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ABSTRACT

This study investigated the effects of a visually mediated intervention (i.e., social stories, written social phrases, pictures of social skills, and videotaped feedback) on the social communication of five elementary students with pervasive developmental disorders. Five triads, each with one subject and two typically developing peers were formed. A multiple baseline design across triads and social behaviors revealed that the intervention was effective in increasing the frequency of four specific social communication skills for the five focus children. Two participants demonstrated generalization of social improvements and parents and naive judges reported improvements in social interactions for all triads. Class-wide sociometric ratings increased for four of the five participants. Overall, the intervention was judged effective in teaching social skills necessary for participation in conversations and positive social interactions with peers in inclusive settings. (Contains 37 references.) (Author/DB)

Effects of Visually-Mediated Intervention On the Social Communication of Children with Pervasive Developmental Disorders

FINAL REPORT

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II. ABSTRACT

Effects of Visually-Mediated Intervention On the Social Communication of Children with Pervasive Developmental Disorders

This study investigated the effects of a visually-mediated intervention (i.e., social stories, written social phrases, pictures of social skills, and videotaped feedback) on the social-communication of five elementary students with pervasive developmental disorders. Ten typical peers participated as communication partners, with two peers paired with one focus child to form five triads. Additional goals focused on (a) determining if social skill improvements would generalize to new settings and social partners, (b) measuring parents' and naïve judges' perceptions of changes in the quality of the children's social interactions with peers following intervention, and (c) examining changes in class wide sociometric status ratings.

A multiple baseline design across triads and social behaviors revealed that visually-mediated intervention was effective in increasing the frequency of specific social communication skills for the five focus children. Treatment effects were replicated across four different social behaviors with the initiation of the intervention. Two participants demonstrated generalization of social improvements in the classroom and naïve judges reported improvements in the quality of social interactions for all triads. Class wide sociometric ratings increased for 4 of the 5 participants with social impairments.

The findings support recommendations for using visually-cued instruction to guide the social development of children with pervasive developmental disorders. Involving typical peers as conversational partners contributed to the children's success and peer acceptance increased among classmates not involved in the intervention. This intervention was effective in teaching social skills necessary for participation in conversations and positive social interactions with peers in inclusive settings.

The results of this project have been presented at National conferences, and within the state of Florida in the form of in-service training for teachers, speech-language pathologists, and special educators. Recommendations were incorporated in a manual entitled "Picture My Words: Visual Strategies for Improving Social Skills of Elementary School-Age Children". This manual was distributed to the Center for Autism and Related Disabilities at FSU, and other interested agencies.

TABLE OF CONTENTS

GOALS AND OBJECTIVES

Objective 1: To investigate the effects of an intervention utilizing static and dynamic visual stimuli for instructing, modeling, and providing feedback to improve the social conversational skills (i.e., securing attention, initiating comments and requests, and responding contingently) of elementary school children with social impairments.

Objective 2: To investigate generalization and maintenance of treatment effects to new settings and conversational partners.

Objective 3: To assess social validity through (a) measures of parents' and naïve judges (i.e., teachers and graduate students) perceptions of changes in the quality of interactions between the focus children and the typical peer participants following the intervention, and (b) changes in class wide sociometric status ratings.

Objective 4: To produce training materials and in-service programming for teachers, speech-language pathologists, and special educators, and disseminate results in state and national conferences and selected journals.

THEORETICAL FRAMEWORK

Much research has described the restricted range of social communication skills for children with Pervasive Developmental Disorders (PDD), including autism, such as limited speech acts to request information from others, acknowledge others, or comment (Volkmar, Carter, Grossman, & Klin, 1997; Wetherby & Prutting, 1984). Other researchers have documented a lack of nonverbal or verbal initiations to greet/say farewell or engage others (Hobson & Lee, 1998), and impaired abilities to ask questions, listen and respond to others, and interact in simple social games (VanMeter, Fein, Morris, Waterhouse, & Allen, 1997). This limited repertoire of social communicative behaviors may negatively influence a child's ability to enter into and maintain positive interactions with peers in inclusive education settings, resulting in fewer opportunities to practice and learn important socialization skills.

Studies focusing on unique cognitive and language competencies of children with PDD have revealed particular strengths in visual-perceptual skills (Lincoln, Courchesne, Kilman, Elmasian, & Allen, 1988), processing and interpreting static visual stimuli (Hodgdon, 1995), and early word recognition skills (Whitehouse & Harris, 1984). Quill (1997) discussed learning styles and instructional considerations for children with autism and stated, "the specific communicative functions used by autistic children appear to be related to the presence or absence of visible retrieval cues" (p.701). She recommended using visually-cued instruction (e.g., graphic cues) to improve children's social communication. Interventions that capitalize on cognitive strengths and learning styles of students with PDD using visual stimuli may improve areas of impairment such as social communication. Identifying effective social interventions in the early elementary grades may significantly impact a student's ability to develop friendships and engage in successful classroom or extracurricular social activities across the school years.

Different types of visual cues or stimuli that have been effective in improving social communication of children with autism or related developmental disabilities have included: (a) written prompts or pictorial cues (Bryson, Landry, & Smith, 1994; Kistner, Robbins, & Haskett, 1988; Krantz & McClannahan, 1998; Schuler, 1995), (b) peer self-evaluation books (Sainato, Goldstein, & Strain, 1992), (c) videotape feedback of behaviors and conversations (Charlop & Milstein, 1989; Kern-Dunlap et al., 1992), (d) videotaped peer models (Haring, Kennedy, Adams, & Pitts-Conway, 1987), and (e) video self-modeling (Heptig & Goldstein, 1996). Kistner and colleagues (1988) capitalized on the superior word recognition skills of a young girl with autism and hyperlexia, to improve her functional language skills. Hyperlexia has been described as a preoccupation with letters and words at an early age, and exceptional reading and word recognition skills with delayed comprehension of meaning (Healy, 1982). Results indicated that written prompts (e.g., verbal prompt: "What do you want?" written prompt: "Want cookie.") were successful in teaching functional language skills such as responding to questions. Progress was maintained with removal of the written cues. Charlop and Milstein (1989) assessed the effects of video modeling on conversation skills of children with autism between the ages of 6 to 7 years. The authors reported that not only did all 3 participants' conversational speech improve, but also new skills generalized to different settings and social partners.

In a study examining the effects of peer-mediated social intervention, Sainato et al. (1992) stated that the use of illustrations within self-evaluation books (containing cartoons of facilitative social strategies) (a) increased peer's use of trained social strategies with children with autism, (b) provided a way for the trainer to compare his evaluations with the peer participants, and (c) assisted investigators in giving specific feedback for appropriate skill use. These studies provide preliminary evidence of the potential benefits of using visually-cued instruction to improve

social communication of young children with social impairments. Additional research is needed that examines the effectiveness of combining different types of visual stimuli to improve social relationships among elementary students with social impairments and peers without disabilities.

In summary, given the unique qualitative differences in social, cognitive, and communication behaviors of children with PDD (Bristol et al., 1996; Lincoln et al., 1988) some intervention approaches may be more or less beneficial than others. Social intervention strategies that capitalize on children's visual strengths may improve their ability to engage in conversations with peers. This could be accomplished through the use of visually coded information, especially for children with emergent or acquired literacy skills. Teaching social communication skills through concrete visual representations may enhance children's understanding and accurate interpretation of different social rules and situations, thereby enhancing interactions with peers without disabilities.

METHOD

Participants

Participants were 5 children with social and language impairments and 10 typical peers from a local elementary school. Two typical peers from each focus child's classroom were assigned to a triad (consisting of 1 focus child and 2 peers). The 5 focus children were males, ranging in age from 6;6 (years;months) to 12;2, and enrolled in grades 1st through 5th. These participants were assessed with the following instruments: Childhood Autism Rating Scale (CARS) (Schopler, Reicher, DeVallis, & Daly, 1980), Peabody Picture Vocabulary Test-Revised (PPVT-R) (Dunn & Dunn, 1981), the Test of Language Development-2 (TOLD-2, Newcomer & Hammill, 1988) or the Clinical Evaluation of Language Fundamentals-3rd Edition (Psychological Corporation, 1994), the Test of Nonverbal Intelligence-2nd Edition (TONI-2, Brown, Sherbenou,

& Johnsen, 1990), the Parent and Teacher Reports of the Social Skills Rating System (SSRS, Gresham & Elliott, 1990), and the Word Identification subtest of the Woodcock Reading Mastery Tests-Revised (Woodcock, 1998). Only the Teacher Report of the SSRS was re-administered post intervention, as minimal changes were expected on the other tests given the short duration of the intervention. Participant information and results of the assessments are summarized in Table 1.

Participants were selected based on the following criteria: emergent or acquired decoding skills, functional verbal communication skills, fully or partially included in regular education, and social impairment. Social impairment was confirmed based on results from the SSRS (Parent or Teacher Report), the CARS, and a Social Conversational Skills Checklist (SCSC) designed by the first author (see Appendix A). A certified school psychologist diagnosed two children with autism, Casey and Greg. All children except Dan scored in the autistic range on the CARS. All of the children were registered with Florida State University's Center for Autism and Related Disabilities (CARD). None of the focus participants or the typical peers demonstrated hearing, vision, or physical motor impairments.

The SCSC was adapted from Prutting and Kirchner's (1987) pragmatic protocol. Other social skills were added based on clinical observations and parent report of common social difficulties. The student investigator and a research assistant completed three checklists based on 10-minute observations of the focus participants and their peers during (1) small group work in the classroom, (2) special area (e.g., music, art, or PE), and (3) recess. The total number of inappropriate and not observed social behaviors checked were divided by the total number of social behaviors possible that the child had the opportunity to express (i.e., maximum 20). This calculation resulted in a percentage of social deficits across nonverbal, paralinguistic, and verbal

discourse categories on the SCSC. For inclusion in the study, all participants had to demonstrate $\geq$ 50% social deficits during a minimum of two out of three 10-minute observations.

Casey was integrated in a regular 1st grade classroom for part of the day (i.e., center time academics, recess, and special area). He exhibited average nonverbal intellectual skills, and above average decoding abilities. Casey demonstrated characteristics of hyperlexia (Healy, 1982), with an interest in letters, reading, and writing at an early age but weak reading comprehension. His expressive language consisted of immediate echolalia and 2-4 word sentences to have personal needs met. Casey's repertoire of different communicative functions was significantly limited, and his intelligibility was poor. Results from the SCSC revealed deficits across all nonverbal, paralinguistic, and verbal discourse categories, with 100%, 71%, and 79% social deficits noted during the three social interaction observations.

Greg was integrated in the same 1st grade classroom as Casey for part of the day. Because the intervention involved the use of written visual cues, Greg's teacher was interviewed and reported that he knew all letter names, was starting to associate sounds to beginning letters of words, and recognized some sight words. Greg communicated using simple sentences to request, comment, and respond; however, a significant number of his utterances were scripted or rote (memorized from favorite movies or video games). He received weekly home-program services from a behavioral consultant. Greg exhibited 60%, 65%, and 22% social deficits based on the SCSC observations. His social communication with peers improved during recess (i.e., 22%).

John was fully integrated in a regular 1st grade class and had received ongoing 1-1 academic support since Kindergarten. He had an expanding sight word vocabulary, emergent knowledge of sound-letter correspondence, and comprehended simple written sentences. John's expressive language contained a significant amount of memorized scripts from favorite movies

or video games; however, he was capable of using complete sentences to talk about a variety of topics. During the SCSC observations, John exhibited 55% and 50% social deficits during recess and PE respectively, and 37% social deficits during a small group center activity in the classroom. A discrepancy was noted between Parent and Teacher report of social difficulties on the SSRS (see Table 1). John and his family had received ongoing consultation from CARD for issues related to social and academic functioning since he was in preschool. John was included in the study based on his long history of social problems, continued parent report of social interaction difficulties, and results of the CARS and SCSC observations.

Ivan was fully integrated in 2nd grade, and received resource room services for reading and math. Although Ivan's decoding skills on the Woodcock were less than 2 standard deviations below the mean at the beginning of the study, his literacy skills improved markedly by the time he began the intervention. He had a large sight word vocabulary, knowledge of sound-letter correspondence, was beginning to segment and blend sounds to read words. Ivan communicated using multiple, complete sentences, and evidenced advanced vocabulary for topics of personal interest. He had a high degree of awareness of his social and academic difficulties. On the SCSC, Ivan demonstrated 53%, 59%, and 58% social deficits during the three social observations.

Dan was fully integrated in a regular 5th grade classroom and had participated in regular education since Kindergarten. He received resource support for reading, language arts, and math. His decoding skills were within normal limits, and he comprehended simple paragraphs. Dan communicated using full sentences and responded to simple questions appropriately. He had difficulty understanding lengthy verbal directions, language that required abstract reasoning, and answering complex questions (e.g., why, how). Although Dan's score on the CARS placed him in the non-autistic range, a social impairment was confirmed with the SSRS, Parent and Teacher

report and the SCSC. On the SCSC, Dan exhibited 68%, 63%, and 61% social deficits during the three social observations. The majority of inappropriate social behaviors were observed in the paralanguage (e.g., low volume, flat intonation, and a fast rate of speech) and verbal discourse categories. He was not observed to initiate activities or topics, maintain topics, ask questions, or repair communication breakdowns with peers.

The 10 typical peers were identified and recommended by the focus children's regular classroom teachers. The teachers were asked to recommend children who: (a) did not evidence social communication difficulties, (b) could provide appropriate social models, and (c) consistently completed their assignments so they could leave the classroom twice per week to participate. There were mixed genders (i.e., one girl and one boy without social impairments) in each of the triads except for Greg's group, which were all boys.

Setting and Session Organization

All of the sessions took place in an average-sized media room in the school library. Three triads met during regular scheduled morning center-time, and two triads met in the morning prior to the start of classes. During baseline, the triads attended two 10-minute sessions each week. Once a group started treatment, they attended two 30-minute intervention sessions each week. Each intervention session included: 10-minutes reading the social story followed by instruction, discussion, and modeling of appropriate social phrases, 10-minutes engaging in a social activity, and 10-minutes of videotaped feedback of the social interaction.

Social activities selected were mainly familiar social routines with unifying themes, predictable turn-taking sequences, and exchangeable participant roles. A rotation of three types of activities centered on (1) thematic or pretend play (e.g., restaurant, grocery store), (2) board games, and (3) art/science projects. To assist with participant motivation and interest, a minimum

of five different activities for each type of social play were used. Activity agendas were used to assist with knowledge of task expectations.

Procedures

Peer orientation. Two peers without social impairments from each triad met with the investigator for a 30-45-minute orientation session before beginning intervention. Each child was given a notebook with pictures and sentences that described skills related to "How you can talk to your friends." These skills consisted of (a) get your friend's attention, (b) start talking about what you are doing, (c) ask questions, and (d) solve problems together. The children wrote examples of appropriate social phrases that matched the pictures of the social skills. Specific examples of positive or negative social behaviors observed in the baseline sessions for each focus child were discussed with the peers. Peers were told they would receive occasional prizes for using positive social skills with their friends.

Teaching use of social stories, written phrases and pictures of social skills. Four social stories (Gray & Garand, 1993) were written to describe the four social skills targeted during intervention. The content of the social stories included: (a) securing attention (i.e., title: "Getting Friends to Look"), (b) initiating comments (i.e., title: "Start Talking to My Friends"), (c) initiating requests (i.e., title: "Ask My Friends Questions"), and (d) contingent responses (i.e., title: "Keep Talking to My Friends"). The social stories were written according to Gray's rules for including descriptive, perspective, and directive sentences (see Appendix B for an example of a social story). For the older children (i.e., John, Ivan, and Dan), a hand-drawn, colored picture depicting two children performing the target social skill was placed at the bottom of the story, along with empty topic bubbles (as in a cartoon) above the children's heads. Real photos were used for the two youngest children. The pictures of the social skills were laminated on a separate

single page. Two to three social utterances (e.g., sentence starters, phrases, or simple sentences) appropriate to the target social skill were written in laminated topic bubbles, and velcroed onto the empty topic bubbles. For example, for the skill securing attention the picture was of one child tapping another child on the shoulder and words such as "Look," "Watch this," or a child's name were written in the topic bubbles. These utterances were rehearsed a minimum of three times before starting the activity. The visual cues were left on the table throughout the group interaction to provide the children with constant access to the visual prompts.

At the beginning of each intervention session the participants read one social story targeting a specific social skill. The clinician then asked 4-5 simple interrogative and wh-questions to monitor and improve participant's understanding of the story content (see Appendix B). The social story was left on a flip chart on the table during the social activity. Parents were given a copy of each social story (as it was introduced) to read daily with their child at home. Daily readings of the story were monitored through completion of weekly checklists that the parents mailed in.

Once per minute during the 10-minute treatment session, the examiner provided a visual (or if necessary verbal) prompt by pointing to one of the written social phrases if the focus child did not spontaneously use the targeted social skill. Otherwise, the investigator remained at a distance from the group. Casey's peers were taught to prompt him to use the written phrase cues due to a high level of adult dependency observed during the first few sessions.

Videotaped feedback. After the 10-minute social activity, children self-evaluated their use of targeted social skills. The examiner taped the picture of the social skill and the written social phrases (topic bubbles) on the bottom of a television. Each child had a clipboard with the social skill written at the top of a sheet of paper (e.g., "I started talking" for initiating comments). The

paper also had two columns marked "Yes" circled in green and "No" circled in red with a line crossed through it. The examiner played the videotape of the interaction, paused it after one conversational exchange, and asked the children if they heard examples of the targeted social skill. The tape was paused a minimum of three times. Checks were exchanged for tickets and used collectively to obtain small toys or other reinforcers.

Experimental Design

A multiple baseline across two to three social language skills replicated across five triads (i.e., one participant with social delays and two typical peers) was used to assess changes in conversational skills for the participants with social impairments. The possible pool of targeted social skills included: (a) secures for attention, (b) initiating comments, (c) initiating requests, and (d) contingent responses. The discourse skills taught were counterbalanced among the triads to control for possible order effects.

During baseline, each triad engaged in one 10-minute social activity per session. No attempts were made to reinforce or influence interactions. Following stable performance or no upward trend in a specific social behavior, the first social story, written cues, and picture stimuli were implemented (e.g., targeting secure for attention). Baseline measurement of the other three social skills continued. When an observable and notable upward trend in the targeted social skill was observed over a minimum of four sessions, treatment was initiated for the second social skill (e.g., initiating comments) and maintenance data were collected on the first social skill (i.e., secure for attention). Baseline data continued to be collected for the other two social skills (i.e., initiating requests and contingent responses. If improvements in social behaviors occurred only when intervention was initiated, then one can claim treatment effects. If these effects were replicated consistently across behaviors and across triads, one can make a convincing case for

experimental control.

For two children, a modified treatment approach was implemented for the final 5-6 sessions because of reduced maintenance on previously targeted social skills. Three social skills were combined into one social story and represented by the original social skill pictures or photos. One social phrase was written as a visual cue for each targeted skill. Thus, there were three possible social skills and three possible written phrases that the children could choose to use in the social interaction. Videotaped feedback forms also were modified to allow for self-evaluation and feedback on all three social skills.

Data Collection and Coding

Observational coding. A direct observation coding system with a 15-second audio-recording interval was used to code frequency of occurrence of all appropriate and inappropriate social language measures (see Table 2) within the 10-minute social activity. All sessions were audio- and videotaped. The four primary dependant social measures included securing attention, initiating comments, initiating requests, and contingent responses. These social discourse skills were selected based on a review of the literature on normal and disordered development of topic maintenance skills (Brinton & Fujiki, 1984; Foster, 1985; Mentis, 1991,1994; Prutting, 1982; Prutting & Kirchner, 1987). Other measures of interest included frequency of inappropriate discourse skills such as topic changes, unintelligible responses, other, and no responses.

The average length of multiple-turn conversational episodes was determined by totaling the number of the focus child's sequential utterances related to the same topic or action (ending with a minimum of a 3-second pause or a change in topic) and dividing by the total number of episodes during the 10-minute coding interval. These data were collected and averaged over the last five baseline sessions (just prior to initiation of treatment of the first social skill) and the last

five treatment sessions for each participant.

Generalization probes. Generalization data were collected in the classroom setting for 3 participants (Casey, Greg, and John) over 3-4 days. In the classroom, social story instruction and videotaped feedback were omitted from the procedures. Written social phrases were rehearsed a minimum of three times prior to the triad engaging in an already scheduled 10-minute center activity. Activities ranged from reading big books, working on computers, completing math worksheets, and doing art projects. If peers became too directive they were provided with occasional prompts to use previously trained social skills.

Assessment of social validity. A parent questionnaire was administered pre- and post-intervention. This questionnaire was designed to assess parent's perceptions of meaningful changes in their child's social functioning. The questionnaire consisted of 10 questions (based loosely on social interaction behaviors described in the SCSC) rated on a 5-point Likert scale (i.e., 1 = Never observed, and 5 = Always observed). Seven regular education teachers and six graduate students in speech-language pathology provided additional subjective ratings of meaningful changes in social interactions between children with social impairments and their peers by observing pre- and post-intervention videotape segments. Each baseline and treatment segment lasted approximately 2-minutes and the sessions were counterbalanced. Judges rated the quality and quantity of (1) the focus child's social behaviors towards their peers, and (2) the peer's social behaviors toward the focus child. The questionnaire consisted of six questions rated on a 5-point Likert Scale (i.e., 1 = No active involvement, 5 = Better than average involvement).

Sociometric status. The sociometric status of the focus children and the regular education peers were determined by asking all classmates to rate each other using Polaroid pictures or name cards. Three boxes with slots (to place the pictures/cards) were placed in front of the child.

Each child was individually instructed to place a photo or name card in the box associated with whether or not they liked to play with that person at school. Happy, neutral, and sad faces were drawn on the front of each box to represent likes to play with, sometimes play with, and don't like to play with respectively. These procedures were completed pre- and post-intervention in a quiet area of the classroom.

Reliability

Prior to the beginning of the study, the examiner trained two research assistants using previously recorded videotapes of other friendship groups. Once the interobserver agreement for identification of the social language measures reached a minimum agreement criterion level of 80% over three days, the assistants were considered familiar enough with the coding procedures to code on-line. A primary coder reviewed the audiotape and videotape of each session, and made corrections as necessary prior to secondary coding and graphing. Interobserver reliability was calculated by dividing the number of agreements by the agreements plus disagreements, and multiplying by 100. Interobserver agreement was calculated separately for 30% of the baseline and treatment sessions, and 30% of home videotape samples. Interobserver agreement was consistently above 80% for all participants. Agreement ranged from 83 to 100% for Casey, 81 to 94% for Greg, 80 to 100% for John, 84 to 95% for Ivan, and 87 to 100% for Dan. Interobserver agreement results for 30% of the home videotaped social samples ranged from 81 to 87%.

Treatment fidelity was monitored for 20% of the intervention sessions using a checklist of the proposed intervention procedures. Treatment fidelity was consistently above 82%, with a range from 82 to 100%.

METHODOLOGICAL CHANGE

Originally, implementation of the intervention was planned at the FSU Speech and Hearing Clinic. This project eventually occurred at a local elementary school for the following reasons: (a) to improve probability of enlisting same-age typical peers to participate in the social groups, (b) to provide the intervention in a more natural social context, and (c) to increase the likelihood of generalization of trained social behaviors to different peers and social settings.

RESULTS

Focus Children's Social Communication Progress

Frequencies of targeted social language skills for the participants are presented in Figures 1 through 5. Dan demonstrated low rates of securing attention during baseline, with clear improvements following treatment. During treatment on the next social skill, initiating comments, these improvements declined but still maintained above baseline levels in the absence of prompts. The intervention was effective in increasing Dan's frequency of comments, and improvements were maintained in the absence of prompts. The frequency of initiating requests seemed to improve once intervention began on the first behavior targeted, suggesting generalized treatment effects. Prompts were mistakenly provided for comments and requests during treatment of secures for attention (e.g., written cue: "Michelle, can I ___?"). However, when written cues for initiating requests were removed during treatment on initiating comments, generalized improvements continued for requesting behaviors. Moderate improvements were noted once treatment began on initiating requests. Contingent responses were not targeted in treatment as this social skill steadily improved over the course of intervention.

During baseline, Greg demonstrated a generally low rate of securing attention with the exception of Session 10. Following treatment, there were noticeable increases in his use of this

social skill. These improvements were maintained as prompts were faded in treatment; however, Greg's continued use of securing attention without visual cues during treatment of the next social skill was variable. Greg emitted a higher number of comments during a number of baseline sessions that involved playing a board game. The treatment resulted in higher and more stable initiation of comments across different social activities (i.e., thematic play and art/science projects). These improvements endured as prompts were faded. Once treatment began on initiating requests, Greg's number of comments as well as requests increased dramatically. Generalized treatment effects may explain these improvements. However, generalization data revealed no clear maintenance of improved target behavior performance in the modified classroom activities.

Initiating comments and requests were combined into one category (i.e., initiations) and targeted simultaneously for John and Casey due to low baseline performance and related definitions. Immediate treatment effects were observed for John for initiations and securing attention. John's improved ability to initiate to peers continued as prompts were faded. Transitioning to treatment on a new social skill resulted in a reduction in initiations and especially securing attention during maintenance conditions. However, improvements were largely recovered for initiations and somewhat recovered for secures for attention during the combined treatment condition (i.e., visual cues available for all previously targeted skills). During baseline, John's contingent responses to peers were highly variable. Treatment was effective in stabilizing his performance on this social skill, although not at a noticeably higher level. These results may reflect an increased amount of peer-initiated requests directed towards John. Generalization to the classroom setting was minimal for all social skills, except for securing attention.

Casey demonstrated low baseline performance on all targeted social behaviors. For example, he expressed an average of 2.7 initiations (both comments and requests) during baseline. The treatment was effective in more than doubling Casey's unprompted initiations to an average of 6.3 per treatment session. Slight improvements were observed following treatment on securing attention, as prompts were faded. Casey's average number of unprompted secures for attention increased from 0 in baseline to 1.8 per treatment session. Treatment effects for initiations and secures for attention were not maintained without visual cues or prompts. Once treatment began on contingent responses, Casey demonstrated marked improvements in his ability to answer peer's yes/no questions. These results may be somewhat inflated due to increased peer-initiated requests to Casey. Combined treatment led to improvements in all previously targeted social skills with the exception of responding contingently to peers. Decreased use of this skill may be partly explained by increased initiations to peers, and fewer peer-initiated requests directed to Casey. In the classroom, Casey demonstrated good generalization for all trained behaviors.

Ivan demonstrated variable initiation of comments during baseline, which did not change with the onset of treatment. This lack of improvement was attributed to the following: (1) his reading skills were emergent and he often became frustrated when asked to read the social story or written social cues out loud, and (2) he disliked being singled out from his peers during the instruction time. Thus, the original treatment was modified slightly in the following manner: (1) all children took turns reading parts of the social story, and (2) a written cue was placed in front of each child. Following implementation of "Treatment 2," Ivan's frequency of comments steadily increased and he maintained these improvements. The treatment also was effective in improving Ivan's ability to secure attention. Initiating requests and contingent responses were

relatively high frequency behaviors in Ivan's repertoire, thus these skills were not targeted. Maintenance and generalization data were not assessed due to the end of the school year.

Multiple-turn interactions. Table 3 summarizes changes in the children's average number of utterances per conversational episode during a sample of the last five baseline (before treatment on the first social skill) and last five treatment sessions. Numbers in the table represent the average number of utterances per episode for five sessions. By the end of treatment, all focus children demonstrated increases in expression of sequential utterances related to specific topics. Ivan and Casey more than doubled their utterances to maintain conversational topics. Given that Casey rarely engaged in conversational exchanges with peers, his improved ability to take almost three verbal turns per topic by the end of treatment is noteworthy.

Assessment of Social Validity

Minimal to no changes were noted in parents' perceptions of their child's social functioning based on pre- and post-intervention completion of a Parent Perception Questionnaire. Judgments of the quantity and quality of changes in specific social behaviors and interactions between the focus children and their peers are presented in Table 4. These data were collected from 13 teacher and graduate student ratings of 2-minute pre- and post-intervention videotaped segments of social interactions. Following intervention, all 13 naïve raters consistently reported improvements in social behaviors and reciprocal interactions between the focus children and their peers. There were only two instances where a rater did not judge the post-intervention samples better than the pre-intervention samples. Thus, based on 63 of 65 judgments, improvements in social interactions were readily perceptible to these judges.

Sociometric Status Changes

Class wide sociometric ratings were completed for the focus children and their classmates

prior to and at the end of study. Table 5 shows before- and after-treatment ratings for the children with social impairments, and class averages. With the exception of John, classmates reported positive changes in sociometric status for all other participants with social impairments. Further, these changes were all greater than the class average pre-post sociometric status differences.

DISCUSSION

Visually mediated intervention was effective in increasing specific social language skills for five elementary school-age children with social impairments in small group interactions with typically developing peers. A combination of static and dynamic visual stimuli resulted in increased frequency and/or more consistent rates of targeted social behaviors compared to baseline data for each focus child. Treatment effects were replicated across four different social behaviors with the introduction of the visually-mediated procedures. Clear experimental control over three targeted social skills was demonstrated by three of the five focus children, and over two out of three social skills for two participants. For one child (Ivan), treatment effects were not initially observed after initiation of the treatment. However, a modification in intervention procedures resulted in eventual treatment effects across two trained social behaviors for this child. These findings demonstrate the importance of monitoring effects and applying clinical judgment to individualize social interventions.

Two participants (Dan and Greg) generalized improvements across targeted social behaviors. For example, Dan generalized initiating comments and requests after being taught to secure attention. Once Dan started calling a peer's name to gain their attention, he would then ask a question or give directions. Treatment on initiating requests led to an improved ability to initiate comments for Greg. This generalized treatment effect possibly reflects interrelated social behaviors underlying initiations in general. In the classroom setting, two participants generalized

treatment effects (John and Casey). John generalized his ability to secure attention and Casey continued to use the visual cues to secure attention, initiate comments and requests, and respond contingently. All participants demonstrated improved conversational abilities by engaging in multiple-turn dialogues on different topics. These simultaneous improvements across related social language skills have promising clinical implications relating to goal setting and improved generalization for children with social impairments.

Overall, maintenance data across participants was limited. In the absence of visual cues or as new treatment phases began, three of the five participants demonstrated maintenance of some previously targeted social skills. These three children maintained improvements in their ability to initiate comments to peers, and one out of the three also maintained the ability to gain a peer's attention. Data showing a general lack of maintenance across targeted social behaviors have important clinical implications. First, the marked or gradual return to baseline performance observed for some participants following removal of visually-mediated cues for a target social behavior suggests that the visual cues were primarily responsible for initial treatment effects. Second, it appears that some participants with social impairments may require more intensive intervention to learn certain social communication skills. For instance, the extended length of time necessary to effect change in securing attention and the improvements observed following 'booster' treatment sessions indicate that this particular skill may be more challenging for some children with social impairments to learn. Premature removal of adult or peer-mediated prompts may lead to loss of treatment gains. These findings underscore the importance of the adult's role in structuring social opportunities for children to practice using new skills.

Social validation results confirmed the clinical significance of this treatment approach. First, 13 naïve judges perceived meaningful changes in social interaction behaviors for both the

focus children and their peers based on pre- and post-intervention videotaped interactions. The second positive social validation finding came from the focus children's classmates. The classmates, including children not involved in the triads, reported positive changes in sociometric status ratings for 4 of the 5 children. The lower sociometric ratings at the end of the study for John may have been due to a high frequency of inappropriate social skills observed in the classroom, as reported by the teacher. These inappropriate social behaviors generally consisted of facial grimaces directed to peers, yelling out in class to gain attention, and repeating scripts from movies and videos out loud.

The findings of this investigation contribute to the treatment efficacy literature for improving communication of young children with social impairments in several ways. First, this research documents the potential benefits of using visually-cued instruction to improve social communication for children in the early elementary grades. Although it is difficult to identify which components of the treatment package were beneficial, a number of strategies capitalized on the visual modality to ameliorate social impairments. For example, written visual stimuli were left on the table during the activities to allow constant access to appropriate social utterances. These written cues also were used by the typical peers, which resulted in increased modeling of targeted social skills. This investigation also used *social stories* (Gray & Garand, 1993) written to increase the focus children's understanding and awareness of specific social skills. The social stories included descriptions of situations where it would be appropriate to use the social skill, possible reactions of others in that social situation, and directive statements of appropriate or desired social responses. Finally, videotaped feedback was used in conjunction with static visual stimuli as a component of the treatment program. Generally, only the three oldest participants demonstrated consistent self-evaluation skills. Thus, this component of treatment may be more

beneficial for older, higher-functioning children who have better developed metapragmatic awareness. Furthermore, because there was a 2 to 5 day lapse between sessions, caution is warranted in stating the relative contribution of videotape feedback to changes in specific conversational skills. Additional research is necessary to evaluate the relative contributions of videotape modeling and feedback, self or peer models, and opportunities to practice skills to treatment outcomes.

Thus far, the majority of intervention literature on improving social interactions of children with PDD has focused on preschoolers (English, et al., 1997; Goldstein & Cisar, 1992), adolescents (Haring & Breen, 1992; Schnorr, 1997), or elementary school children with low IQs and moderate to severe developmental delays (Kamps, Locke, Delquadri, & Hall, 1989; Mundschenk & Sasso, 1995). In contrast, all participants in this study were partially or fully included in regular education classes, had emergent or acquired reading skills, and were verbal communicators. The findings of this study augment other research efforts that seek to guide procedural decisions and program planning for effective social intervention for children with PDD and autism.

In summary, this study examined the effects of a visually-mediated intervention on the social communication of five elementary students with social impairments associated with PDD. The visual strategies were effective in improving specific social communication skills of the focus children as they interacted with peers without disabilities. Capitalizing on the visual modality resulted in higher rates of socially desirable behaviors, with generalized treatment effects observed across untrained behaviors. General education teachers and graduate students unfamiliar with the study socially validated improved reciprocal social interactions. Improved relationships with other classmates not involved in the intervention were noted based on positive

changes in sociometric status. These findings support recommendations for using visually-cued instruction to guide the social development of children with social impairments (Quill, 1997; Schuler, 1995), and add to the scant literature available for effective social intervention supports and strategies for elementary students with more developed language and reading skills.

Appendix A

Social Conversational Skills Checklist

(Thiemann, 1997; adapted from Prutting & Kirchner, 1987)

Name: _____ Date: _____ Age: _____

Observer: _____ Setting: _____

Relationship of Social Partner: _____

Social Skills:	Consistently	Occasionally	Inappropriate	Not observed	Comments (examples or note lack of opportunity to observe)
1. Nonverbal Discourse Skills:					
a) Communicative gestures (points, waves)					
b) Eye gaze (e.g., eye contact, to signal attention)					
c) Proximity (e.g., appropriate distance to partner)					
d) Physical contacts (uses approp. touch to gain atten)					
e) Facial expression (e.g., uses positive, negative, or neutral expressions as appropriate)					
2. Paralanguage Skills:					
a) Volume/intensity (varies with setting)					
b) Intonation (prosody and stress patterns)					
c) Fluency/rate (smoothness/speed)					
d) Pitch/quality (appropriate for age and setting)					
3. Verbal Discourse Skills:					
a) Initiates topics, games, activities with others using different speech acts (e.g., requests, comments)					
b) Introduces new topics within social interactions					
c) Takes other's perspective (e.g., comments on peer's topic)					
d) Maintains topics with more than 5 verbal turns					
e) Asks different questions (e.g., what, where, why)					
f) Contributes relevant comments to the conversation					
g) Gives verbal/nonverbal feedback to the listener (e.g., nods head, "mhmm")					
h) Recognizes pauses or eye gaze as turn signals (i.e., knows not to interrupt speaker)					
i) Recognizes and repairs breakdowns (e.g., requests clarification, responds to peers requests)					
j) Adjusts message based on listener's knowledge of the event (i.e., provides background information)					
k) Uses socially polite words (e.g., please, thank-you)					

Appendix B

Social Story Stimuli

Example Social Story:

"Getting Friends to Look"

Friends like playing with different toys and games.

Friends like to show each other what they are doing.

Sometimes a friend calls my name and says "look."

This means they want to show me something, and they like it if I look.

I can try to call my friend's name or say "look" to show them what I am doing.

Comprehension Questions for Social Story "Getting Friends to Look":

1. What can friends show each other?
2. Do friends say your name to get you to look at them?
3. If a friend calls your name, what should you do?
4. Do they like it if you don't look at them?
5. What can you say to get your friends to look at you?

TABLES

Table 1

Participants' Test Performance

	Participants				
Test performance	Casey (6:6)	Greg (7:6)	John (8:2)	Ivan (12:2)	Dan (11:6)
CARS	36	39.5	35	30	25
	Mild to Mod	Severe	Mild to Mod	Mild to Mod	Non-Autistic
PPVT-R	<40	<41	<40	64	67
TOLD-2 Primary:					
Oral Vocabulary	2P	1P	1P		
Grammatic Understanding	<1P	<1P	1P		
Grammatic Completion	2P	1P	1P		
CELF-3:					
Sentence Assembly				1P	2P
Formulated Sentences				1P	1P
Recalling Sentences				1P	1P
TONI-2	37P	19P	9P	3P	3P
SSRS:					
Parent Report:					
Social Skills	60	71	84	68	84
Problem Behaviors[a]	100	131	110	118	100
Teacher Report:	Pre- Post-	Pre- Post-	Pre- Post-	Pre- Post-	Pre- Post-
Social Skills	82 84	59 91	106 103	59 91	82 87
Problem Behaviors	120 113	135 115	135 120	135 115	106 112
WRMT-R: WI Subtest	120	65	77	65	87

Note. All scores reported are Standard Scores with the exception of Raw Scores reported for the CARS and percentiles reported for TOLD-2 Primary, CELF-3, and TONI-2.

[a]Problem Behaviors scale on the SSRS assesses negative behaviors, therefore higher scores = more problem behaviors than the average student in the standardization comparison group.

Table 2

Definitions for Appropriate and Inappropriate Social Language Measures

Appropriate Social Skills	Description
Contingent Response (CR)	Coded if the target child's utterance is contingent upon a peer's immediate prior utterance, within a 2-second interval following the peer's utterance, through (a) acknowledging (e.g., "hmm") and direct or partial repetition of the utterance, (b) agreeing (e.g., head nod, "yeah"), (c) answering peer's question(s), (d) responding with a related comment about observable objects or events within the ongoing activity, (e) confirming/clarifying a question or comment from the peer (e.g., "What did you say?").
Securing Attention (SA)	Coded if the target child (a) requests attention or acknowledgement from peers (e.g., "Hey!" "See this?" or "Look."), (b) calls the peer's name to gain attention, or (c) uses gestures or vocalizations to establish joint attention with the peer (e.g., taps on shoulder, hold an object up to show peers).
Initiating Comments (IC)	Descriptive comments that are related to the ongoing topic/event, but not contingent upon a peer's prior utterance and not used to request information, and the target child (a) provides a comment following a 3-second interval after a peer's last utterance, (b) initiates a new idea or topic that relates to the ongoing joint activity/topic, but is not a request, (c) compliments the peer (e.g., "You did it!") or himself, (d) reinforces the peer for winning, (e) expresses enjoyment to the peer regarding their interaction together (e.g., "This is fun!"). Note: Child's utterances coded as IC if it met the criteria of (b) to (e) and if within the 3-second interval.
Initiating Requests (IR)	Coded if target child's utterance is related to the ongoing topic/event, but not contingent upon a peer's prior utterance and not used to clarify something the peer said (would be CR), and the target child requests information or actions following a 3-second interval after a peer's last utterance.

(Table 2 Continued)

Inappropriate Social Skills	Description
Topic Change (TC)	Coded with or without a change in materials/games if the target child: (a) interrupts (definite overlap of words) a peer to introduce a new topic that has not been discussed previously, or to reintroduce a previous topic, (b) changes the topic to something unrelated to and noncontingent upon the peer's prior utterance, (c) comments tangential to some aspect of the peer's previous utterance, but there is an ambiguous semantic referent not immediately recognizable, (d) verbal turns that follow a TC are coded as CR, IC, IR, SA if the conversation follows the changed or shifted topic.
Unintelligible (UN)	Utterances that are not interpretable or are unintelligible to the coder on-line and after listening to the audiotape a maximum of three times.
Other (OT)	Code as "Other" any (a) animal noises or other vocalizations, (b) stereotypic or perseverative utterances (considered perseverative on the THIRD utterance - code as OT; if another child speaks or the child continues the perseveration at a later time, start over and code the first two utterances as they are defined), (c) delayed echolalia that is non-interactive or perseverative
No Response (NR)	Child does not respond verbally or nonverbally within 3-seconds to a peer's requests for: (a) information, requests for actions, or protests, (b) if the child is performing an action requested by the peer that takes longer than 3-seconds, wait to see if he completes the task and give him credit if he does, or (c) if the peer asks the same question again within the 3-second interval, the utterance is not coded, and the time frame starts at 0 after the peers second question; if the child does not respond after the peer repeats themselves 2 or more times, code as "NR".

Table 3

Average Number of Target Children's Utterances per Conversational Episode Based on Last Five Baseline and Last Five Treatment Sessions

	Session Type	
Participant	Baseline	Treatment
Casey	0.6	2.9
Greg	3.8	5.1
John	2.4	4.1
Ivan	2.4	4.9
Dan	1.9	3.4

Table 4

Summary of Teacher and Graduate Student Social Validity Ratings Pre- and Post-Intervention

		Teacher Ratings				Graduate Student Ratings			
		Pre-Tx		Post-Tx		Pre-Tx		Post-Tx	
Child		M	SD	M	SD	M	SD	M	SD
Casey	TC[a]	1.7	1.7	3.2	2.2	1.4	0.8	2.7	2.8
	P[b]	2.8	4.0	4.1	1.0	1.6	2.6	3.4	3.0
Greg	TC	2.2	3.3	3.7	2.7	2.2	1.5	4.2	0.8
	P	3.6	4.2	4.3	1.5	2.9	3.1	4.1	0.4
John	TC	1.4	1.3	3.3	1.6	1.9	1.2	3.5	1.0
	P	1.8	3.2	3.6	1.1	1.8	1.6	4.0	1.7
Ivan	TC	2.0	2.3	4.3	1.3	2.1	1.2	4.1	1.6
	P	1.5	2.3	4.1	0.4	1.2	1.2	3.9	2.2
Dan	TC	2.7	1.8	4.0	1.7	2.3	2.7	3.0	2.0
	P	3.0	3.3	4.7	1.2	2.0	3.5	4.0	1.7

Note. 1 = No active involvement in activity, verbal initiations, or responses to peer's comments, 5 = Better than average engagement in these 3 behaviors.

[a] TC = Target child's social behavior ratings. [b] P = Peer's social behavior ratings.

Table 5

Summary of Sociometric Status Before and After Visually-Mediated Treatment

	Before Tx		After Tx		Pre-Post	Class-Wide
Participant	M	SD	M	SD	Change	M Change
Casey	2.19	.83	2.38	.38	.19	.06
Greg	2.31	.87	2.69	-.19	.38	.06
John	1.94	.93	1.75	.21	-.19	.06
Ivan	2.00	.75	2.21	.30	.21	.17
Dan	1.83	.72	2.13	.69	.30	.19

Note. Based on class-wide ratings on a scale of 1 to 3 with 1 = Doesn't like to play with and 3 = Likes to play with.

Figure 1. Frequency of Appropriate Social Language Skills During Baseline, Treatment, and Maintenance Social Activities.

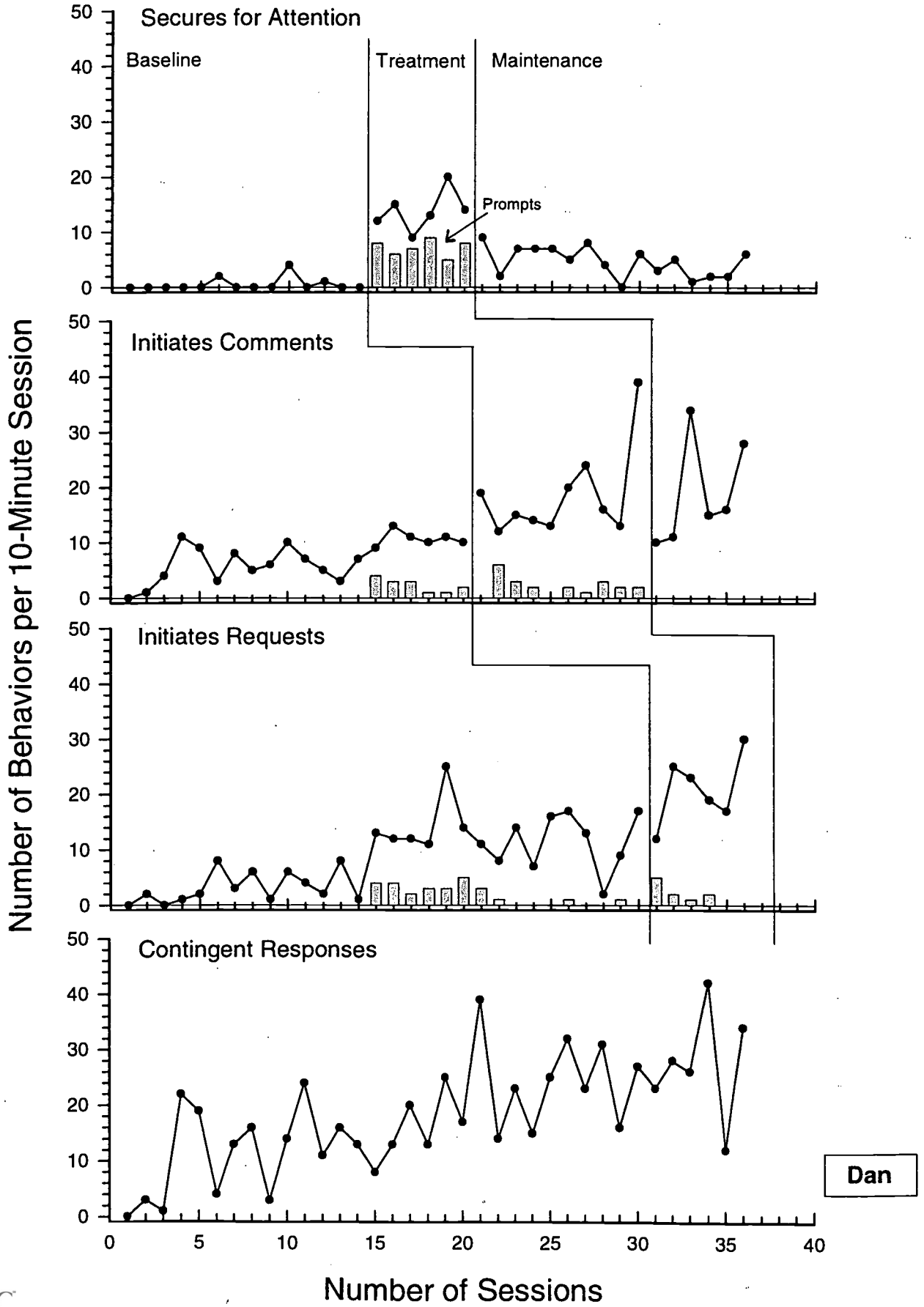


Figure 2. Frequency of Coded Social Language Skills During Baseline, Treatment, Maintenance, and Classroom Social Activities.

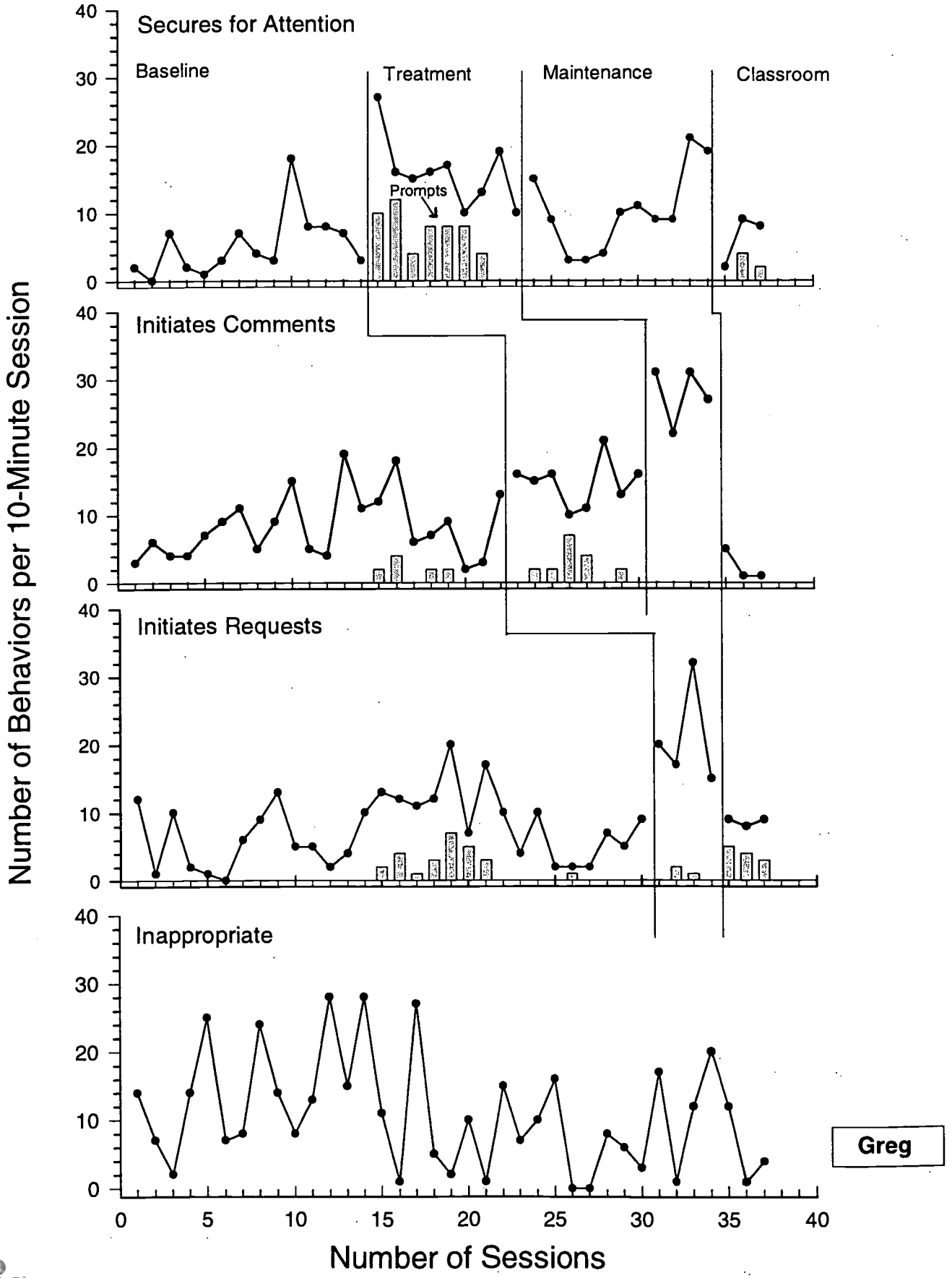


Figure 3. Frequency of Coded Social Language Skills During Baseline, Treatment, Maintenance, and Classroom Social Interactions.

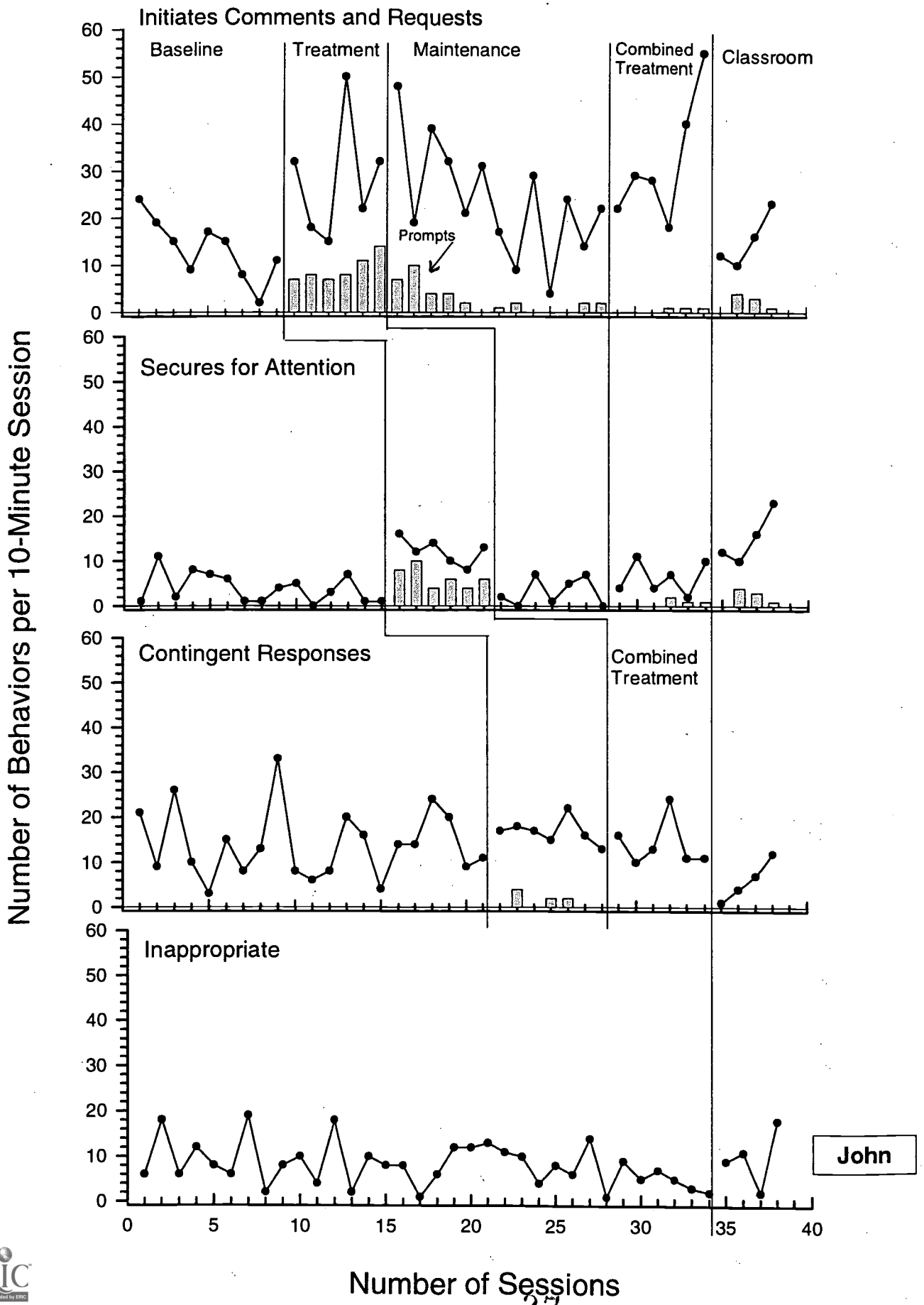


Figure 4. Frequency of Coded Social Language Skills During Baseline, Treatment, Maintenance, and Classroom Social Interactions.

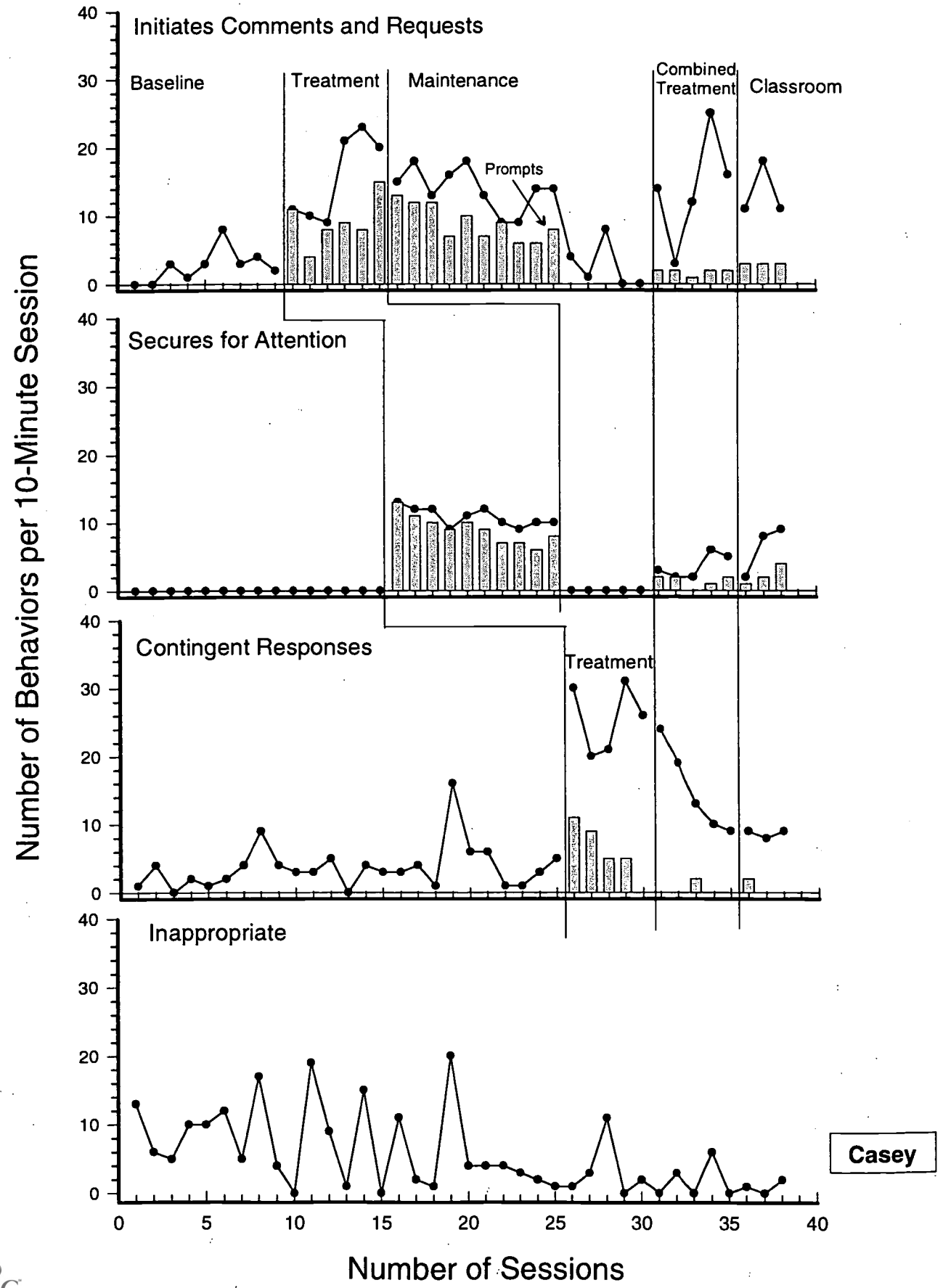
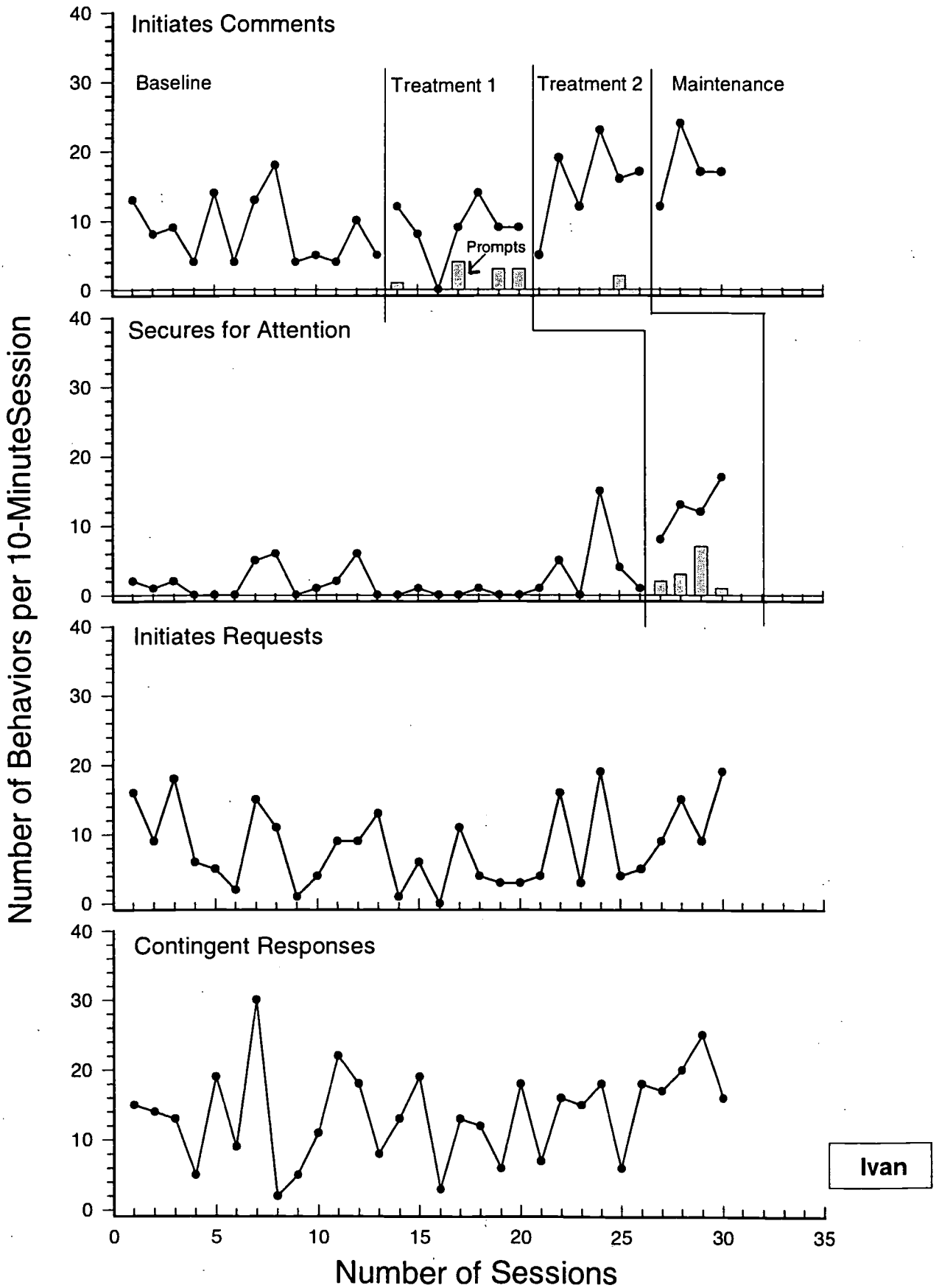


Figure 5. Frequency of Appropriate Social Language Skills During Baseline, Treatment, and Maintenance Social Activities.



PROJECT IMPACT

Implications of Findings:

(1) The outcomes of this research generate new knowledge on the effectiveness of an intervention that capitalizes on the visual modality to remediate social deficiencies. The results may directly influence early intervention efforts for improving reciprocal social interactions between young children with PDD and their peers in inclusive classrooms.

(2) Implementing this intervention in the early elementary grades may have a significant impact on later emotional, cognitive and language development, and possibly prevent continued social difficulties in adulthood.

(3) The results add to the scant literature available on effective intervention strategies for young children with PDD who exhibit basic expressive language and reading skills.

(4) The results extend research investigating the role of typical peers as mediators of social interventions for elementary students with social impairments. Although only limited peer training was provided, it was evident that involving peers as conversational partners contributed to the focus children's success. Interacting with peers during typical social activities created multiple opportunities for the focus children to respond to and use a variety of functional social communication skills. Involving typical peers as conversational partners contributed to the children's acceptance among classmates not involved in the intervention.

Dissemination Activities:

(1) Thiemann, K. S. & Goldstein, H. (July, 1999). Effects of Visually-Mediated Intervention on the Social Communication of Children with Pervasive Developmental Disorders. Poster presented at the annual OSEP Leadership Project Director's Conference, Washington, DC.

(2) Thiemann, K. S. & Goldstein, H. (November, 1999). Effects of Visually-Mediated Intervention on the Social Communication of Children with Pervasive Developmental Disorders. Poster presented at the Annual Convention of the American Speech-Language and Hearing Association, San Francisco, CA.

(3) Thiemann, K. S. (July, 1999). Guiding Social Development Through Visual- and Peer-Mediated Approaches. In-service presented to the Center for Autism and Related Disabilities, Florida State University, Tallahassee, FL.

(4) Thiemann, K. S. (February, 2000). Enhancing Friendships Between Children with Autism Spectrum Disorders and Their Peers. In-service presented to Valparaiso Elementary School, Okaloosa County, FL.

(5) Thiemann, K. S. (June, 2000). Enhancing Social Competence and Friendships of High-Functioning Elementary Students with Autism Spectrum Disorders. Presentation at the Institute on Autism at Florida State University, Tallahassee, FL.

(6) Thiemann, K. S. (February, 1999). Picture My Words: Visual Strategies for Improving Social Skills of Elementary School-Age Children. Social intervention manual provided to the Florida State University Center for Autism and Related Disabilities, Tallahassee, FL.

PLANNED FUTURE ACTIVITIES

(1) Research findings will be submitted for presentation at regional and national conferences on early intervention/education for children with disabilities in the upcoming year.

(2) Continued in-service training for local and/or regional educators and speech-language pathologists as invited.

(3) Investigators will be submitting manuscript for publication to appropriate journals.

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