotaped using a Panasonic AG188 VHS movie camera. A direct observation, paper and pencil coding system was used to code the frequency of occurrence of eight social-communication skills (six appropriate and two inappropriate) for the students with autism. Coding of all communication behaviors occurred live for all sessions during the 10 min social activity. The six appropriate social-communication measures included (a) securing attention, (b) initiating comments, (c) initiating compliments, (d) initiating requests for information, (e) initiating requests for actions/objects, and (f) contingent responses (see the Appendix). These six skills represented the range of possible behaviors that could be targeted during WTT. They were selected based on a review of the literature on normal and disordered development of topic maintenance and pragmatic language skills, and based on the negative impact of the absence of these language skills on conversational interactions (Brinton & Fujiki, 1984; Lord & Paul, 1997; Mentis, 1994; Prutting & Kirchner, 1987). A range of possible target behaviors was selected to allow for individualizing intervention goals based on child development, baseline observations of skill proficiency, and observed effects of peer training. To measure the effects of peer training on focus children's rates of social-communication skills, the total number of (a) initiations and contingent responses (i.e., all six appropriate communication skills) and (b) initiations only (i.e., all appropriate communication skills except contingent responses) was calculated for each experimental session. Inappropriate behaviors coded included "other" and "no response" (see the Appendix).

In addition, topic maintenance skills were measured. That is, data on the children's average number of sequential utterances per conversational episode, or multiple-turn conversational interactions (MCIs), were collected. A 3-s pause or change in topic signaled the end of one conversational episode. The average length of an MCI was calculated by adding the total number of appropriate utterances expressed in one 10-min session and dividing by the total number of conversational episodes. A minimum of one initiation–response sequence between the focus child and a peer was necessary to include an episode in the total number. MCI data were collected and averaged over the last three baseline sessions, just prior to peer training, and the last three WTT sessions for all participants. We also measured changes in peer responsiveness. The percentage of peer responses to focus children's initiations was determined by dividing the total number of peer responses per 10-min session by the total number of the focus child's initiations per session and multiplying by 100. A minimum 1-s pause between initiations was necessary for an initiation to be included in the total. A peer response was recorded if the response occurred within 5 s.

Experimental Design

A multiple baseline design was used to examine (a) the effects of peer training on the focus children's overall rates of social interaction and (b) the effects of systematic instruction using written text cues on specific social-communication skills. First, a multiple baseline, across-participants design was used to evaluate effects of peer training on the overall rates of interaction. Whereas it was anticipated that children might interact at higher rates, we hypothesized that improvements would not be seen in potential social-communication targets as a function of peer training. Thus, immediately following peer training, we anticipated a baseline condition that encouraged responsive interactions and could be used to select communication targets and evaluate the effects of the WTT. Second, a multiple baseline, across social-communication skills design replicated across triads was used to measure the effects of the WTT on social-communication initiations. For 4 children with autism, the three targeted communication skills were (a) initiating requests for actions/objects, (b) initiating requests for information, and (c) initiating compliments. Initiating comments replaced initiating requests for actions/objects for Shane. The order of initiating treatment for the selected skills was counterbalanced among the children.

Procedures

Baseline

During baseline, each triad (1 focus child and 2 peers) engaged in a 10-min planned social activity. Prior

to this activity, the investigator reviewed the session agenda and job list, gave the children the necessary materials, explained task expectations, and set the clock for 10 min. No prompts were provided unless a child left the group. Baseline data on the dependent measures were collected for each focus child during this 10-min activity.

Peer Training

Following a minimum of five baseline sessions and stable performance in coded communication skills, peer training was implemented sequentially across four of the five dyads. That is, training began for the peers in Triad 1, while baseline data collection continued for the other four triads. Because of time constraints, two peer dyads began training on the same day. Each peer dyad was taught separately before or after school by the first author in an empty classroom. The focus children did not attend these sessions. Peers were taught five standard facilitative social skills (Hops, Walker, & Greenwood, 1988; McGinnis & Goldstein, 1997), one 30-min session per skill, for a total of 150 min of instruction over 5 days. The five skills trained were (a) "look, wait and listen"—to allow the focus child time to initiate, (b) "answer questions", (c) "keep talking", (d) "say something nice", and (e) "start talking". Peer training included (a) discussion of four behavioral steps per skill, (b) writing peer-generated examples of a skill in topic bubbles beside cartoons of children talking, (c) adult–student and student–student role-play, (d) adult feedback, and (e) review of behavioral steps. Each peer had a notebook with copies of the five target skill sheets. Data collection on dependent measures was discontinued during peer training.

Post-Peer Training Baseline

Following peer training, each peer dyad resumed their group interactions in the classroom with the focus child. Before the start of the 10-min social activity and before the focus child joined the group, the peers were shown a list of the five social skills taught, with three faces drawn beside each skill. The investigator explained what each face meant (e.g., sad = skill not used, neutral = skill used once, and happy = skill used two or more times), that she would keep track of their skill use during the activity, and that if five happy faces were checked (i.e., each skill used at least two times) by the end of the 10 min, they could choose a small toy or candy from a treasure chest. The focus children also received a prize for participation. The investigator then set the clock for 10 min and observed the interaction from a nonintrusive distance. If a peer did not use any of the five trained skills within 1-min intervals, prompts were provided for one trained skill by showing a small index

card describing the skill. The specific skill prompted depended on (a) which skill(s) a peer had not demonstrated in the previous 1-min interval, (b) the communication context (i.e., what skill was appropriate to use at that time), and (c) which skill(s) had not been used at least twice thus far during the 10-min activity. Once WTT began, adult prompts and feedback to peers on the five taught social skills were no longer provided.

WTT

Data collected during baseline assisted in the selection of three target communication skills (i.e., no upward trend observed) for each focus child. Instruction using written text and pictorial cues was provided for 25 min, on one skill at a time, 3–4 times per week. Each 25-min treatment session consisted of 10 min of systematic instruction, 10 min engaged in a social activity, and 5 min of adult feedback and reinforcement. Visual supports used during WTT included (a) a skill sheet with a written label of the target skill at the top, a picture of a boy with two topic bubbles (as used in comics), and up to 10 small happy faces under the boy, (b) written phrases (scripts) appropriate to the planned activity printed in the bubbles, and (c) monitoring and feedback forms. The 10-min instruction proceeded as follows: (a) the adult reviews the target skill, (b) children generate ideas of words they could say during the activity that match the target skill, (c) the adult writes the words in the topic bubbles, (d) children rehearse written scripts through role-play, (e) the focus child reads the written scripts, and (f) children set goals for how many times they will use the target skill (e.g., 10, 15, or 20 productions) based on performance in the previous session. These instruction procedures were provided to all the children in the triad. Before beginning the activity, we propped up the target skill sheet on an easel binder or photo frame in front of the focus child. The children were provided with all necessary materials, task expectations were explained, and the clock was set for 10 min. During this time, the investigator sat at a nonintrusive distance and periodically returned to the table to provide feedback, to the focus child only, on skill use by marking a happy face on the skill sheet. A continuous reinforcement schedule was used initially to reinforce every occurrence of the target skill, to a maximum of 10. If the child did not express the skill spontaneously (i.e., using the written script or a novel but related utterance), the investigator prompted skill use at 1-min intervals. Prompting progressed from least to most intrusive (e.g., from pointing to the script, to asking "What can you say to your friends?", to providing sentence completion cues such as "Can I___?" for requesting an object). Once the child expressed a minimum of 10 spontaneous target utterances in one session, an intermittent reinforcement schedule was implemented, with the

goal of progressing toward naturally occurring reinforcement. The investigator also monitored skill use by peers and the focus child by using a form with three columns of happy faces. During the 5-min feedback period, each child's happy faces were totaled and they received a prize if they met their predetermined criterion (e.g., 10, 15, or 20 happy faces); their performance was tracked on a line graph. Following a notable increase in the first targeted skill for a minimum of four treatment sessions, the procedures were initiated for the second selected communication skill. Maintenance data were collected on the first skill, and baseline data collection continued for the third skill. During treatment on the third social skill, maintenance data were collected on the first two skills treated.

Maintenance Condition

Once WTT was initiated for the second skill, written scripts used for the first skill remained on the target skill sheet, underneath or beside the second skill. Fewer happy faces were drawn under this skill (i.e., 5 vs. 10), and the font size of the writing, topic bubbles, and child's face were smaller. Similarly, when treatment transitioned to the third skill, written scripts for the first and second skills remained on the skill sheet. The WTT procedures (e.g., review discussion, role-play, rehearsal) were implemented only for the new target skill. These procedures may differ from standard maintenance conditions in that the children had access to visual cues associated with previously targeted skills. In this condition, the investigators were interested in determining if the children would self-cue and read written scripts for previous skills with occasional reminders and, thus, "maintain" their performance. If the adult observed that the child was not self-cueing, and if the communication context warranted it, an occasional prompt was given (i.e., pointing to the appropriate written words).

Peer Acceptance Ratings

Peer acceptance was assessed through pre- and postintervention completion of a Peer Acceptance Questionnaire administered to a random sample of 8 classmates from each focus child's classroom. The random selection of raters resulted in 1 trained peer and 7 untrained peers completing the scales for 4 focus children, and 8 untrained peers completing the scales for 1 child (Allan). Thus, nearly all of the peer raters were unfamiliar with project goals. In an effort to keep student raters unaware that the questionnaire was being used to assess changes for the focus child, each rater completed one questionnaire for the focus child and one for each of 4 randomly selected peers from the same classroom. Using a 5-point Likert scale (i.e., 1 = never,

2 = not usually, 3 = sometimes, 4 = most of the time, and 5 = always), the eight raters answered five questions related to amount of time spent playing with the child, talking to the child, sitting beside the child at lunchtime, enjoyment playing with the child, and being a friend. Pre- and posttreatment average ratings and change scores per question for each focus child were compared to average ratings and change scores for the 4 peers combined.

Social Validity

Teachers completed the Teacher Report questionnaire from the SSRS pre- and posttreatment to assess changes in their perceptions of the focus children's social skill development. This questionnaire assesses social skill development in three areas: (a) cooperation, (b) assertion, and (c) self-control. Also, 16 graduate students unfamiliar with the study viewed 10 two-minute video clips of a pre- or posttreatment social interaction. The short video clips were combined on one 20-min tape, with the order of baseline and treatment clips counterbalanced across triads and presented blind to the raters (i.e., they were not aware of the experimental condition). For posttreatment video clips, the cartoons with written cues were not visible; viewers could see a black binder on the table. After viewing one interaction, judges completed a 5-point Likert rating scale (i.e., 1 = not at all, 5 = better than average) for six questions related to the frequency of (a) the focus child's active involvement or peer's attempts to engage the child in the activity, (b) verbal initiations, and (c) acting friendly towards others (e.g., laughing, giving compliments).

Reliability

The primary investigator taught two assistants to code dependent measures to a criterion level of 85% over 3 days, before the start of the study. Videotaped interactions of similar groupings of children (i.e., 1 child with autism and 2 typical peers) from a preliminary study were used for training. Interobserver agreement of 80% was established for two classroom sessions before actual data collection commenced. Observations were supplemented by audio- and videotaped recordings of interactions, which were reviewed by coders prior to submitting coding sheets for analysis. A prerecorded 15-s interval tape, positioned near the video camera microphone, was used to assist with interobserver reliability coding. Agreements were scored if both observers coded the occurrence of a specific communication behavior within the same interval. If one observer recorded a behavior at an interval boundary, an arrow was marked between the two intervals. It was considered an agreement if the second coder observed the same behavior

within either interval. Disagreements were scored if the coders did not agree on the type of behavior or if one coder did not observe a behavior. Interobserver agreement was calculated by dividing the number of agreements by the agreements plus disagreements and multiplying by 100. Table 2 shows the average interobserver agreement (IOA) across conditions for each child and for each communication behavior coded. Low IOA for "no response" may be explained by the observation that these behaviors occurred very infrequently and, thus, were occasionally missed by the coders. The majority of "other" behaviors were coded for Chase, with disagreements on interpretation of comments as delayed echolalia or a perseverative utterance. A 15-item procedural checklist of the WTT was used to monitor treatment fidelity for 25% of the sessions. Treatment fidelity was consistently above 80% (range = 80%–100%).

Results

Social Interaction Rates Following Peer Training

Figure 1 shows total rates of interactions per session over time. The line graph shows the total number of initiations (i.e., secures for attention, comments, requests for objects/actions, requests for information, and compliments), and the bar graph shows the total number of initiations plus contingent responses. Figure 1 shows that the participants with PDD were capable of interacting with peers from the outset of the study. During baseline, all five participants demonstrated variable and occasionally high initiation and contingent response rates. The relatively high rates of these social behaviors are consistent with the children's developed verbal language abilities. Peer training treatment effects (prior to the start of WTT) on rates of interactions were most noticeable for 2 children; effects were evident for both initiations and the sum of initiations plus responses for Allan and to a lesser extent Greg. Initially, training peers to be more responsive helped stabilize Shane and Chase's rates of interactions, although not at noticeably higher levels than in baseline. Data in Figure 1 failed to show clear and consistent improvements in Gary's initiation and contingent response rates after peer training.

Gradual improvements in initiation behaviors and total social behaviors continued for Allan, Greg, and the other participants over the course of the study. Often there was a dip with the initiation of a new WTT phase, followed by successive increases in overall initiation rates. Overall, 4 of the 5 children increased their average initiation rates during the WTT condition as compared to the post-peer-training phase that preceded the onset of systematic instruction for the first target skill. Although variable from session to session, Shane's average initiations improved from a mean of 18.4 after peer training to a mean of 35.0 in WTT. Allan's average

Table 2. Interobserver agreement for social-communication data for each focus child (top panel) and interobserver agreement for total specific communication behaviors coded (bottom panel).

Child	Baseline			Treatment and maintenance		
	Sessions	Mean agreement (%)	Range (%)	Sessions	Mean agreement (%)	Range (%)
Shane	13	93	89–100	29	88	83–97
Chase	12	92	82–100	18	84	60–95
Allan	15	94	87–100	21	94	88–100
Greg	15	91	87–96	18	89	82–95
Gary	18	91	88–94	14	85	71–91

Behavior	Total coded	Mean agreement (%)
Secures for attention	357	92.2
Initiate comments	1195	82.1
Initiate requests for information	295	92.5
Initiate requests for actions or objects	359	83.8
Contingent responses	1834	89.5
Compliments	1648	99.6
No response	14	64.3
Other	93	73.1
Total	5795	90.5

Figure 1. Frequency of unprompted total initiations plus responses (bars) and unprompted total initiations (circles) per 10-min session during baseline and post-peer training. WTT 1, 2, 3 = start of written text treatment for each targeted social skill.
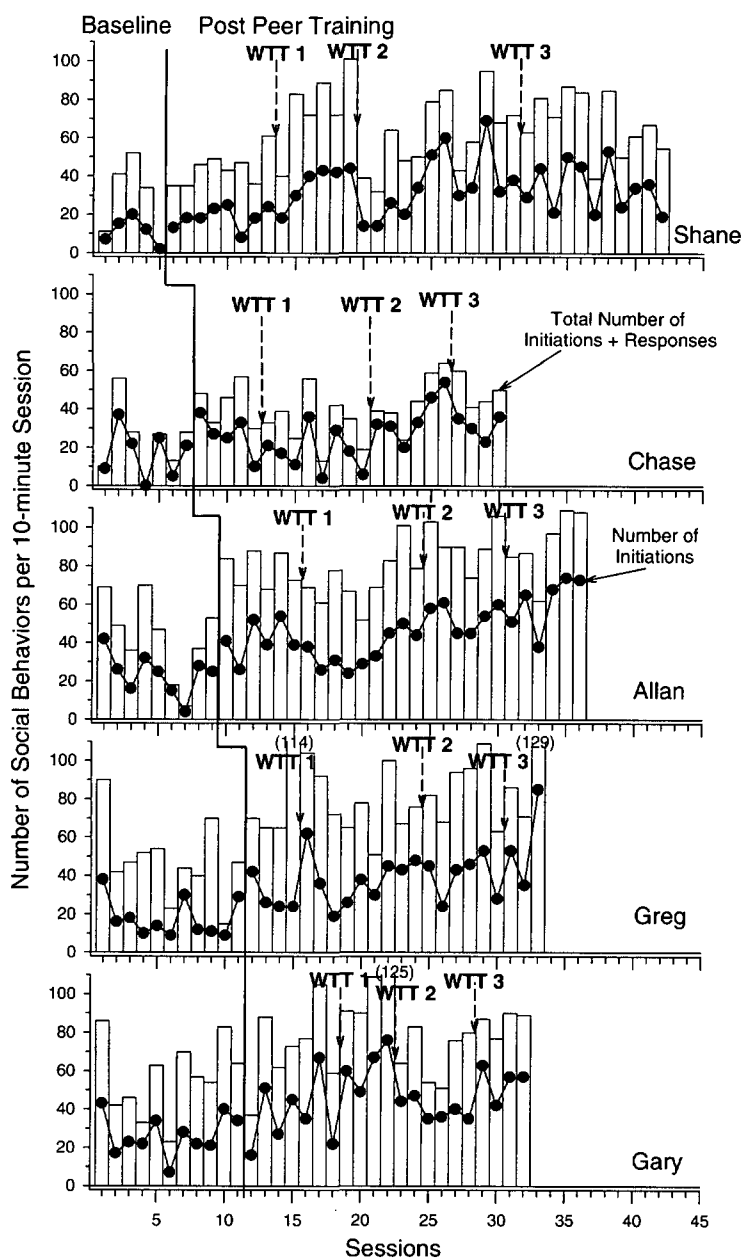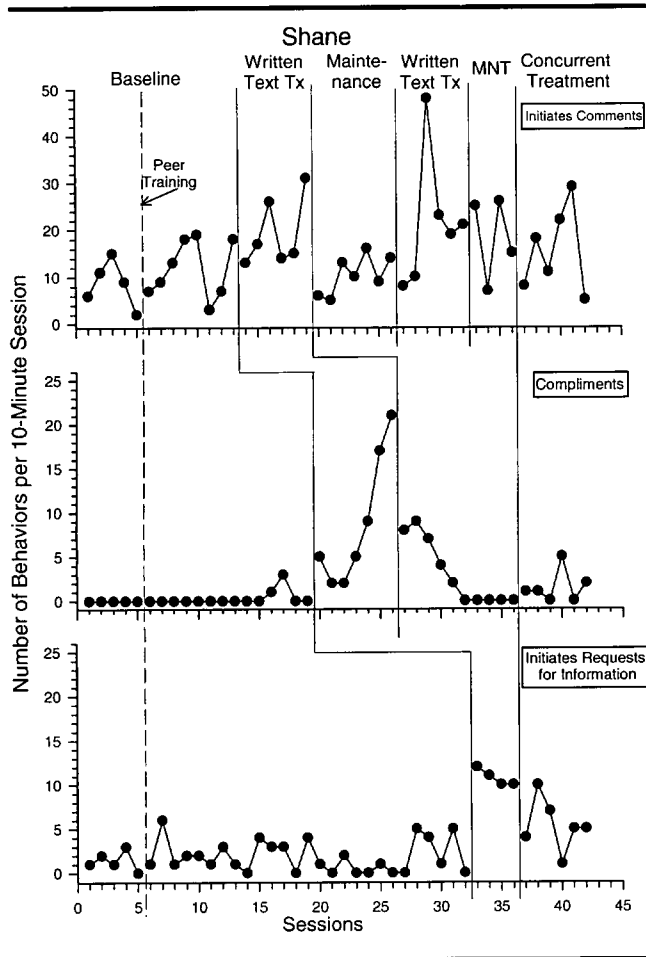
initiation rates improved from a mean of 41.8 per session after peer training to a mean of 48.2 in WTT. Greg increased his mean number of initiations from 29.0 to 42.2 per WTT session, and Gary's initiations increased from 37.6 after peer training to 50.6 in WTT. Although Chase's average initiation rates did not increase during WTT (M = 26.6 after peer training and 26.8 in WTT), his repertoire of initiation skills increased as he began to use each of the five skills more consistently, especially during the last seven WTT sessions.

Focus Children's Communication Progress Following Peer Training and WTT

Figures 2–4 show unprompted frequencies of targeted communication skills for the 5 participants with PDD. Prompted use of target skills is not included in the figures. During baseline before and after peer training, Shane's frequency of comments was variable (see Figure 2). WTT resulted in increased use of comments

Figure 2. Frequency of unprompted targeted social-communication skills during baseline, written text treatment, and maintenance for Shane.


(Sessions 37, 38, and 39). One written social script was generated for each skill (i.e., three written cues) and placed horizontally in a three-paned 5 × 7 picture frame. The investigator provided immediate reinforcement for every production of a target skill. During this condition, Shane's average frequency of the three skills did not recover to previous treatment levels. The investigator then provided a booster treatment session for each of the three target skills individually. For example, only compliments were treated in Session 40, which resulted in a slight increase (i.e., 5 compliments) compared to baseline. In Session 41, treatment was reinstated for initiating comments and Shane's performance recovered to previous treatment levels (i.e., 29 comments); the number of compliments returned to 0. The booster session for initiating requests for information (i.e., Session 42) did not result in a recovery to initial treatment levels; in the absence of visual cues or prompts, frequency of comments returned to baseline levels.

Throughout baseline conditions, Chase demonstrated low rates of initiations to request actions or objects, compliment peers, and request information (see Figure 3). Thus, these three skills were targeted in succession for WTT. Once treatment began, Chase more than doubled his requests for actions or objects, from an average of 2.9 in baseline to 6.3 per treatment session. Improvements in requests for actions or objects further increased to 10.3 per session during treatment of compliments. Chase's greatest progress was observed in complimenting others, which increased from 0 to 6.5 per session. Chase's teacher reported generalized use of similar compliments cued in treatment (e.g., "good job") to other classmates during whole-group lessons. During treatment of the third skill, initiating requests for information, Chase continued to use the written cues to compliment peers above baseline levels ($M = 3.5$). Treatment also was effective in increasing his requests for information from an average of 0.7 in baseline to 5.5 in treatment.

Allan used fewer than 10 occurrences of all targeted communication skills per session during baseline conditions (see Figure 3). Delayed treatment effects were observed on the first two targeted skills: initiating requests for information and requests for actions/objects. Improvements in requests for information beginning in Session 22 were attributed to (a) enhanced reinforcement schedule, (b) improved comprehension of treatment procedures, and (c) increased peer responsiveness to his initiations. Overall, Allan's ability to request information increased from an average of 3.9 to 8.4 in treatment, and he maintained these improvements ($M = 13$). His requests for actions/objects increased from an average of 2.2 to 10.7, and he maintained his performance ($M = 8.7$). The WTT resulted in

($M = 19.4$ per session). However, these improvements were not maintained ($M = 13.3$) as WTT focused on the second target skill, compliments. Consequently, written text cues were reintroduced for comments during a second treatment phase. This resulted in a recovery of comments to initial treatment levels ($M = 21.5$). The high number ($n = 48$) of comments expressed during Session 29 consisted mainly of repetition of object labels. Once again, Shane's commenting was variable during the second maintenance phase. Throughout baseline, Shane demonstrated low rates of compliments ($M = 0$) and initiations to request information ($M = 1.4$). Following WTT, his compliments increased to 6.2 per session but decreased during maintenance ($M = 2.7$). WTT was immediately effective in increasing Shane's frequency of initiations to request information to an average of 8.6 per session. Once treatment effects were observed across the three communication skills, alternative procedures to assist Shane in maintaining his progress were explored. First, the investigator provided concurrent instruction on all three previously targeted skills

Figure 3. Frequency of unprompted targeted social-communication skills during baseline, written text treatment, and maintenance for Chase and Allan.
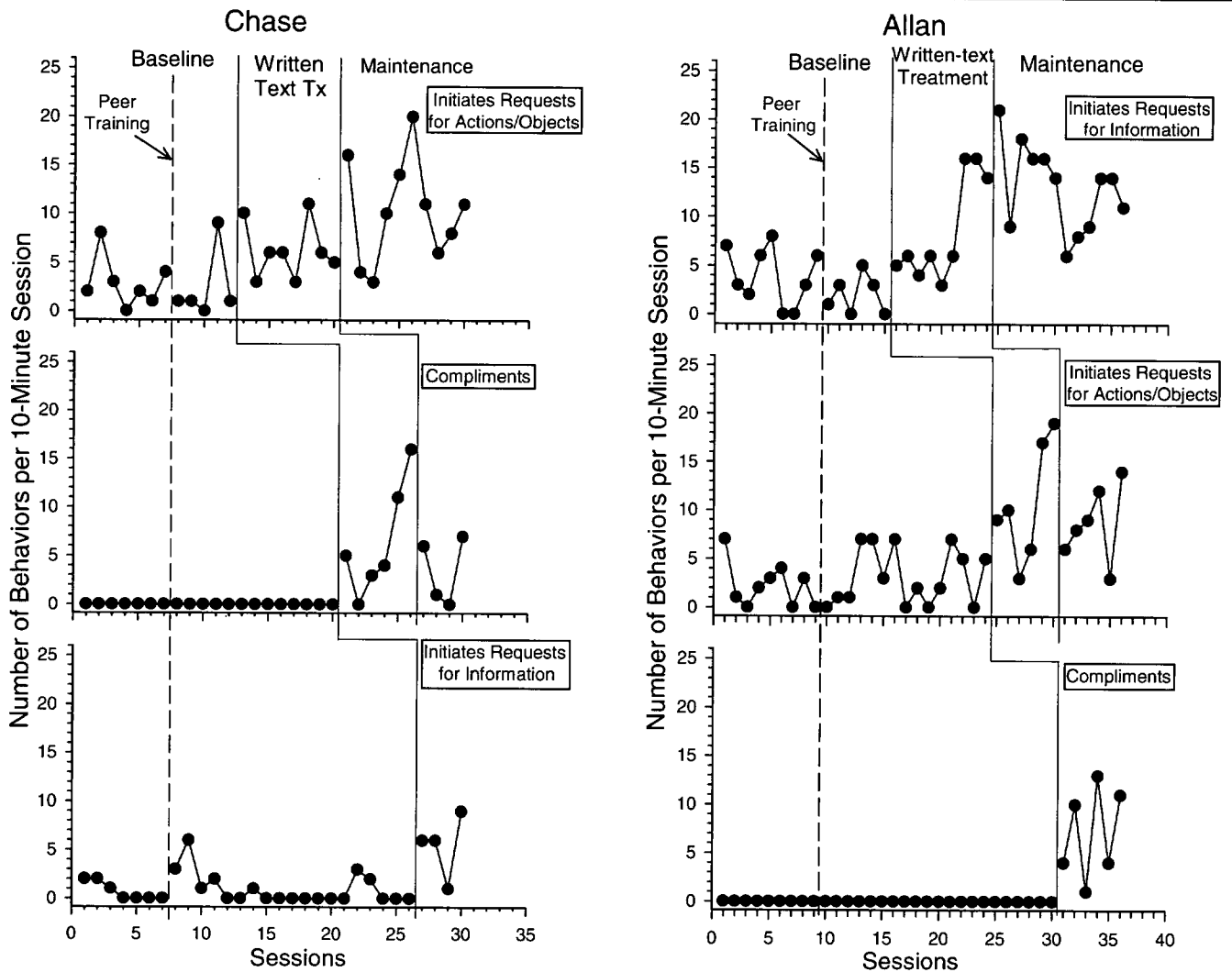
dramatic, yet variable, use of compliments, averaging 7.2 after a zero baseline.

Greg also demonstrated low baseline performance on all three communication skills selected for WTT (see Figure 4). Following the introduction of WTT, immediate treatment effects were observed across all three communication skills. His frequency of compliments increased from 0 to 5.5 per session, and he maintained these improvements (M = 6.4). His ability to initiate requests for actions or objects and to initiate requests for information increased from 1.5 to 8.7 and from 3.3 to 10 per session, respectively. Greg's improved ability to initiate requests for actions or objects continued (M = 10.2) as treatment began on initiating requests for information.

Similarly, Gary exhibited low baseline levels of initiations to request actions or objects, compliments, and initiations to request information (M = 2.5, 0, and 3.1 per session, respectively; see Figure 4). The treatment was effective in increasing Gary's frequency of initiations to request actions or objects to 14.8 per session, with an average of 11 requests initiated during maintenance. His frequency of compliments increased to 5.2 per session, with progress maintained (M = 7.8) during treatment of the final social skill. Rates of initiations to request information more than doubled, increasing from 3.1 to 10.8 per treatment session.

Adult Prompting

The average frequency of adult prompts provided to the participants with PDD during WTT and maintenance conditions is summarized in Table 3. Before the start of WTT, adult prompts were not provided to the

Figure 4. Frequency of unprompted targeted social-communication skills during baseline, written text treatment, and maintenance for Greg and Gary.
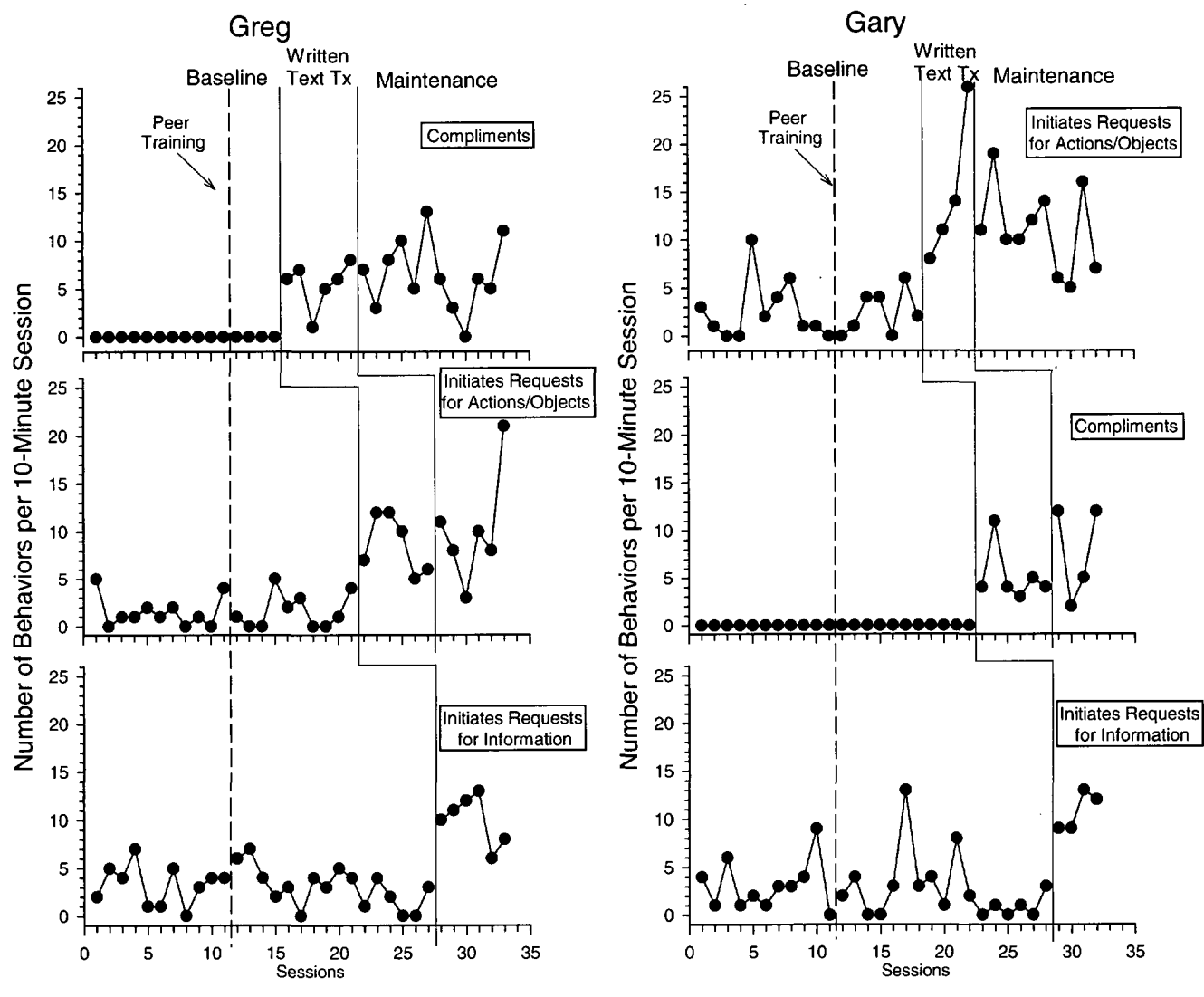
children with PDD unless a child left the group. Treatment guidelines required adult prompts (e.g., "point to the written cues") at 1-min intervals if the focus child had not used the target skill spontaneously in this time frame. During treatment of a skill, adult prompts ranged from 2.0 to 6.0 per session. Adult prompting for continued use of previously targeted skills was not originally planned, and with the exception of Shane, few or no prompts were necessary for the children to use previously targeted skills. For example, Allan and Gary needed less than one reminder per 10-min session on average to maintain improvements in two earlier targeted skills. Increased adult prompts during maintenance were necessary for Shane, who had greater overall difficulties maintaining previously trained skills.

MCIs

The number of sequential utterances per conversational episode (or MCIs) was sampled from the final three baseline sessions prior to peer training and from the final three WTT sessions. The peers' MCI averages were 3.6 and 3.5 in the baseline versus WTT comparison, respectively. In baseline, however, peers' MCIs were attributed to peer–peer interactions that typically did not include the focus child. By the end of WTT, results for all focus children revealed increased utterances per topic, with contributions to ongoing conversations more closely resembling those of peers. Chase, Allan, and Greg expressed more utterances during WTT, with average MCIs increasing from 0.8 to 2.1, 0.8 to 3.1, and 3.5 to 6.3, respectively. Shane and Gary made smaller MCI

Table 3. Average frequency of adult prompts per 10 min session for targeted social communication skills during written text treatment (WTT) and maintenance.

Participants and behaviors	Condition	
	WTT	Maintenance
Shane		
Initiate comments	2.3	0.4
Compliments	4.6	3.5
Initiate requests for information	2.5	NA
Chase		
Initiate requests for actions or objects	6.0	2.2
Compliments	4.3	0.8
Initiate requests for information	6.0	NA
Allan		
Initiate requests for information	4.3	0.2
Initiate requests for actions or objects	4.7	0.0
Compliments	4.2	NA
Greg		
Compliments	4.8	2.3
Initiate requests for actions or objects	5.0	0.2
Initiate requests for information	3.5	NA
Gary		
Initiate requests for actions or objects	2.0	0.8
Compliments	4.0	0.3
Initiate requests for information	3.0	NA

Note. NA = not available.

gains, from 1.9 to 2.6 and from 3.1 to 3.4 utterances per episode, respectively.

Changes in Peer Responsiveness

Total percentages of peer responses to focus child initiations were averaged across baseline (range: 5–11 sessions), post-peer training (range: 4–8 sessions), and WTT and maintenance sessions combined (range: 14–29 sessions) (see Figure 5). Data revealed that after peer training, four of the five peer dyads increased their responsiveness to initiations by the focus children. Shane's dyad increased their average responses from 31% in baseline to 41% after peer training. Chase's peers almost doubled their responses to his initiations, from an average of 20% to 39% after peer training. Allan's peers' responses improved from 13% in baseline to 48%. Greg's peers demonstrated similar rates of responding during baseline to rates of the other four peer dyads after peer training (i.e., 50%). Gary's peer dyad increased their responses from an average of 35% in baseline to 44% after peer training. During the WTT and maintenance conditions, all five peer dyads demonstrated even higher levels of responsiveness (i.e., increases to 49%, 63%, 52%, 56%, and 50% for Shane, Chase, Allan, Greg, and Gary, respectively).

Changes in Peer Acceptance

Table 4 illustrates average pre- and posttreatment peer acceptance ratings and change scores for each focus

Figure 5. Average percentage of peer responses to focus children's initiations across conditions. WTT = written text treatment; MNT = maintenance.
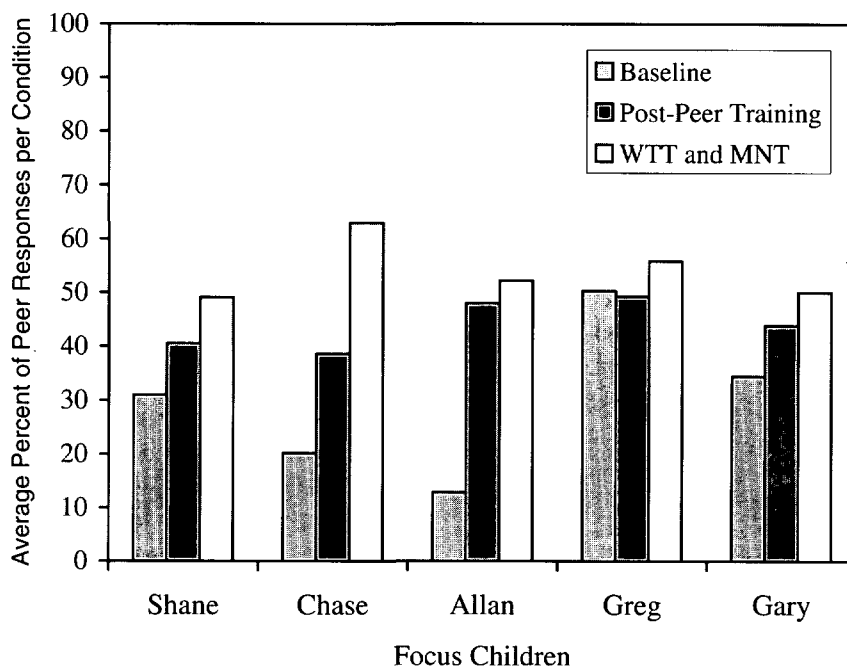
Table 4. Average peer acceptance ratings and change scores at pre- and posttreatment.

Participants	Do you play with ___ on the playground?		Do you like to play with ___?		Would you choose to sit beside ___ at lunchtime?		Do you talk to ___ in the classroom?		Is ___ your friend?		Avg. change
	Pre-	Post-	Pre-	Post-	Pre-	Post-	Pre-	Post-	Pre-	Post-	
Shane	2.5	2.8	3.1	3.4	3.4	3.5	3.3	2.9	4.0	4.0	0.1
Shane's peers	3.3	3.5	3.6	3.7	3.6	3.8	3.2	3.6	4.3	4.4	0.2
Chase	3.3	4.9	3.4	5.0	3.3	4.7	3.6	4.6	3.6	4.7	1.3
Chase's peers	3.2	3.3	3.3	3.5	3.2	3.5	3.3	3.8	3.6	4.0	0.3
Allan	3.1	2.9	3.4	3.5	3.3	3.6	3.5	3.5	3.5	4.4	0.2
Allan's peers	3.1	3.2	3.6	3.8	3.6	3.6	3.6	3.5	3.8	4.2	0.1
Greg	2.9	3.8	3.1	3.8	4.0	3.8	3.3	3.9	3.9	4.3	0.5
Greg's peers	2.9	2.7	3.0	3.1	3.0	3.0	3.1	3.3	3.7	3.7	0
Gary	1.3	1.9	1.6	3.0	1.8	3.6	1.9	2.8	1.9	4.1	1.4
Gary's peers	3.8	4.1	3.9	4.0	3.9	3.7	3.9	4.0	4.2	4.4	0.1

child and the 4 other randomly selected, rated peers. Average ratings for the peers were calculated by summing the ratings given per question and dividing by four (total number of peers rated). Change scores represent the difference in rating scores for each question from pre- to posttreatment completion of the questionnaire; average change scores were calculated by totaling the change scores across the questions and dividing by total number of questions asked (i.e., 5). The amount of change recorded for the peers serves as a baseline against which to measure change for each focus child. Although Shane's average ratings increased slightly on the first two questions, the amount of change reported ($M = 0.1$) was similar to that reported for his peers ($M = 0.2$) after treatment. Similarly, Allan's peers reported a positive change for one question (No. 5), in that they considered him more of a friend; however, his average ratings and change scores were similar to those reported for his peers. Compared to changes reported for Greg's peers, Greg was more accepted on the playground and his peers expressed more enjoyment playing with him at the end of treatment. Chase and Gary showed the greatest changes, with increased ratings on all five peer acceptance questions. Chase's average change score ($M = 1.3$) was higher than that of his peers ($M = 0.3$). His peers reported that they played with him more often on the playground and that they "always" liked to play with him (i.e., a change from 3.4 to 5.0). The amount of change in peer acceptance for Gary was greater than that of his peers on all five questions, with an average change of 1.4 across all questions compared to only 0.1 for his peers. The greatest changes were observed on questions related to enjoyment of playing with Gary (change of 1.4), choosing to sit beside him at lunchtime (change of 1.8), and viewing him as a friend (change of 2.2).

Social Validity Assessment
Teacher Ratings

At the end of the study, Chase's and Allan's teachers reported marked improvements in social development based on scores on the SSRS. Their standard scores improved to within 1 SD of the mean (i.e., from 79 to 87 for Chase, and from 80 to 94 for Allan; $M = 100$, $SD = 15$; see Table 1). The other 3 focus children's teachers did not report significant changes based on the SSRS.

Graduate Student Ratings

The 16 naïve judges were asked to first complete three questions related to the focus child being socially active, initiating verbal interactions, and acting friendly toward others, and then rate the same behaviors of the peers toward the focus child. The data show that before treatment, all judges perceived poor quality and limited rates of interactions across all five triads, with average ratings ranging from 1.1 to 2.4 (1 = *not at all*, 2 = *much less than average for age group*) for the focus children's social interaction behaviors, and average ratings of 1.3 to 1.8 for the peers. After treatment, the 16 judges reported improvements in the quality and rates of interactions for all five triads, with average ratings consistently above 3.5 for the focus children and above 3.0 for the peers (3 = *somewhat less than average*, 4 = *average for age group*).

Discussion

This study examined the effects of consecutively introducing two social intervention approaches—peer training and systematic instruction using written text cues (e.g., phrases appropriate to the social activity)—

on the social-communication skills of 5 elementary students with PDD. Teaching peers without social delays to use five facilitative social skills (i.e., keep talking, start talking, compliment, answer questions, and look, wait, and listen) was effective in improving overall rates of interactions for 2 children with autism and in stabilizing interaction rates for 2 other children. For all 5 children, peer training did not influence their use of specific social initiation strategies. Once implemented, the WTT improved their repertoires and rates of three targeted social-communication skills. By the end of the study, these changes resulted in perceived improvements in the quality of interactions for all five triads.

A noteworthy feature of this study was the successive examination of two recommended social intervention approaches, as opposed to evaluation of one comprehensive intervention package that included both approaches. Although having more responsive peers improved or helped stabilize interaction rates for 4 children with autism, increases in specific initiation strategies were not observed until an adult taught and prompted these skills. The written text cues were similar to those used in Thiemann and Goldstein (2001) and were chosen as the primary treatment component to provide opportunities to practice utterances related to the social context and peer modeling of target skills. WTT effects were replicated across three different communication skills for all 5 participants with PDD. Shane's ability to comment, compliment, and initiate requests for information improved after WTT. Chase, Allan, Greg, and Gary demonstrated marked communication improvements in requesting actions or objects, requesting information, and complimenting peers. Slight modifications for Shane, which seemed to enhance his performance, were fewer words in the scripts, larger print, and using similar written scripts across activities. Treatment effects on Allan were initially delayed for initiating requests for information and for requests for actions or objects. Following slight modifications to the reinforcement schedule and increased comprehension of treatment procedures, these skills improved. Given the reported variability across social, behavioral, and cognitive domains for children with autism, such flexibility in social programming is recommended (Bristol et al., 1996).

Four children with autism maintained their use of targeted communication skills. When treatment transitioned to a new skill, Chase, Allan, Greg, and Gary continued to express two previously treated skills using the written cues (or novel utterances), with few or no adult prompts. Some might consider leaving the written cues on the stimulus sheet for skills already targeted a weak test of maintenance; however, the investigator reasoned that because of the short treatment

period, removing the written cues too soon would lead to decreased performance and a failure to integrate skills into existing communication repertoires. This was observed in a related study (Thiemann & Goldstein, 2001), when removal of written cues for previously targeted skills resulted in a return to baseline performance. For the most part, 4 children in this study maintained their communication progress by reading the written cues on their own or by expressing related novel utterances. For Shane, maintenance was limited for all three targeted skills. His lack of maintenance may have been due to less sophisticated language and reading skills. During the 10 min instruction period, Shane had significant difficulties generating phrases to write in the topic bubbles. Many adult prompts were used to help him express his ideas. Although Shane passed the informal reading measure and performed at grade level on the formal reading test, he often struggled to decode the written text cues. His mother reported that his reading improved with familiar books and limited distractions. The hand-written cues did not resemble book font or style. This may explain his improved reading performance during testing, in comparison to the more complex experimental sessions. These observations suggest that treatment effects using written text strategies may be more evident for children with better developed language and reading skills. Future research that carefully assesses planned fading procedures and skill maintenance in the absence of prompts and written-script stimuli is necessary.

The results of this study extend intervention research that has focused on measuring changes in overall social interaction rates by providing an analysis of improvements in different verbal communication skills. The results are promising in light of the considerable challenge of teaching verbal initiation skills to children with PDD. In addition to learning new strategies to initiate with peers in small group settings, the children with PDD engaged in longer conversations by taking more verbal turns by the end of treatment. These findings are significant, considering the reported lack of growth in topic maintenance skills for this population (Tager-Flusberg & Anderson, 1991). WTT might have had less of an effect if peer training hadn't preceded it; however, this requires further investigation. The findings also revealed that peer responses to focus children's initiations increased progressively with the introduction of each treatment condition. Given the focus of intervention on specific communication skills, it was expected that peer responsiveness would increase and perhaps exceed typical peer response rates to children with no social deficits and, similarly, that the children with PDD would use trained initiation skills at higher than typical rates. With better established initiation and response skills, we hoped that the children would be more likely

to maintain new skills and engage in more balanced communication exchanges. Future research documenting peers' uses of similar communication skills in small group activities would provide much needed social comparison data for setting age- and context-appropriate treatment goals.

Another important finding was that visually cued instruction—specifically, written text cues with cartoon graphics—increased communication competence of verbal students with autism who had some reading ability. As expected, leaving the written text cues on the table in the direct line of vision of the focus children allowed for constant access to appropriate activity related comments, requests, and compliments. For example, the children read the written cues when they wanted to ask for a turn, to find out how to play a game or do an activity, to ask for materials (e.g., paper, scissors, dice), or to congratulate a peer on his performance. The results support conclusions from previous peer-mediated intervention studies that have recommended direct teaching of specific social skills to children with autism (Kamps et al., 1997; Kamps, Potucek, et al., 1997) and use of written visual cues to help teach new communication behaviors (Garrison-Harrell et al., 1997; Parker et al., 1999).

Additional positive outcomes were observed based on peer responsiveness and acceptance data and social validity measures. First, implementing the intervention in inclusive settings may have been instrumental in increasing nontrained peers' reports of increased playground interactions, greater play enjoyment, and higher friendship ratings. It has been suggested that teaching young children age-appropriate communication skills may directly influence friendship development (Guralnick & Groom, 1988). In an interview at the end of the study, Gary's teacher indicated that Gary became upset less often and showed a more positive attitude toward his classmates. Shane's teacher reported that Shane participated in more extracurricular activities with 1 peer, and that he referred to both peers as "friends." Second, social validation results revealed more optimal interactions between all the students with PDD and their peers, and improved social development for 2 children based on responses to a standardized questionnaire. Given that the peer acceptance and social validity measures were collected before and after both interventions, positive collateral effects of combining peer training and WTT could explain these results. Results from the peer acceptance and standardized questionnaires should be interpreted with caution. Although the children's acceptance ratings increased, and two teachers reported increased age-appropriate social skills, these changes may have been due to increased familiarity with the focus child over the course of the study,

teacher knowledge of project goals, or a desire to please the examiner. Nonetheless, posttreatment average friendship ratings increased for the majority of the children with autism and were higher than ratings for nontrained classmates. Further, all teachers had the same knowledge of and involvement in the project; yet, posttreatment teacher ratings increased significantly for only 2 children. Thus, it was likely that positive changes in peer and adult perceptions of the focus children's social behaviors were attributable at least in part to the participants' involvement in the social intervention.

A qualitative analysis of communication progress deserves mention to assist with implementation of similar treatment strategies. During treatment, variable performance may have been due to the following reasons. First, explaining the target skills in terms the children understood was difficult, as was translating the meaning of some of the skills into written labels. For example, for the skill "ask for information", the word *information* was a hard vocabulary word. Therefore, generating ideas for written cues was more challenging, especially for Chase and Shane, who had weak comprehension. Adaptations to the written cues (i.e., *find out something* instead of *ask for information*) may have improved child performance. Second, the written text cues did not always match the social context or topic for the entire 10 min interaction and, therefore, could not always be used. For example, children first would have had to finish their artwork before a compliment such as "nice painting" could be used appropriately. We addressed this issue by using sentence completion cues (e.g., "Can I have _____?"). To summarize, careful consideration is recommended in selecting social-communication skills for treatment and in matching written scripts to chosen skills and activities. Selected skills should be (a) developmentally appropriate, (b) easily explainable, and (c) described using simple vocabulary (e.g., *requests for actions or objects* may read *ask for something*).

In summary, the findings of this study indicate that peer training alone was not sufficient to improve children's use of specific social initiation strategies. Combining peer training and written text instruction within contextually supportive social activities appears necessary to impact changes in a variety of social-communication skills. Results of this study suggest the need to examine the effectiveness of different types of visual cues, such as photographs, pictures of social skills, or written text cues of differing mediums (e.g., typed, large print, colored print), especially for students with less functional social communication. Furthermore, it is important that future multicomponent social interventions not only consider a child's individual strengths and areas of competence, but also be powerful enough to affect generalized and durable social outcomes.

Evaluation of treatment factors that enhance generalization outside of structured classroom activities, such as in the cafeteria, at recess, or in the community, awaits future investigation.

Acknowledgments

References

American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders* (4th ed.). Washington, DC: Author.

Baker, J., Koegel, L., & Koegel, K. (1998). Increasing the social behavior of young children with autism using their obsessive behaviors. *Journal of the Association for Persons With Severe Handicaps, 23,* 300–308.

Brinton, B., & Fujiki, M. (1984). Development of topic manipulation skills in discourse. *Journal of Speech and Hearing Research, 27,* 350–358.

Bristol, M. M., Cohen, D. J., Costello, E. J., Denckla, M., Eckberg, T. J., Kallen, R., et al. (1996). State of the science in autism: Report to the National Institutes of Health. *Journal of Autism and Developmental Disorders, 26,* 121–157.

Brown, L., Sherbenou, R., & Johnsen, S. (1990). *Test of Nonverbal Intelligence–Second Edition.* Austin, TX: Pro-Ed.

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

Fry, E. B., Kress, J., & Fountoukidis, D. (2000). *The reading teacher's book of lists* (4th ed). Paramus, NJ: Prentice Hall.

Garrison-Harrell, L., Kamps, D., & Kravits, T. (1997). The effects of peer networks on social-communicative behaviors of students with autism. *Focus on Autism and Other Developmental Disabilities, 12,* 241–254.

Goldstein, H., English, K., Shafer, K., & Kaczmarek, L. (1997). Interactions among preschoolers with and without disabilities: Effects of across-the-day peer intervention. *Journal of Speech, Language, and Hearing Research, 40,* 33–48.

Goldstein, H., & Morgan, L. (2002). Social-communicative strategies for school-age children. In H. Goldstein, L. Kaczmarek, & K. English (Eds.), *Promoting social communication: Children with developmental disabilities from birth to adolescence* (pp. 239–277). Baltimore: Paul H. Brookes.

Grandin, T. (1995). The learning style of people with autism: An autobiography. In K. A. Quill (Ed.), *Teaching children with autism: Strategies to enhance communication and socialization* (pp. 33–52). New York: Delmar.

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

Gresham, F., & Elliott, S. (1990). *Social Skills Rating System.* Circle Pines, MN: American Guidance Service.

Guralnick, M., & Groom, J. (1988). Friendships of preschool children in mainstreamed play groups. *Developmental Psychology, 24,* 595–604.

Hodgdon, L. (1995). Solving social-behavioral problems through the use of visually supported communication. In K. A. Quill (Ed.), *Teaching children with autism: Strategies to enhance communication and socialization* (pp. 265–285). New York: Delmar.

Hops, H., Walker, H., & Greenwood, C. (1988). *Social skills tutoring and games: A program for teaching appropriate social behavior.* Seattle, WA: Educational Achievement Systems.

Kamps, D., Barbetta, P., Leonard, B., & Delquadri, J. (1994). Classwide peer tutoring: An integration strategy to improve reading skills and promote peer interactions among students with autism and general education peers. *Journal of Applied Behavior Analysis, 27,* 49–61.

Kamps, D., Gonzalez-Lopez, A., Potucek, J., & Garrison-Harrell, L. (1998). What do the peers think? Social validity of peer-mediated programs. *Education and Treatment of Children, 21,* 107–134.

Kamps, D., Kravits, T., & Ross, M. (2002). Social-communicative strategies for school-age children. In H. Goldstein, L. Kaczmarek, & K. English (Eds.), *Promoting social communication: Children with developmental disabilities from birth to adolescence* (pp. 239–277). Baltimore: Paul H. Brookes.

Kamps, D., Leonard, B., Vernon, S., Dugan, E., Delquadri, J., Gershon, B., et al. (1992). Teaching social skills to students with autism to increase peer interactions in an integrated first-grade classroom. *Journal of Applied Behavior Analysis, 25,* 281–288.

Kamps, D., Potucek, J., Lopez, A., Kravits, T., & Kemmerer, K. (1997). The use of peer networks across multiple settings to improve social interaction for students with autism. *Journal of Behavioral Education, 7,* 335–357.

Kelly, A. (1996). Talkabout: A social communication skills package [Computer software]. Winslow, U.K.: Speechmark.

Kennedy, H. C., & Shukla, S. (1995). Social interaction research for people with autism as a set of past, current, and emerging propositions. *Behavioral Disorders, 21,* 21–35.

Kohler, F., Strain, P., Hoyson, M., & Jamieson, B. (1997). Merging naturalistic and peer-based strategies to address the IEP objectives of preschoolers with autism: An examination of structural and child behavior outcomes. *Focus on Autism and Other Developmental Disorders, 12,* 196–206, 216.

Lord, C., & Paul, R. (1997). Language and communication in autism. In D. Cohen & F. Volkmar (Eds.), *Handbook of autism and pervasive developmental disorders* (2nd ed., pp. 195–225). New York: Wiley.

Loveland, K., & Tunali-Kotoski, B. (1997). The school-age child with autism. In D. Cohen & F. Volkmar (Eds.), *Handbook of autism and pervasive developmental disorders* (pp. 283–308). New York: Wiley.

McConnell, S., Sisson, L., Cort, C., & Strain, P. (1991). Effects of social skills training and contingency management of reciprocal interaction of preschool children with behavioral handicaps. *Journal of Special Education, 24,* 473–495.

McGinnis, E., & Goldstein, A. (1997). *Skillstreaming the elementary school child: New strategies and perspectives for teaching prosocial skills.* Champaign, IL: Research Press.

Mentis, M. (1994). Topic management in discourse: Assessment and intervention. *Topics in Language Disorders, 14*(3), 29–54.

National Research Council. (2001). *Educating children with autism: Committee on Educational Interventions for Children With Autism.* Washington, DC: National Academy Press, Division of Behavioral and Social Sciences and Education.

Oke, N. J., & Schreibman, L. (1990). Training social initiations to a high-functioning autistic child: Assessment of collateral behavior change and generalization in a case study. *Journal of Autism and Developmental Disorders, 20,* 479–497.

Parker, D., Kamps, D., & Setser, K. (1999, May). *The use of peer mediation and task analysis to teach functional activities to students with autism.* Symposium conducted at the 24th Annual Convention for Behavior Analysis, Chicago.

Pierce, K., & Schreibman, L. (1995). Increasing complex social behavior in children with autism: Effects of peer implemented pivotal response training. *Journal of Applied Behavior Analysis, 28,* 285–295.

Prizant, B., & Wetherby, A. (1998). Understanding the continuum of discrete-trial traditional behavioral to social-pragmatic developmental approaches in communication enhancement for young children with autism/PDD. *Seminars in Speech and Language, 19,* 1–45.

Prutting, C., & Kirchner, D. (1987). A clinical appraisal of the pragmatic aspect of language. *Journal of Speech and Hearing Disorders, 52,* 105–119.

Quill, K. (1997). Instructional considerations for young children with autism: The rationale of visually cued instruction. *Journal of Autism and Developmental Disorders, 27,* 697–715.

Roid, G., & Miller, L. (1997). *Leiter International Performance Scale–Revised.* Wood Dale, IL: Stoelting.

Sainato, D. M., Goldstein, H., & Strain, P. S. (1992). Effects of self-evaluation on preschool children's use of social interaction strategies with their classmates with autism. *Journal of Applied Behavior Analysis, 25,* 127–141.

Sasso, M. G., Peck, J., & Garrison-Harrell, L. (1998). Social interaction setting events: Experimental analysis of contextual variables. *Behavioral Disorders, 24,* 34–43.

Schopler, E., Reichler, R., & Rochen-Renner, B. (1988). *Childhood Autism Rating Scale.* Los Angeles, CA: Western Psychological Services.

Schwartz, I. (2000). Standing on the shoulders of giants: Looking ahead to facilitating membership and relationships for children with disabilities. *Topics in Early Childhood Special Education, 20,* 123–128.

Snyder-McLean, L., Solomonson, B., McLean, J., & Sack, S. (1984). Structuring joint action routines: A strategy for facilitating communication and language development in the classroom. *Seminars in Speech and Language, 5,* 213–228.

Sparrow, S., Balla, D., & Cicchetti, D. (1984). *Vineland Adaptive Behavior Scales.* Circle Pines, MN: American Guidance Service.

Stone, W., & Caro-Martinez, L. (1990). Naturalistic observations of spontaneous communication in autistic children. *Journal of Autism and Developmental Disorders, 20,* 437–453.

Tager-Flusberg, H., & Anderson, M. (1991). The development of contingent discourse ability in autistic children. *Journal of Child Psychology and Psychiatry, 32,* 1123–1134.

Thiemann, K., & 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.

Thorndike, P. L., Hagen, E. P., & Sattler, J. M. (1986). *Stanford-Binet Intelligence Scale* (4th ed). Chicago: Riverside.

Wechsler, D. (1991). *Wechsler Intelligence Scale for Children* (3rd ed). New York: The Psychological Corporation.

Wolfberg, P., & Schuler, A. (1993). Integrated play groups: A model for promoting social and cognitive dimensions of play in children with autism. *Journal of Autism and Developmental Disorders, 23,* 467–489.

Woodcock, R. D. (1998). *Woodcock Reading Mastery Tests–Revised.* Circle Pines, MN: American Guidance Service.

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Appendix. Definitions of coded social-communication measures.

Securing Attention (SA)

The child (a) indirectly requests attention or acknowledgment from peers (e.g., "Hey!", "See this?", "Look."), (b) calls a peer's name, or (c) taps a peer on the shoulder. Each SA behavior is coded separately if there is more than a 1-s pause between SA behaviors.

Initiating Comments

Descriptive comments that (a) are related to the ongoing topic/activity (e.g., "This is fun."), (b) express an opinion (e.g., "I think we should start."), (c) are in response to a peer's action (e.g., "You're done."), or (d) express enjoyment or frustration (e.g., "Oh no!").

Compliments

The child reinforces a peer for (a) doing nice work (e.g., "Good job!"), (b) winning a game (e.g., "You did it!"), or (c) success/personal performance (e.g., "Nice try."). Note: Compliments take precedence over contingent responses.

Initiates Requests for Information

The child asks a question to (a) learn/follow game rules (e.g., "How do we play?"), (b) understand a peer's actions (e.g., "Why did you do that?"), (c) understand expectations (e.g., "What do we do?"), or (d) acquire knowledge about the activity.

Initiates Requests for Actions/Objects

The child (a) requests an action (e.g., "Can I have a turn?"), (b) requests an object (e.g., "Can I have a marker?"), or (c) tells a peer what action to do or not to do (e.g., "Stop it."; "Put it there.").

Contingent Responses

The utterance is contingent on a peer's prior utterance, and within a 3-s interval the child (a) acknowledges what was said (e.g., "hmmm"), (b) repeats part or all of a prior utterance, (c) answers a question (e.g., head nod, "yeah"), (d) responds with a related comment about events in the activity, (e) confirms/clarifies a question or comment from peer (e.g., "What did you say?"), and (f) agrees or disagrees (e.g., "Yeah", head shake for "no").

Other

Any (a) animal noises/inappropriate vocalizations, (b) unintelligible utterances, (c) noninteractive delayed echolalia or stereotypic utterances (e.g., repetitions of movie lines, memorized scripts), and (d) perseverative utterances that match the communicative context (code as OT on the third repetition, and the first two as defined).

No Response

The child does not respond verbally/nonverbally to a peer's requests (e.g., for information, objects, actions) within 3 s, or a peer repeats the request 3+ times; if the child is doing an action requested by a peer that takes more than 3 s, wait to see if he or she completes the task and responds.

Note. An utterance is an initiation only if (a) there is a minimum 3-s pause after a peer's prior utterance, (b) it is not contingent on a peer's prior utterance, or (c) it introduces a new topic.

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