

THE EFFECTS OF A FEEDBACK PACKAGE ON THE FACIAL ORIENTATION  
OF A YOUNG GIRL WITH AUTISM DURING RESTRICTED AND FREE  
OPERANT CONDITIONS

Wendy Lynn Jacobs, B.A.

Thesis Prepared for the Degree of  
MASTER OF SCIENCE

UNIVERSITY OF NORTH TEXAS

August 2000

APPROVED:

Shahla Alai-Rosales, Major Professor  
Richard Smith, Committee Member  
Jesus Rosales-Ruiz, Committee Member  
Sigrid Glenn, Chair of Graduate Studies in Behavior  
Analysis  
David Hartman, Dean of the School of Community Service  
C. Neal Tate, Dean of the Robert B. Toulouse School of  
Graduate Studies

Jacobs, Wendy Lynn, The effects of a feedback package on the facial orientation of a young girl with autism during restricted and free operant conditions. Master of Science (Behavior Analysis), August 2000, 105 pp., 6 tables, 14 illustrations, references, 22 titles.

A multiple baseline design across activities and people was used to assess the effectiveness of a feedback package on the facial orientation of a young girl with autism. During baseline, observations indicated low rates of facial orientation and high rates of gaze avoidance during conversation (restricted operant) and play (free operant) conditions. After treatment, facial orientation rates increased and gaze avoidance rates decreased to levels similar to typically-developing peers and maintained at one month follow up. These results suggest that the feedback package was effective in producing durable facial orientation across different environments and people. Possible interpretations, strengths, and limitations are discussed.

Copyright 2000

by

Wendy Lynn Jacobs

## ACKNOWLEDGMENTS

I would like to thank my Thesis Advisor Dr. Shahla Alai Rosales for her patience, wisdom, and guidance throughout the composition of this thesis. I am certain that her outstanding knowledge, professionalism, and artistry will continue to inspire me throughout my career long after graduation. I also thank Dr. Richard Smith and Dr. Jesus Rosales for their valuable suggestions which greatly improved the quality of this thesis. I also would like to thank those graduate students and Dr. Joel Greenspoon who provided important feedback on parts of this paper. I also thank Kenda Morrison for her professional courtesy in providing her reference list which was very helpful. I would like to thank Marguerite Jacobs for the sacrifices that she made to help me, not only throughout this process, but throughout my life as well. Finally, I thank David Jacobs, Kimberly Connelly, Matthew Connelly, and Harold Edwards for their endless support and love.

## TABLE OF CONTENTS

	Page
COPYRIGHT.....	iii
ACKNOWLEDGMENTS .....	iv
LIST OF TABLES .....	vii
LIST OF FIGURES .....	viii
1. INTRODUCTION .....	1
Significance of the Problem	
Literature Review	
Experimental Questions	
2. METHOD .....	10
Participants	
Setting and Materials	
Response Definitions	
Interobserver Agreement	
Experimental Design	
Experimental Conditions	
Social Validity	
3. RESULTS .....	21
Glance and No Facial Orientation	
Sustained Facial Orientation	
Prolonged Facial Orientation	
Fleeting Facial Orientation	
Normative Data	
Social Validity Ratings	
4. DISCUSSION.....	40
Experimental Questions	

Summary and Importance of Results  
Relation Between Present Results and Previous Literature  
Interpretation of Results  
Strengths and Limitations

APPENDICES .....	72
REFERENCES .....	99

## LIST OF TABLES

Table	Page
1. Studies reviewed using experimental manipulation to increase eye contact from 1967 to 1993.....	50
2. Range and overall interobserver agreement on duration categories of facial orientation. ....	52
3. Interobserver agreement on each duration category of facial orientation when the child speaks .....	53
4. Interobserver agreement on each duration category of facial orientation when the adult speaks .....	54
5. Average numbers of duration categories of facial orientation observed.....	55
6. Order and content of videos watched for each of the 10 observers.....	57

## LIST OF FIGURES

Figure	Page
1. Glance and no orientation when the child speaks.....	58
2. Glance and no orientation when the adult speaks.....	59
3. Sustained orientation when the child speaks.....	60
4. Sustained orientation when the adult speaks.....	61
5. Prolonged orientation when the child speaks.....	62
6. Prolonged orientation when the adult speaks.....	63
7. Fleet orientation when the child speaks.....	64
8. Fleet orientation when the adult speaks.....	65
9. Amy and typical children during social questions when child speaks.....	66
10. Amy and typical children during social questions when adult speaks.....	67
11. Amy and typical children during pretend play when child speaks.....	68
12. Amy and typical children during pretend play when adult speaks.....	69
13. Observer's social validity ratings for Amy and comparison children for all questions targeted to increase ratings.....	70
14. Observer's social validity ratings for Amy and comparison children for all questions targeted to decrease.....	71



## INTRODUCTION

Gaze avoidance is generally recognized as an area of concern for children with autism (Rimland, 1964; Schreibman, 1988; Tiegerman & Primavera, 1984). Atypical social relationships, including lack of eye contact, are among the defining characteristics of autism (APA, 1994; Mirenda, Donnellan & Yoder, 1983). It is presumed that eye contact facilitates learning, compliance (Hamlet Axelrod, & Kuerschner, 1984), and social interactions (Arbelle, Sigman, & Kasari, 1994). Mirenda et al. (1983) report that gaze behavior may serve: to indicate interest, to communicate the type of relationship during social interaction, to obtain information regarding nonverbal cues, to regulate the flow of conversation, and may function as a consequence during social interchanges.

Although eye contact has long been noted as one of the earliest and most pervasive deficits in children diagnosed with autism (Rimland, 1964; Schreibman, 1988; Tiegerman & Primavera, 1984), a limited number of studies have been conducted. Upon review of the experimental treatment literature, only 11 studies were identified as pertaining to the acquisition of eye contact. A summary of this research is presented in Table 1. The first column lists the studies in chronological order from top to bottom. The top row indicates: (a) the number of participants and respective diagnoses and ages, (b) whether typically developing participants were included as normative comparisons, (c) the social context(s) or format in which eye contact was studied, (d) the specific response definition of eye contact, (e) the criteria used for scoring and/or not scoring eye

contact, (f) how eye contact was measured during sessions, (g) the type of treatment used, (h) whether the researchers produced an increase or improvement in eye contact during treatment sessions, (i) the different professionals who served as interaction partners during the treatment sessions, (j) whether or not maintenance of eye contact was assessed and/or obtained, and (k) whether generalization of eye contact was assessed and what type was demonstrated across settings, people, social conditions or responses.

A wide variety of participants are included in this literature (see Table 1): people with autism (Koegel & Frea, 1993; Santarcangelo & Dyer, 1988; Taras et al., 1988; Volkmar et al., 1985), mental retardation (Elias-Burger et al., 1981; Frame et al., 1982; Matson, 1982; Taras et al., 1988), developmental disabilities (Blake & Moss, 1967), attention deficit hyperactivity disorder or Tourette's Syndrome (Santarcangelo & Dyer, 1988), and mental retardation with schizophrenia and psychosis or Prader-Willi syndrome (Rolider et al., 1991).

Many contexts were also included in previous research, such as: (a) discrete trials (Blake & Moss, 1967; Rolider et al., 1991; Santarcangelo & Dyer, 1988), (b) interviews (Elias-Burger et al., 1981), (c) question and answer periods (Matson, 1982; Taras et al., 1988), (d) casual conversation (Koegel & Frea, 1993), (e) role play scenes involving everyday activities from home or hospital life (Frame et al., 1982), (f) role plays ranging from pretending to be an animal to pretending to be a teacher (Williams, 1989), (g) recreational games, (h) school class periods (Hamlet et al., 1984), and (i) residential program activities such as meal preparation and academic tasks (Volkmar et al., 1985).

Eye contact by young children with autism during play and conversational activities was only addressed by Williams (1989).

The definitions of eye contact included various criteria, such as: (a) occurrence/nonoccurrence of looking or gazing into or at the eyes of another (Elias-Burger, Sigelman, Danley, & Burger, 1981) for either an entire response (Matson, 1982) or while speaking (Frame, Matson, Sonis, Fialkov, & Kazdin, 1982; Taras, Matson, & Leary, 1988), (b) looking directly into the experimenter's eyes for any duration (Blake & Moss, 1967), (c) orienting toward the face and sharing the same line of vision (Hamlet et al., 1984; Santarcangelo & Dyer, 1988), (c) gazing in the direction of staff or referent (Volkmar, Hoder, & Cohen, 1985; Koegel & Frea, 1993), (d) eyes open and oriented toward the adult for a minimum of 3 seconds (Rolider, Cummings, & Van Houten, 1991), or (e) no definition specified (Williams, 1989). Also, the studies utilized percentage of trials (Blake & Moss, 1967; Rolider et al., 1991; Santarcangelo & Dyer, 1988), percentage of time (Elias-Burger et al., 1981), percentage of 10 second intervals (Koegel & Frea, 1993), frequency within sessions (Frame et al., 1982; Taras et al., 1988), rate (Matson, 1982), ANOVA mean scores based on percent of episodes (Volkmar, Hoder, & Cohen, 1985), and overall social scores on a standardized social skills assessment (Williams, 1989) as measures. In these studies, varying dimensions (i.e., duration) of eye contact were summarized into a single measure. That is, the definitions and criteria used to score eye contact did not allow for separation of varying durations of eye contact.

Ten of the 11 studies reviewed demonstrated increases in eye contact (Blake & Moss, 1967; Elias-Burger et al., 1981; Frame et al., 1982; Hamlet, et al., 1984; Koegel

& Frea, 1993; Matson, 1982; Rolider et. al., 1991; Santarcangelo & Dyer, 1988; Taras et. al., 1988; Volkmar et. al., 1985). For example, Blake & Moss (1967) used contingent delivery of spoonfuls of ice cream and light upon eye contact, contingent delivery of darkness (lights turned off) upon looking away, and the instruction “Look at me”, to produce dramatic increases in eye contact. Similarly, Hamlet et al. (1984) used the instruction, “Look at me” to increase and sustain eye contact in typically-developing children. Santarcangelo & Dyer (1988) also gave the instruction, “Look at me” and varied voice inflection from conversational to “baby talk” during instructions and praise to increase eye contact in children. This intervention produced consistent increases in eye contact for all four participants. However, when Williams combined gentle reminders to look with modeling, increases in eye contact were not produced. Varying the ratio of staff to residents (1:4 to 1:2 and 1:1) during residential program activities (Volkmar, Hoder, & Cohen, 1985) has yielded little increases falling just short of significance in the percentage of trials containing eye contact for participants residing in a residential treatment center. Another treatment, delivery of exercise or restraint contingent upon aggression, property destruction, screaming, or swearing, produced increases in the percentage of trials containing eye contact for two participants (Rolider et al., 1991).

Packages of feedback and modeling with either instruction, praise, and/or rehearsal (Elias-Burger et al., 1981; Frame et al., 1982; Taras et al., 1988) produced less improvement in eye contact than feedback packages using tokens or written checkmarks backed with either preferred activity access (Koegel & Frea, 1993) or food (Matson,

1982). Elias-Burger et al. (1981) achieved a modest increase in eye contact of 18-30 year old adults with mental retardation using varied verbal comments as feedback combined with instruction, modeling, and role play during simulated job interviews. These modest increases in eye contact were found in conditions using verbal feedback whereas those who watched a video of themselves and those who did not receive treatment did not demonstrate any improvement in eye contact. Also, Frame et al. (1982) moderately reduced poor eye contact with instructions, modeling, rehearsal, and feedback from a mean frequency of 10.3 in baseline to 2.4 in treatment and 4.0 follow up in a 10 year-old boy with depression. After the therapist modeled an appropriate response during social skills training, the children were to engage in role play. Acceptable responses were followed by praise and unacceptable answers were followed by correction from the therapist. Similarly, Taras et al. (1988) effected small increases of eye contact in two children with autism while an adult questioned them about general information. Through modeling, feedback on the child's general answer response, and praising an acceptable answer, the procedures produced some improvement in eye contact in one participant. No increase was observed with the other participant.

More promising results were found when feedback was combined with tokens or written checkmarks. Matson (1982) observed impressive gains in eye contact of adults with mental retardation and depression during a series of social questions regarding the participants' view of themselves and the environment. Matson (1982) used feedback on the content of their answers to the questions, tokens for each acceptable response, and required his subjects to repeat their answer when an unacceptable answer occurred.

Tokens were exchanged for food items. Similarly, Koegel & Frea (1993) increased eye contact from 10% to nearly 100% of 10-s intervals after discrimination training on appropriate and inappropriate behaviors, and feedback with checkmarks for the occurrence of eye contact and other social behaviors. Based on the literature review, there appears to be a connection between types of intervention and quantity of behavior change. That is, interventions that include feedback systems produce moderate outcomes and those that include feedback systems plus tokens or checkmarks backed by valued rewards yield better outcomes.

Table 1 illustrates that eye contact was only observed, trained, and evaluated with a limited range of interaction partners. Partners reported in the reviewed studies include adults such as: (a) experimenter (Blake & Moss, 1967), (b) psychologist (Matson, 1982), (c) clinician (Koegel & Frea, 1993), (d) psychology intern (Frame et al., 1982), (e) therapists (Rolider et al., 1991; Taras et al. 1988;), (f) teachers (Hamlet et al., 1984), and (g) staff (Volkmar et al., 1985; Williams, 1989). Although many types of professionals served as interaction partners, no family members were involved in the treatment of any of the past participants. Therefore, after professionals completed treatment sessions, no trained individuals were available to re-implement treatment if the gains began to deteriorate over time.

Maintaining behavior change is of the utmost importance for applied research aiming to treat deficient or maladaptive behavior (Stokes & Baer, 1977). However, of the 11 studies reviewed, only 3 evaluated and demonstrated maintenance (i.e., the durability of behavior change over time) after treatment was removed (Frame et al., 1982;

Koegel & Frea, 1993; Matson, 1982). Frame et al. maintained improvements in eye contact for 4 months, Koegel & Frea maintained eye contact increases for 14 sessions after treatment, and Matson maintained gains in eye contact for at least 4 and 6 months. One study (Blake & Moss, 1967) evaluated and found generalization to another setting and to other tasks, but it was only achieved by maintaining the prompt, “Look at me” throughout that setting and those tasks. Three studies (Koegel & Frea, 1993; Hamlet et al., 1984; Taras et al., 1988) evaluated and observed desired changes in other behaviors as well. Koegel & Frea (1993) observed a reduction in topic perseveration, Hamlet et al. (1984) found an increase in compliance, and Taras et al. (1988) observed improvements in appropriate sitting and social acceptability ratings after eye contact had increased.

Generalization and maintenance of eye contact are of particular interest due to a possible connection with social reinforcement. One way to increase the probability that behavior change will persist is to establish skills that will be reinforced by others in the environment so as to enter “behavior traps” in the “natural environment” (Baer & Wolf, 1970; Kohler & Greenwood, 1986; McConnell, 1987). A behavior trap is a behavioral process by which newly acquired social responses come under the control of naturally occurring social reinforcers (McConnell, 1987). For clarification, conditions that are not part of experimental manipulations producing the behavior change will be referred to as the natural environment (Kohler & Greenwood, 1986). To demonstrate that a given target behavior has entered into a behavior trap experimenters must (1) prove that behaviors will persist once treatment is removed, (2) prove that skills will generalize across conditions or behaviors outside of training, and (3) choose a target behavior that

covaries with social behaviors of others which may reliably prompt or reinforce the target behavior (McConnell, 1987). Kohler & Greenwood (1986) state two additional types of evidence for the existence of behavioral traps: (1) identify the maintenance and deterioration of the trained behavior once treatment has been removed by inserting and removing the natural communities of reinforcement, and (2) use the same natural communities of reinforcement with other people in other conditions to demonstrate similar changes.

Based on the reviewed studies we can conclude that reinforcement (edibles and light) plus punishment (darkness), verbal prompts (“Look at me”), feedback (on acceptable answers) with tokens for food, punishment (exercise, restraint) for inappropriate behavior, and feedback (on social behavior) with checkmarks for preferred activity access, produced increases in eye contact. Feedback combined with tokens or written checkmarks demonstrated the most lasting improvement in eye contact without verbal prompts or punishment. Generalization was found using checkmarks (Koegel & Frea, 1993) but it was not assessed using tokens (Matson, 1982). Specifically, Koegel & Frea (1993) observed improvements in topic perseveration after eye contact was treated.

Although most of the studies described above offer useful information on how to improve eye contact, very little information has been produced on how to maintain these gains, and even less information has been offered on how to produce generalization. Since variations in measurement, settings, conditions, and interaction partners may help to not only increase eye contact, but also improve maintenance and generalization of this important social skill, the present study sought to address some of these issues.



The purpose of this study was to assess the effectiveness of a feedback package using written plusses and minuses for preferred activity access on the facial orientation of a young girl with autism when she spoke and when others spoke. The effects of this package were evaluated across two very different social situations (a conversational setting and a play setting) and with two very different interaction partners (the experimenter/therapist and grandmother). Additionally, various durations of facial orientation were measured to determine the degree to which this dimensional change would be observed during baseline, treatment, and one-month follow-up sessions. Furthermore, normative information was gathered to determine the extent that this dimension of facial orientation approximated that of similar-aged, typically-developing peers.

## METHOD

### Participants

The target participant was a six year-old female. Amy was diagnosed with mild to moderate autism according to the Childhood Autism Rating Scale (Schloper, Reichler, & Remler, 1986). She resided in a small rural southern town with her family and attends classes in a typical first grade classroom. She also received afternoon in-home behavioral therapy services from the experimenter for 5-6 hours each week during the course of the study. Four typically- developing peers between the ages of 5 and 6 years participated to provide normative data for each of the conditions. One of the typically-developing peer participants was Amy's fraternal twin brother.

At the beginning of the study, Amy spoke an average of 3 to 5 words per utterance, performed many independent living skills (e.g., eating, and toileting) and frequently engaged in appropriate solitary play with small toys. In school, Amy was able to independently participate in all classroom activities, except for math and reading. A facilitator accompanied her to provide extra support during those periods. Although Amy functioned fairly well at home and in school, her parents reported that she rarely displayed eye contact during conversations without verbal prompts. Her individual education plan (IEP) objectives included eye contact, as well as compliance, functional communication, food sampling, tolerance of changes, sustaining conversations, and initiating social interaction with peers during play.

### Setting and Materials

All of Amy's sessions were conducted an average of three times a week in her grandmother's home between the hours of 3:00 p.m. and 6:00 p.m. Experimental sessions as well as afternoon therapy activities took place in a family playroom that contained toys (e.g., toy bowls and spoons, towels, pillows, blankets, a Barney doll, small child chairs, a toy doctor kit) and educational materials (e.g., workbooks, puzzles, flash cards). An 8mm video camera with a tripod was used to tape all sessions. A feedback sheet was present during treatment sessions only. This sheet contained a table of boxes on which feedback, represented as plusses and minuses, was given (see Appendix A).

Two of the four typically-developing children completed participation in their own playrooms. One of the typically-developing children participated in a children's clinic located at a local university. Finally, Amy's twin brother participated in his grandmother's home.

### Measurement

Data were collected on various categories of eye contact and verbalizations for both Amy and typically-developing peers. That is, the different durations of the child's eye contact during child and adult comments and requests were scored separately. Eye contact was included under the broader category of facial orientation. In addition, because play interactions involved rapid movement of both child and adult participants, reliable observations of eye contact were extremely difficult to obtain. Four different categories of facial orientation were scored. Fleet orientation (FO) was scored if the child's facial orientation was less than 2 s in duration. Glance orientation (GO) was

recorded if the participant's facial orientation lasted between 2 to 5 s in duration. If facial orientation lasted between 6 to 9 s, sustained orientation (SO) was scored, and if facial orientation lasted between 10 to 20 s, prolonged orientation (PO) was scored. In addition, no orientation (NO) was recorded if the child or adult spoke without facial orientation by the child.

Participant and adult verbalizations with and without child facial orientations included: (a) child comments, (b) child requests, (c) adult comments, and (d) adult requests. Although child protests were also recorded, these verbalizations were not included in the presented data because protests were very infrequent throughout the study.

Each session video was observed and scored twice, once to record the child's facial orientation during child verbalizations and once to record the child's facial orientation during adult verbalizations. A continuous event recording system was used for each of the two observations. The observation protocol, response definitions, and data sheet are included in Appendix B.

#### Interobserver Agreement

A graduate behavior analysis student and an undergraduate psychology student served as secondary observers to obtain interobserver agreement scores. Primary and secondary observers scored videotapes independently. That is, after the primary observer scored a tape, it was given to a second observer to score at a later time. To prepare secondary observers to score the videotapes, each one was given definitions of the target behaviors as well as inclusionary and exclusionary examples (see Appendix B).

Furthermore, the primary observer identified all occurrences of target behaviors featured on a sample video for each secondary observer before scoring began. For facial orientation, the observer and experimenter practiced counting the seconds together to train a consistent counting pace across all observers. For verbalizations, the primary observer asked the secondary observer what type of verbalization occurred for each type featured in a sample video. After the observers could reliably discriminate between the five facial orientation categories (i.e., FO, GO, SO, PO and NO) and the three verbalization types (i.e., comments, requests, and protests), each observer was given a practice video to score. Observer training was complete when the secondary observers demonstrated at least 80% overall interobserver agreement with the primary observer (i.e., the experimenter) during a practice video.

After the primary and secondary observers completed scoring a particular session, the total number of each facial orientation category under each verbalization category was compared between observers to calculate interobserver agreement for each category of facial orientation and no orientation (see data sheet in Appendix B, row totals). Also, the total number of each facial orientation category was summed and compared between observers to calculate overall agreement (see data sheet in Appendix B, last column totals). Percentage of interobserver agreement was calculated by dividing the smaller number of agreements by the larger number of agreements, and multiplying that number by 100. Interobserver agreement scores were collected in both baseline and feedback conditions. There was a total of 48 interobserver agreement scores for 24 sessions. That is, each of the 24 sessions was scored twice: once for the child's facial orientation while

she spoke and once for the child's facial orientation when the adult spoke. Overall interobserver agreement scores on all facial orientation categories ranged from 73.1 to 96.1. Overall interobserver agreement scores on each facial orientation category ranged from 0 to 100. Ranges and overall interobserver agreement scores of facial orientation for each condition when the child and adult speaks is shown in Table 2. Table 3 shows the interobserver agreement scores for each facial orientation type and overall interobserver agreement for facial orientation when the child spoke and Table 4 displays the interobserver agreement scores for each facial orientation type and the overall interobserver agreement of facial orientation when the adult spoke.

#### Experimental Design and Conditions

A multiple baseline with treatment withdrawal design across adults and activities was used to assess the effects of the feedback package using plusses and minuses on the participant's rate and duration of facial orientation. Therefore, the effects of the intervention (and its withdrawal) were assessed by noting changes in the target behavior and indirect changes, if any, in behavior in the remaining baselines. Because each of the four different baseline sessions were conducted per day, the staggered comparisons between treatment and baselines are chronologically accurate.

The experimenter and grandmother conducted two conditions: (a) a social questions condition, and (b) a pretend play condition. Social questions was primarily a restricted-operant condition in which the adult controlled the rate of question presentation, and comments on the child's answers. Pretend play was primarily a free-operant condition in which the experimenter placed no constraints on the child's

behavior. Furthermore, the child controlled the adults' rate of verbalizations in that the adults were not to speak until prompted by the child.

### Baselines

Social questions. Prior to each social questions session, the child was asked to choose what she would like to talk about from a pool of topics. That is, the adult would verbally list the topics while holding the respective questionnaire in view for the child to choose a topic. Eight topics consisting of 18 to 26 questions each were available for discussion: (a) Amy, (b) Amy's bedroom, (c) Amy's family, (d) baseball, (e) any cartoon character, (f) Barney (a popular television character), (g) holiday, and (h) school. Questions were constructed so that a number of different potential answers containing more than one word were possible (see Appendix C).

After the child chose a topic, a countdown timer set for 5 min, was started when the first question was asked. During social questions, the child was seated in a chair while the adult either kneeled down to the child's eye level or sat on a permanent fixture allowing eye-to-eye seating during conversation opportunities. After a question was presented, the adult waited 3 to 5 s for a response. If there was no response, the experimenter presented the next question. If the child answered, the adult either made a comment about the response (e.g., smiling/nodding while saying, "Oh, okay.", or "Wow!") or repeated the child's response (e.g., "You have a lot of toys in your room, cool!"). Both adults responded with smiles, nods, and enthusiasm throughout the experiment. The adult would then wait 3 to 5 s for another child response before asking the next question. If the child replied with an off-topic response, the question was

repeated at a decreased pace with emphasis on the discriminative word. For example, if the child answered, “She plays hopscotch” in response to the question “Who does D.W. play with?”, emphasis would be placed on the critical word, *who*. If the child still did not respond with an on-topic reply, the adult would wait 3 to 5 s and present the next question. All misunderstood questions were repeated so that Amy had another opportunity to answer. Sessions ended when the 5 min timer sounded.

Pretend play. Before each pretend play session, the child was asked what role she would like to play (e.g., “Who do you want to be?”). Next, the adult asked the child what role she would like the adult to portray (e.g., “Who should I be?”). Because Amy appeared to enjoy the use of “props” during play, toys were used during some sessions. This arrangement simulates typical play by allowing improvisation. Additionally, the child and adult took on character roles (as opposed to the use of figurines) since the use of figurines increased facial orientation to the toy and decreased facial orientation to the adult.

After the child chose roles, sessions began when the adult started the 5 min timer. The child was free to move about the room, select her own props, and direct the adult’s behavior. The adults attempted to remain within one to four feet of the participant at her eye level as she moved about. Also, the adult usually only spoke to the child if the child spoke to the adult first. That is, the adult was not to initiate verbalizations to the child but was to respond to child verbalizations. For example, if Amy did not begin speaking right away, the adult waited until she said something before speaking to her. As in social



questions, the adults responded to Amy's verbalizations with smiles, nods, and enthusiasm. Sessions ended when the 5 min timer sounded.

Normative samples. Social questions and pretend play sessions for typically-developing peers were conducted in the same manner described above. That is, in social questions, the children chose a topic, answered questions, and the adult responded accordingly. In pretend play, the children chose the characters to be portrayed and led the play by initiating verbalizations which prompted the adults to respond.

#### Intervention (Feedback Package)

Social questions. Sessions were conducted in a manner similar to baseline except for the implementation of a formal feedback system. See Appendix D for the decision-making sequence of events during this condition. Treatment sessions included: (a) a description of the contingencies prior to each session as to what criterion was required to gain access to other activities, (b) feedback about her responses in the form of written plusses, minuses and a verbal statement (i.e., "That's a plus!" and "Aww, that's a minus."), (c) when Amy earned a predetermined number of consecutive plusses, she was allowed to engage in an activity of her choice, and (d) if Amy did not provide facial orientation while answering, the question was repeated and the plusses earned before the "error" were not counted toward criterion (i.e., "We will have to start over."). For example, if the criterion to be met was three consecutive GO, and Amy earned two pluses but then answered without GO, she would lose those two plusses and would have to answer three more questions with consecutive GO (see Appendix E description).

A timer for questions was used in conjunction with an activity timer so that feedback sessions and baseline sessions were of an equal duration. Each time a criterion was met, the session timer was stopped during the preferred activity and started again for the next set of questions. An escalating criterion was placed on the frequency and duration of facial orientation to increase the probability that Amy would be successful. That is, Amy must have had a certain number of consecutive facial orientations lasting a predetermined duration to have gained access to preferred activities. After Amy demonstrated stable progress (had met the criterion twice consecutively), the criterion for preferred activity access was increased.

Initially, Amy was only required to exhibit fleet orientation (FO) for two consecutive questions. After Amy met that criterion, she chose an activity to engage in for 5 minutes. Because the time to meet criterion was often brief, the child usually chose the same activity until it was completed (i.e., a board game). After criterion was met twice consecutively, the frequency criterion for that facial orientation category was increased by one until Amy displayed four correct responses, consecutively.

If Amy had met criterion twice but the next criterion could not be attempted for at least 24 hours, she had to meet that particular criterion once more before advancing to the next step. This procedure continued until Amy was emitting at least 5 s of facial orientation for four consecutive questions (see Appendix F).

Pretend play. The intervention procedures for pretend play were similar to the social questions condition in that feedback and activity access were also utilized. Instead of meeting criteria for emitting facial orientations in response to social questions though,

the child must have met criteria for emitting facial orientations during her comments and requests while playing with her play interaction partner. In addition, instead of verbally informing Amy that she earned a plus by looking, the adult would sometimes write the plus conspicuously in front of Amy. Verbal feedback was withheld if she was speaking at a high rate to avoid interrupting the flow of her verbalizations. When she had reached criterion, however, the adult waited until the child finished a verbalization before telling her that she could choose an activity. If desired, Amy was allowed to continue the play session as her selected activity. After each criterion was met, the adult gave Amy access to an activity of her choice.

Feedback Package Withdrawal (Return to Baseline). Prior to feedback removal sessions, the adult told Amy that she had forgotten to bring the data sheet and that they would play or answer the questions the same way anyway. The data sheet, written pluses and minuses, as well as verbal feedback were simultaneously removed for all conditions with both adults. The child simply answered questions and played with the adult in the absence of written or verbal feedback for 5 consecutive minutes as in baseline.

### Social Validity

Video vignettes and surveys were constructed to assess the social validity of Amy's facial orientation during social questions and pretend play (see Appendix G). Four videotapes were recorded featuring four 30 s clips of the children in a randomized order within social questions and pretend play. Each tape included: (a) a pre-intervention clip, (b) a post-intervention clip, and (c) two typically-developing peer clips. The

presentation of the clips was taped in a random order to minimize bias (Quinn, Sherman, Sheldon, Quinn, & Harchik, 1992). By combining two clips of Amy and two clips of a typically-developing child within the same condition, raters may be more likely to produce unbiased responses. Additionally, because no intervention clips were included, the only difference between Amy's clips and the typically-developing clips was the children's behavior and possibly setting and/or the participating adult. Customers at a tire establishment and employees at a drug company were solicited to watch the clips.

Four 12-question surveys were to be completed by each observer to obtain ratings for each child's performance after viewing each clip. All observers were given a pen to mark their answers with to minimize the likelihood of changing their answers. Observers provided their ratings in a small, quiet room with a television/video cassette recorder combination, a survey box, a desk, and a chair. Observers were to independently watch a clip and then immediately rate that child's (a) interaction interest, (b) attentiveness, (c) topic or play interest, (d) enjoyment of the interaction, (e) participation, (f) therapist likeableness, (g) participation, (h) distractibility, (i) listening skills, (j) behavior appropriateness, (k) disruption, and (l) demeanor. Questions were devised with a 4-point Likert scale format ranging from not at all (1 point) to very much (4 points). After a survey was completed, observers were to insert that survey into a box marked, "Survey". Raters' opinions concerning Amy's behavior were compared across baseline and posttreatment to determine the social validity of her facial orientation after treatment. That is, did the intervention produce behavior changes that would make others describe her as more similar to her same age typically-developing peers.

## RESULTS

### Facial Orientation when Child Speaks (NO, GO)

Figure 1 displays Amy's verbalizations with glance orientation (GO) and her verbalizations with no orientation (NO) when she spoke across social questions (top and second from the bottom graph) and pretend play (second from the top and bottom graph) with her therapist (upper portion) and grandmother (lower portion). The ordinates display responses per minute, calculated by dividing the total number of a given facial orientation category by the number of minutes in the session (5 min). The abscissas display 5 min observation sessions across an 11 month period. The closed circles represent Amy's rates of GO when she spoke and the open circles represent Amy's rates of NO when she spoke. Figure 2 shows Amy's rates of GO and NO when the adult spoke.

Figure 1 shows that in general, low rates of GO and high rates of NO are observed in the first baseline conditions. For social questions in baseline with both therapist and grandmother, Amy's GO rates were  $M= 1.75$  (range 0 to 3.80) and her NO rates were  $M= 4.76$  (range 1.60 to 9.40). For pretend play in baseline with both therapist and grandmother, Amy's GO rates were  $M= 2.96$  (range 1.00 to 5.80) and her NO rates were  $M= 5.64$  (range 0.60 to 9.80).

Following implementation of the intervention, her GO rates increased and her NO rates decreased in both types of activities with both interaction partners. Both activities with the therapist (top two graphs) show sharp initial increase with fairly stable GO rates

(M = 4.77; range 4.20 to 10.00). The data path for Amy's GO rates in social questions with her grandmother (second from the bottom graph) immediately increased to a higher level than baseline and then remained fairly stable (M = 8.05; range 6.80 to 12.00). Amy's GO rates in pretend play with her grandmother (bottom graph) first increased, then decreased (M = 6.85; range 5.20 to 9.00). Amy's NO verbalizations rates drop to much lower levels than baseline and remain stable during both social questions activities (top and second from the bottom graphs; M = 0.63; range 0.20 to 1.20 and M = 1.00; range 0.60 to 1.40). NO rates for pretend play activities (second and bottom graphs; M = 1.78; range 0.00 to 3.40 and M = 2.20; range 1.00 to 3.60) remain erratic and lower than baseline.

When the intervention was removed, desired effects were maintained. However, her GO rates during pretend play with her grandmother (bottom graph) were lower (M = 6.86; range 5.20 to 7.60). Amy's NO rates maintained at levels similar to her NO rates during intervention (M = 1.15; range 0.60 to 2.20) except for social questions with her grandmother (second graph from the bottom; M = 1.86; range 1.20 to 2.40) which were slightly higher.

One month later, follow up showed that Amy's GO rate and her NO rate maintained in all activities except social questions with her grandmother (second graph from the bottom). Specifically, her GO rate was 3.60 and her NO rate was 4.00.

In the 5 days in which intervention was applied exclusively to social questions with the therapist, Amy's average GO rates increased during social questions with her grandmother (second graph from the bottom) from M= 0.98 (sessions 10-23 in the second

graph from the bottom) to  $M= 3.28$  (sessions 24-30 in the second graph from the bottom). In the 7 days in which intervention was applied exclusively to both activities with the therapist (top and second graphs), Amy's average GO rates increased in both activities with her grandmother from  $M= 0.98$  (sessions 10-23 in the second graph from the bottom) to  $M= 3.28$  (sessions 24-30 in the second graph from the bottom) in social questions and from  $M= 2.12$  (sessions 10-23 in the bottom graph) to  $M= 4.58$  (sessions 24-34 in the bottom graph) in pretend play.

#### Facial Orientation when the Adult Speaks (NO & GO)

Figure 2 displays Amy's rates of verbalizations with glance orientation (GO) and her verbalizations without facial orientation (NO) when the adult spoke across social questions (top and second from the bottom graph) and pretend play (second from the top and bottom graph) with her therapist (top and second from the top graph) and grandmother (second from the bottom and bottom graphs). The ordinates display responses per minute, calculated by dividing the total number of a given facial orientation category by the number of minutes in the session (5 min). The abscissas display 5 min observation sessions across an 11 month period. The closed circles represent Amy's GO rates when the adult spoke and the open circles represent Amy's NO rates when the adult spoke.

No intervention was implemented for Amy's NO and GO rates when the adult spoke. Yet, Figure 2 shows that when the adult spoke, Amy's GO rates increased and her NO rates decreased for all four conditions when the intervention was implemented for Amy's facial orientation when she spoke. Specifically, Amy's GO rates in social

questions baselines (top and second from the bottom graphs) when the adult spoke increased from M=1.23 (range 0.20 to 1.80) and M= 1.15 (range 0.00 to 4.40) to M=5.28 (range 2.60 to 7.40) and M=5.43 (range 4.00 to 6.80) respectively. For pretend play baselines (second and bottom graphs) Amy's GO rates increased from M= 1.62 (range 0.00 to 4.00) and M= 2.03 (range 0.40 to 5.20) to M= 4.36 (range 3.00 to 5.60) and M= 4.75 (range 3.60 to 5.40) respectively. Data paths for Amy's GO rates jumped to higher rates across baselines when intervention was implemented for facial orientation when Amy spoke.

Amy's NO rates when the adult spoke slightly decreased for both conditions with the grandmother during intervention when Amy spoke (second from the bottom and bottom graphs) from M= 4.80 (range 2.80 to 9.20) and M= 6.60 (range 3.00 to 12.00) to M= 3.97 (range 3.00 to 5.80) and M= 3.20 (range 2.20 to 4.20) respectively. For social questions with the therapist (top graph) during intervention when Amy spoke, her NO rates when the adult spoke decreased from M= 5.87 (range 3.20 to 9.40) to M= 2.13 (range 0.60 to 4.40). Finally, Amy's NO rates when the adult spoke during pretend play with the therapist (second graph) decreased slightly from M= 4.87 (range 1.00 to 9.00) to M= 2.73 (range 1.00 to 4.20) when intervention was implemented for Amy's verbalizations. Her NO rates increased in social questions baselines (top and second from the bottom graphs) and rates in pretend play baselines (second and bottom graphs) remained stable with the therapist and decreased with Amy's grandmother.

When intervention for Amy's facial orientation was removed for when she spoke, Amy's GO rates when the adult spoke began to decrease, especially for pretend play with



her therapist (second from the top graph) and social questions with her grandmother (second from the bottom graph). Also, her GO rates were maintained only for social questions with her therapist (top graph). However, her GO rates in all conditions were generally above initial levels.

One month later, follow up showed that the rate of Amy's GO and her NO maintained in all conditions except social questions with her grandmother (second from the bottom graph). Amy's GO rate in the second from the bottom graph decreased to 2.00 from  $M= 4.00$  and her NO rate increased to 7.00 from  $M= 3.06$ .

In the 5 days in which intervention was applied exclusively to social questions with the therapist for when Amy spoke, her average number of GOs when the adult spoke during social questions with the grandmother (second graph from the bottom) increased from  $M= 0.72$  (sessions 10-23) to  $M= 2.00$  (sessions 24-30). In the 7 days in which intervention was applied exclusively to both conditions with the therapist when Amy spoke (Figure 3, top and second graphs), Amy's average number of GO when the adult spoke increased in both activities with the grandmother from  $M= 0.72$  (Figure 4, sessions 10-23 in the second from the bottom graph) to  $M= 2.00$  (Figure 4, sessions 24-30 in the second from the bottom graph) in social questions and from  $M= 1.55$  (Figure 4, sessions 10-23 in the bottom graph) to  $M= 2.65$  (Figure 4, sessions 24-34 in the bottom graph) in pretend play.

#### Sustained Facial Orientation (SO) when the Child Speaks

Figure 3 shows the rate of sustained orientation (6 to 9 seconds) when she spoke across social questions (first and second from the bottom graph) and pretend play (second

from the top and bottom graphs) with her therapist (upper portion) and her grandmother (lower portion). The ordinate shows responses per minute, calculated by dividing the number of responses into the number of minutes in the session (5 min). The abscissas show each 5 min session across an 11 month period. The closed circles represent Amy's rates of SO when she spoke.

Figure 3 shows that following implementation of the intervention, Amy's SO rates increased in both social questions conditions with her therapist and grandmother from  $M= 0.06$  (range 0.00 to 0.40) and  $M= 0.22$  (range 0.00 to 1.40) to  $M= 1.89$  (range 0.00 to 3.60) and  $M= 2.13$  (range 0.80 to 3.20) respectively. Similarly, Amy's SO rates in pretend play conditions with her therapist and grandmother increased from  $M= 0.28$  (range 0.00 to 1.20) and  $M= 0.30$  (range 0.0 to 1.20) to  $M= 1.74$  (range 0.00 to 4.00) and  $M= 1.80$  (range 0.60 to 4.00) respectively. Upon implementation of the intervention, these rates continued to increase.

After the intervention was removed, Amy's SO rates maintained for both social questions and pretend play. Amy's SO rates in pretend play with her therapist and grandmother increased from  $M= 1.74$  (range 0.00 to 4.00) and  $M= 1.80$  (range 0.60 to 4.00) to  $M= 3.40$  (range 3.00 to 4.20) and  $M= 2.20$  (range 1.80 to 2.60) respectively. Amy's SO rates during social questions with both therapist and grandmother slightly increased from means of 1.89 and 1.95 to means of 2.40 and 2.13 respectively.

In the probe sessions taken a month later, Amy's SO rate maintained in social questions with the therapist, but declined in all other conditions. Amy's SO rate in social questions with the grandmother (second from the bottom graph) decreased from  $M= 2.13$

to 0.80, and in both pretend play conditions with her therapist and grandmother, SO rate decreased greatly from  $M= 3.40$  and  $2.20$  to  $1.40$  and  $0.80$ , respectively.

In the 5 days during which intervention was applied exclusively to social questions with the therapist, Amy's rates of SO increased slightly during social questions with the grandmother from  $M= 0.01$  to  $M= 0.65$ . In the 7 days during which intervention was applied exclusively to both conditions with the therapist, her SO rates increased slightly in both conditions with the grandmother from  $M= 0.01$  to  $M= 0.65$  in social questions and  $M= 0.05$  to  $M= 0.61$  in pretend play. In the 4 days in which intervention was applied to all of the baselines except pretend play with her grandmother, Amy's SO rates increased slightly from  $M= 0.24$  to  $M= 0.60$  for this baseline.

#### Facial Orientation (SO) when the Adult Speaks

Figure 4 displays Amy's verbalizations with sustained orientation (SO) when the adult spoke across social questions (top and second from the bottom graphs) and pretend play (second and bottom graph) with her therapist (upper portion) and her grandmother (lower portion). The ordinates shows Amy's SO rates, calculated by dividing the number of her SO by the number of minutes in the session (5 min). The abscissas show each 5 min session across an 11 month period. The open squares represent Amy's SO rates when the adult spoke.

Figure 4 shows that when intervention was implemented for Amy's facial orientation when she spoke, her SO rates when the adult spoke also increased for all conditions. Amy's SO rates' increase for pretend play conditions was similar with both her therapist and grandmother from  $M= 0.13$  (range 0.00 to 0.8) and  $M= 0.18$  (range 0.00

to 0.80) to  $M= 0.76$  (range 0.00 to 2.40) and  $M= 0.60$  (range 0.60 to 1.60) respectively. Greater increases in Amy's SO rates were found for social questions conditions with both her therapist and grandmother from  $M= 0.03$  (range 0.00 to 0.20) and  $M= 0.14$  (range 0.00 to 1.40) to  $M= 1.11$  (range 0.00 to 2.40) and  $M= 1.25$  (range 0.60 to 1.60) respectively. Further increases in Amy's SO rates were found when the aforementioned intervention was removed for both therapist and grandmother in pretend play and social questions with all means between 1.40 and 1.93. The probe taken one month later revealed that this increase was only maintained for conditions with the therapist (social questions 1.20 per minute; pretend play 0.80 per minute) and fell to 0.20 per minute for both conditions with her grandmother.

In the 7 days in which intervention was implemented in both conditions with the therapist only, Amy's SO rates increased in baseline during social questions with her grandmother from  $M= 0.01$  to  $M= 0.40$  per minute. No other changes in SO rates were demonstrated for any other baselines following the implementation of intervention for different baselines.

#### Facial Orientation when the Child Speaks (PO)

Figure 5 displays Amy's prolonged orientation (PO) when she spoke across social questions (top and second from the bottom graphs) and pretend play (second from the top and bottom graphs) with her therapist (upper portion) and grandmother (lower portion). The ordinates show Amy's rates of PO calculated by dividing the number of Amy's PO by the number of minutes in the session (5 min). The abscissas show each 5 min session

across an 11 month period. The closed circles represent Amy's rates of PO when she spoke.

Figure 5 shows almost no PO in baseline for all conditions. Following implementation of the intervention, Amy's rates of PO increased from M= 0.02 in social questions and 0.00 in pretend play conditions with the therapist to M= 0.75 in social questions and M= 0.36 in pretend play. Amy's rates of PO in the conditions with her grandmother increased from means of 0.07 and 0.03 to means of 0.71 and 0.30 in social questions and pretend play respectively. After intervention was removed, Amy's PO rates maintained for all conditions with both adults and further increased during pretend play with her grandmother with M= 1.66 was observed. One month later, Amy's PO rates maintained only for both pretend play conditions and no PO occurred in the social questions probe sessions.

After intervention was implemented for the conditions with Amy's therapist, Amy's mean rates of PO increased slightly in social questions with her grandmother (Figure 5, second from the bottom graph) from 0.00, (sessions 10 to 23) to 0.22 (sessions 24 to 30) per minute in baseline. No other increases in remaining baselines were found upon intervention application for earlier conditions.

#### Facial Orientation when the Adult Speaks (PO)

Figure 6 displays Amy's verbalizations with prolonged orientation (PO) when the adult spoke across social questions (top and second from the bottom graphs) and pretend play (second from the top and bottom graphs) with her therapist (upper portion) and grandmother (lower portion). The ordinates represent the number of PO per minute

calculated by dividing the number of PO occurrences by the number of minutes in the session (5 min). The abscissas represent each 5 min session over an 11 month period. The closed circles signify Amy's PO rates when the adult is speaking to her. The dotted lines mark when intervention began for Amy's facial orientation while she speaks.

Figure 6 shows slight increases in Amy's PO rates when the adult spoke to her following implementation of treatment for her facial orientation when she spoke. Prior to this, Amy emitted very little PO when the adult spoke. After intervention began for Amy's facial orientation when she spoke, her orientation when the therapist spoke rose from  $M= 0.02$  to  $M= 0.36$  in social questions and  $M= 0.02$  to  $M= 0.10$  in pretend play. When this intervention was removed for when Amy spoke, increases when the therapist spoke were maintained. Intervening on Amy's facial orientation when she spoke had some effect on her orientation when her grandmother spoke. In social questions, Amy's mean PO rates rose from 0.06 to 0.35 per minute and in pretend play, her mean PO rates rose from 0.02 to 0.20 per minute. All increases were maintained when treatment for when Amy spoke was removed. One month later, increases were only maintained for conditions with Amy's grandmother.

In the 7 days in which treatment was applied exclusively to both activities with Amy's therapist, her mean PO rates for pretend play with the therapist increased from 0.00 to 0.20 per minute. No other changes were observed in the remaining baselines during the staggering of treatment.

#### Facial Orientation when the Child Speaks (FO)

Figure 7 displays Amy's verbalizations with fleeting orientation (FO) when she speaks across social questions (top and second from the bottom graphs) and pretend play (second from the top and bottom graphs) with her therapist (upper portion) and grandmother (lower portion). The ordinates show the number of FO per minute found by dividing the number of Amy's FO by the number of minutes in the session (5 min). The abscissas show each 5 min session across an 11 month period. The closed circles represent Amy's FO rates when she speaks to an adult.

Figure 7 shows that when Amy spoke, her FO rates for all four conditions remained stable regardless of the intervention except for two short bursts during social questions with her therapist. The most striking increase was demonstrated for social questions with the therapist for the first five sessions before Amy's FO rates returns to baseline levels. There was also a noticeable increase during intervention in session 30 of pretend play with Amy's therapist, but the increase was short-lived. One month later, the probe session showed that Amy's FO remained unchanged.

#### Facial Orientation when the Adult Speaks (FO)

Figure 7 is similar to Figure 8 except the dotted lines represent when intervention was applied for Amy's facial orientation when she spoke. Therefore, no intervention was applied to the responses displayed here. Figure 8 showed that Amy's FO rates remained relatively stable regardless of the application or removal of intervention used for when the adult spoke to her. However, Amy's FO rates when speaking to an adult did sharply increase in the first three sessions and again in session 30 when treatment was applied to her facial orientation when she spoke.

### Comparisons of Typical Children and Amy

Figure 9 displays a comparison of typically developing peer verbalizations made with each facial orientation type (top graph) and Amy's average number of verbalizations made with each facial orientation type in baseline (second from the top graph), feedback package (second from the bottom graph), and removal of the package (bottom graph) during social questions when she spoke. The abscissa displays the range of facial orientation types from none (NO) to up to 20 s (PO). The thin textured bars in the top graph represent the actual number of verbalizations made by a given peer with a given facial orientation type emitted in a 5 min session. The thick black bars in the remaining graphs represent Amy's average number of verbalizations made with a given facial orientation type in her 5 min sessions. The ordinates for the top graph (typically-developing children) display the number of instances for each facial orientation type that occurred in 5 min sessions. The ordinates for the remaining graphs display the average number of each category of facial orientation during Amy's verbalizations in each experimental condition.

In general, Figure 9 showed that Amy's peers emitted far more verbalizations with GO than any other type ( $M = 42.00$ ; range 20.00 to 57.00). Amy's peers emitted a fair amount of verbalizations with FO ( $M = 9.00$ ; range 6.00 to 11.00) and SO ( $M = 8.25$ ; range 4.00 to 16.00) but very few of verbalizations with PO ( $M = 1.25$ ; range 0.00 to 3.00) and NO ( $M = 3.50$ ; range 0.00 to 9.00). In contrast, during baseline, Amy emitted far more verbalizations with NO than any other type ( $M = 23.82$ ; range 8.00 to 47.00). Amy had emitted some verbalizations with GO ( $M = 8.79$ ; range 0.00 to 25.00) and FO



( $M = 6.79$ ; range 0.00 to 12.00). Much like her peers, Amy emitted few verbalizations with PO ( $M = 0.25$ ; range 0.00 to 4.00). Finally, unlike her peers, Amy emitted very few SO ( $M = 0.76$ ; range 0.00 to 7.00). During intervention and after intervention was removed, the relative height of Amy's bars was very similar to that of her peers. Every one of Amy's facial orientation types were within the ranges of her peers except for FO after intervention was removed (peer range 6.00 to 11.00; Amy's range 3.00 to 26.00).

Figure 10 displays a comparison of typically-developing peer verbalizations made with each facial orientation type (top graph) and Amy's average number of verbalizations made with each facial orientation type in baseline (second from the top graph), feedback and activity access (second from the bottom graph), and removal of feedback (bottom graph) during social questions when the adult spoke. The abscissa displays the range of facial orientation types from none (NO) to up to 20 s (PO). The thin textured bars in the top graph display the actual number of verbalizations made with a given facial orientation type emitted in a 5 min session by a given peer. The thick black bars in the remaining graphs represent Amy's average number of verbalizations made with a given facial orientation type in her 5 min sessions. The ordinates for the top graph (typically-developing children) show the number of instances for each facial orientation type that occurred in 5 min sessions. The ordinates for the remaining graphs display the average number of each category of facial orientation during Amy's verbalizations in each experimental condition.

Generally, Figure 10 revealed that Amy's peers emitted far more GO ( $M = 32.00$ ; range 28.00 to 43.00) and some more SO ( $M = 4.50$ ; range 3.00 to 7.00) than Amy ( $M =$

5.91 for GO; M= 0.10 for SO) during baseline. Conversely, Amy emitted far more NO (M= 26.51) in baseline than that of her typically-developing peers (M= 12.50; range 11.00 to 16.00). Amy's average number of FO and PO (M= 3.56 and M= 0.23 respectively) in baseline was similar to that of her peers (M= 4.75, range 1.00 to 8.00; M= 1.00, range 0.00 to 3.00 respectively).

When the adults intervened on Amy's facial orientation when she spoke, her NO (M=13.28) decreased to a level similar to that of her peers (M= 12.50) when the adults spoke and her GO (M= 27.00), SO (M= 5.71), and PO (M= 1.78) increased to levels similar to that of her peers (M= 32.00, M= 4.50, M= 1.00, respectively) when the adults spoke. These effects were maintained when feedback on Amy's facial orientation when she spoke was removed except for a decrease in FO (from M= 8.25 to M= 4.16) and increases in SO (from M= 5.75 to M= 9.00) and PO (from M=1.78 to M=3.00).

Figure 11 displays a comparison of typically-developing peer verbalizations made with each facial orientation type (top graph) and Amy's average number of verbalizations made with each facial orientation type in baseline (second from the top graph), feedback and activity access (second from the bottom graph), and removal of feedback (bottom graph) during pretend play when she spoke. The abscissa displays the range of facial orientation types from none (NO) to up to 20 s (PO). The thin textured bars in the top graph display the actual number of verbalizations made with a given facial orientation type emitted in a 5 min session by a given peer. The thick black bars in the remaining graphs represent Amy's average number of verbalizations made with a given facial orientation type in her 5 min sessions. The ordinates for the top graph (typically-

developing children) show the number of instances for each facial orientation type that occurred in 5 min sessions. The ordinates for the remaining graphs display the average number of each category of facial orientation during Amy's verbalizations in each experimental condition.

In general Figure 11 showed that Amy's average number of GO (M= 14.02) is far lower than that of her typically-developing peers (M= 26.33; range 19.00 to 33.00) during pretend play baseline when she spoke. Similarly, Amy's average number of SO (M= 1.53) and PO (M= 0.16) were moderately lower than the number of SO (M= 4.66; range 1.00 to 7.00) and PO (M= 5.33; range 4.00 to 8.00) emitted by her peers in baseline. In addition, Amy's average number of NO (M= 28.44) was considerably higher than that of her peers (M= 11.33; range 0.00 to 25.00) in baseline. Amy's average number of FO (M=8.41) was somewhat higher than that of her peers (M= 4.66; range 0.00 to 10.00).

During intervention, Amy's average number of GO (M= 31.36) increased to levels that her peers (M=26.33; range 19.00 to 33.00) were emitting during pretend play but her average number of SO (M= 8.78) increased beyond the peers' average (M= 4.66). Although Amy's average PO increased during intervention from (M= 0.16 to M=1.73), it had not risen to the average level of her peers (M= 5.33) during pretend play. Amy's average NO (M= 9.36) decreased during intervention in pretend play, slightly below her peers (M= 11.33). Finally, Amy's average FO (M= 6.21) was similar to that of her peers (M= 4.66; range 0.00 to 10.00) during intervention in pretend play. After feedback was removed during pretend play sessions, all of Amy's average number of facial orientations were maintained with even more improvement in NO, SO and PO.

Figure 12 displays a comparison of typically-developing peer verbalizations made with each facial orientation type (top graph) and Amy's average number of verbalizations made with each facial orientation type in baseline (second graph), feedback and activity access (second from the bottom graph), and removal of feedback (bottom graph) during pretend play when the adult spoke. The abscissa displays the range of facial orientation types from none (NO) to up to 20 s (PO). The thin textured bars in the top graph display the actual number of verbalizations made with a given facial orientation type emitted in a 5 min session by a given peer. The thick black bars in the remaining graphs represent Amy's average number of verbalizations made with a given facial orientation type in her 5 min sessions. The ordinates for the top graph (typically-developing children) show the number of instances for each facial orientation type that occurred in 5 min sessions. The ordinates for the remaining graphs display the average number of each category of facial orientation during Amy's verbalizations in each experimental condition.

Overall, Figure 12 shows that Amy's peers emitted considerably more GO ( $M=17.00$ ; range 13.00 to 24.00) than Amy's average of GO ( $M=9.54$ ) during baseline in pretend play when the adult spoke. Similarly, Amy's average number of PO ( $M=0.13$ ) and her SO ( $M=0.86$ ) was lower than that of her peers ( $M=3.00$ , range 2.00 to 4.00;  $M=3.66$ , range 1.00 to 6.00, respectively) during pretend play in baseline when she spoke to an adult. Amy emitted some more FO ( $M=5.13$ ) and far more NO ( $M=29.36$ ) than her peers' averages of these facial orientation types ( $M=2.33$ , range 0.00 to 6.00;  $M=11.00$ , range 2.00 to 27.00, respectively) in baseline conditions during pretend play.

When the adults intervened on Amy's facial orientation when she spoke, her

facial orientation when the adults spoke adjusted to similar levels of her typically-developing peers during pretend play. Amy's GO average remained above her peers' average when feedback was no longer given (M= 18.50). Amy's GO average (M= 22.21) surpassed her peers' average by 5.23 per session and her SO average (M= 3.63) almost met her peers' average (M= 3.66). Also, Amy's PO average increased by 1.23 during intervention and reached beyond her peers' average (M= 3.00) when feedback was discontinued at an average of 4.16 per session. Amy's average FO (M= 4.63) exceeded her peers' average by 2.80 per session during intervention and fell back to similar averages of her peers (M= 3.00) when feedback was no longer used. Finally, in pretend play when she spoke to an adult, Amy's average NO (M= 14.15) decreased to a level similar to that of her peers (M= 11.00) when the adults intervened on her facial orientation when she spoke and dropped to similar levels of her peers' average when feedback was removed (M= 11.50).

#### Social Validity Ratings

The ratings that Amy and the comparison children scored are presented in Figures 13 and 14. Ten questions targeting desirable outcomes (Figure 13) and two questions targeting undesirable outcomes (Figure 14) were presented in a Likert-type format. Ten independent raters naïve to the experimental questions completed the survey. Ratings for each question could range from 1 (i.e., not at all) to 4 (i.e., very much). Therefore, ratings on all ten questions targeting desirable outcomes could range from 10 (i.e., ten of not at all) to 40 (ten of very much), 40 indicating the best rating possible and ten indicating the poorest rating possible. Likewise, ratings on both questions targeting

undesirable outcomes could range from 2 (i.e., two of not at all) to 8 (i.e., four of very much), two indicating the best rating possible and eight indicating the poorest rating possible.

Each bar graph represents the ratings given from each of the ten observers (Raters A through J) for both questions targeted to increase ratings (Figure 13) and questions targeted to decrease ratings (Figure 14). For each figure, the left portion of bar graphs show the rating results for social questions and bar graphs on the right show the rating results for pretend play. The total number of Likert rating points given by each rater are shown on the respective ordinates. The black, grey, and textured portions of the bar display the total rating number given in response to the questions while the white portion of the bar shows the total number of points missed for each rating. The abscissas indicate what type of video clip the observers watched. That is, the first black and white bar represent the ratings given to Amy before treatment, the second grey and white bar represent the ratings given to her after treatment, and the remaining textured and white bars represent the ratings given to typical children in the same type of condition as Amy.

Figure 13 showed that Amy consistently scored lower ratings for questions targeted to increase ratings before treatment relative to after treatment for all observers in both social questions and pretend play. After treatment, Amy's low ratings increased to compare to or match the comparison children's rating for 60% observers in social questions (raters A, C, and I respectively) and 100% observers in pretend play (raters B,D, F, H, and J respectively). That is, in social questions Amy's rating varied from her peers by +4, +1, and -3 for Raters A, C, and I respectively, and her ratings for pretend

play varied from her peers by +1, +5.5, +7, +2.5, -1.5 for raters B,D, F, H, and J respectively. Amy's ratings for the questions targeted to increase after treatment exceeded the average of the typical children's rating for 40% of the surveys in social questions (i.e., by +4 and +1 from raters A and C respectively) and 60% of the surveys in pretend play (i.e., by +1, +7, +2.5 from raters B, F, and H respectively). For social questions in posttreatment, observers E and G rated Amy's behavior lower than her peers (by -9 and -10 respectively) but higher than the baseline rating (i.e., by +12 and +6 respectively). For pretend play in posttreatment, 80% of Amy's ratings (i.e., +1, +5.5, +7, and +2.5) exceeded the average ratings of the typically-developing peers. Only observer J gave Amy a posttreatment rating that was -1.5 less than the average of her typically-developing peer.

Figure 14 showed that Amy's ratings for the desired low scores were consistently higher in pretreatment than posttreatment. For social questions in posttreatment, 80% of the observers (A, C, E, and I respectively) gave Amy scores similar to that of her typically-developing peers after treatment. That is, Amy's rating either matched (i.e., Raters C and I) or varied by +0.5, +1, +2 (raters A, E, and G respectively) from her peers' average rating in social questions. For pretend play in posttreatment, 100% of the observers rated Amy similar to her peers after treatment. More specifically, Amy's ratings either matched (i.e., Raters D and J) or were better than her peers' average rating by -1.5 (Rater B), -0.5 (Rater F), and -1 (Rater H).

## DISCUSSION

The results of the experiment show that the treatment was effective in producing socially-validated levels of all facial orientation durations when the child spoke to both participating adults and when the adult reciprocated in both social questions and pretend play. After treatment, Amy's facial orientation durations approximated those of her peers. Moreover, this improvement was maintained at one month follow up. Furthermore, there was little difference between Amy's social validity ratings and her typically-developing peers' social validity ratings.

Similar to most of the studies reviewed, the present study observed an increase in facial orientation. This increase can be explained by the direct contingencies. That is, presented with the opportunity to communicate (presence of a partner), a child statement with facial orientation produced a positive feedback statement and a written plus backed up by access to a preferred activity. Furthermore, a child statement without facial orientation produced a negative feedback statement and a minus backed up by a requirement to repeat the statement with facial orientation. These programmed contingencies may have controlled her facial orientation. More specifically, these plusses may have functioned as conditioned reinforcers since plusses were intermittently followed by preferred activity access. Conversely, minuses may have functioned as conditioned punishers because additional responding (e.g., Amy was required to repeat



her answers and comments and requests with facial orientation) postponed her choice of activities when she received a minus.

An important aspect of this study was the inclusion of normative data from typically-developing peers and social validation by adults that had no contact with the subject. Unlike the present study, past studies did not measure different lengths of facial orientation. Because data on different lengths of facial orientation were examined for Amy's typically-developing peers, the most frequent facial orientation lengths found in peers were targeted for increase in her facial orientation. Consequently, the rate of Amy's FO, GO, SO, and PO were proportionate to the rate of her peers' FO, GO, SO, and PO. Targeting certain durations of Amy's facial orientation may have contributed to the positive social validity results. Only one study (Matson, 1982) included normative participants as referents against which to compare the quantity and quality of participant behavior change to peer behavior after treatment. Matson used the Self-Rating Depression Scale and Beck Depression Inventory to assess what effects the increases observed in facial orientation and several other behaviors would have on depression in his subjects with mental retardation. In order to assess the social validity of his results, Matson (1982) compared pretreatment and posttreatment scores of his subjects to 8 adults with mental retardation without depression and found statistically significant results. Other types of social validation was assessed by Koegel & Frea, (1993) and Williams, (1989). Koegel & Frea tested the social validity of their results by having observers independently rate the participants' overall interaction using a 9-point Likert scale. Ratings changed from "very inappropriate" before treatment to "very normal" after

treatment. However, Koegel & Frea did not compare their subject's behavior with typically-developing peers to empirically determine whether their subjects' behaviors resembled those of peers. Finally, Williams used a standardized social behavior questionnaire to evaluate the effects of modeling and gentle reminders. That is, Williams did not seek social validation of results, but rather used the outcomes of questionnaires to support the utility of treatment. Furthermore, the questionnaires were completed for each participant by a staff member who "knew that child best" (p. 150). It is possible that these particular staff members produced favorably biased ratings for these participants.

The present study also examined facial orientation under restricted (social questions) and free (pretend play) operant conditions by scoring four different duration categories for child facial orientation when the child spoke and when the adult spoke. The only consistent difference between social questions and pretend play was that GO and SO rates during treatment were generally higher in pretend play as compared to social questions. In follow up, facial orientation in pretend play was maintained at higher levels relative to social questions. Similarly, the only consistent difference between facial orientation when the child spoke and facial orientation when the adult spoke was that GO rates were slightly higher for facial orientation when the child spoke relative to facial orientation when the adult spoke. Only one other study (Williams, 1989) used restricted and free operant conditions while investigating social behaviors including eye contact. However, no direct measures of eye contact under the two types of conditions were collected (Williams, 1989). Finally, no study has evaluated treatment effects on

individual durations of eye contact while the participant speaks versus while an adult speaks.

All of the previous research included professionals as interaction partners rather than family members (grandmother) as in the present study. The decision to include family members to implement treatment has clinical implications for behavior analysts regarding ease of treatment implementation and maintenance. Because Amy's grandmother quickly learned how to implement treatment successfully, one can conclude that a feedback package may be taught to significant others in the environment. Multiple therapists may assist children with eye contact deficits to hasten improvements and maintain eye contact.

Deterioration of facial orientation was not observed in the present study. After intervention was terminated, most of Amy's facial orientation gains were maintained throughout both conditions with both adults, particularly GO and SO. Few studies have observed maintenance of eye contact with the exception of Frame et al. (1982), Koegel & Frea, (1993) and Matson (1982). Frame et al. found that 3 months after the treatment package had ended, most gains in eye contact were maintained. Similarly, Matson found that all of the gains his subjects made in eye contact were still evident at least 4 to 6 months later. Similar to the present investigation, Koegel & Frea also demonstrated maintenance of eye contact improvements immediately after intervention was removed for 14 sessions. Also, no studies assessed maintenance of untreated forms of eye contact. In the present study, after treatment began for facial orientation when the child spoke, facial orientation also increased in all conditions when the adults spoke, even though no

programmed contingencies were implemented for facial orientation. Furthermore, these gains were maintained one month after treatment was withdrawn.

The presence of common stimuli may partially explain the generalization of facial orientation when Amy spoke to facial orientation when adults spoke (Stokes & Baer, 1977). Setting and adults remained constant across all sessions. Except for the feedback sheet, pen, and a few props during pretend play sessions, most of the identical stimuli found in the treatment sessions were also found in non treatment sessions. An alternative explanation is that the contingencies for facial orientation when Amy spoke were temporally contiguous to effect her facial orientation when adults spoke. If the short span of time between the facial orientation and the direct contingencies produced increases in her facial orientation when the adult spoke, one might expect those gains to be lost after programmed contingencies were removed. Yet, this increase was maintained throughout the experiment, even after the experimental contingencies were terminated. Another explanation is that facial orientation when Amy spoke is in the same functional response class as facial orientation when the adult spoke. The aforementioned interpretation would suggest that not all individual responses within a response class must receive consequences in order for all class members to show increases. Koegel & Frea (1993) also proposed that the generalization they observed could be explained by the behaviors belonging to the same functional response class.

It is also possible that, after Amy's facial orientation when she spoke was treated, the natural consequences supporting facial orientation maintained both her facial orientation when she spoke and when the adults spoke. However, natural consequences

emitted by the adults were not recorded in this study. This generalization strategy, entrapment (or behavioral trap), described by Baer & Wolf (1970), Stokes & Baer (1977), Kohler & Greenwood (1986) and McConnell (1987) may be responsible for the effects observed in the present investigation. According to McConnell (1987), maintenance and generalization may occur by developing treatments that take advantage of natural reinforcers. Therefore, persistence of facial orientation in the absence of treatment and generalization to other people, contexts, and behavior may have occurred because of natural reinforcement when facial orientation during social interaction occurs. As McConnell states,

Entrapment can occur when changes in social behavior of one child are reinforced by the social behaviors of others during interactions in naturalistic settings. When this type of entrapment occurs, we expect newly-acquired social behaviors to continue at high rates and to generalize to new settings or behaviors long after intervention is terminated (p. 261).

Therefore, by teaching Amy the “entry response” of facial orientation, she may have been introduced to those social stimuli and events that make looking at people reinforcing. For example, Amy was introduced to what are usually considered comical facial changes of others during pretend play and interesting facial changes during social questions after her facial orientation began to occur. By reinforcing her facial orientation with plusses and access to preferred activity, Amy’s facial orientation may have become trapped by social reinforcement for facial orientation during social interaction. In essence, other people’s reactions, facial changes, and possibly voice inflection changes

may have replaced the reinforcing functions of the plusses. Santarcangelo & Dyer (1988) found that when teachers gave the direction “(Name), look at me” while varying their voice inflection to resemble “baby talk”, children with autism, pervasive developmental disorder, and attention-deficit hyperactivity disorder gazed at their teacher more than when the teachers would use a “conversational” voice inflection. In the present study, although the adults did not use “baby talk”, they did vary their voice inflection somewhat in social questions and more so in pretend play throughout the entire study. Therefore, voice inflection changes may have supported Amy’s facial orientation while she and the adult spoke.

It is interesting to note that Amy’s facial orientation during pretend play appeared to be more frequent and durable relative to her facial orientation during social questions after treatment had ceased. During some pretend play treatment sessions, Amy chose to continue the play activity as her preferred activity choice. Therefore, the interactions in pretend play may have provided enough reinforcement in its own right regardless of the presence of feedback. That is, Amy’s facial orientation may have been maintained by the naturally-occurring facial expressions made by the adults (cartoon-like faces, bulging eyes, smiles, funny faces, salient voice inflection changes). These natural contingencies found within play may have been sufficient to compete with the choice to engage in different activities. Also, because the reinforcing properties of pretend play were paired with Amy orienting toward the adults, facial orientation with the adult may have become a conditioned reinforcer. In pretend play the adult’s facial changes were more intense than those found in social questions. Because interesting facial expressions were also

found in social questions to a certain extent (albeit not as exaggerated as in pretend play), Amy's facial orientation would have been maintained, but at lower levels without treatment by these less-salient naturally occurring stimuli. Therefore, if entrapment of natural communities of social reinforcement occurred through the adult's facial and voice inflection changes, less maintenance of her facial orientation in social questions relative to pretend play would be expected. The demonstration of differential maintenance effects (i.e., stronger maintenance in pretend play as opposed to social questions) provides further evidence for the existence of entrapment effects of Amy's facial orientation. However, the number of opportunities to contact these natural contingencies may also partially explain the results. That is, because children generally spend a considerable amount of time engaged in play, Amy's twin brother may have provided her many opportunities to strengthen her facial orientation during play situations. Also, it appeared that social question-type interactions were a less frequent activity for this particular family, thereby providing fewer opportunities to maintain her orientation in these situations. Therefore, the differential results of facial orientation between social questions and pretend play may be partially explained by the differential number of opportunities to practice within each type of context.

Kohler & Greenwood (1986) state that trained behavior should be maintained over time after treatment is removed from all settings and behaviors. Because treatment was removed in all conditions simultaneously, and facial orientation persisted in all of those conditions, such a demonstration of maintenance lends further support to the entrapment interpretation. Another criterion for evidence of entrapment is the systematic

replication of the same natural communities of reinforcement on other behaviors within other settings. Amy's facial orientation was treated in two different conditions (social questions and pretend play) with two different adults (therapist and grandmother) and increases in her facial orientation when the adult spoke were found for both conditions with both adults after treatment when Amy spoke. Therefore, these desired effects were systematically replicated for more than one behavior (facial orientation when the child spoke and facial orientation when the adult spoke) in more than one setting (social questions and pretend play). Also, after treatment began for the first baseline, some improvement in facial orientation was observed in the second, third, and fourth baselines providing additional examples for systematic replication of possible natural reinforcer effects.

A number of limitations warrant some caution when evaluating the treatment package used in this experiment. First, because the present study included only a single subject, further investigation of the intervention remains necessary to assess the generality of the treatment package with other participants. Second, since intervention efficacy with peers or siblings was not examined, future studies may focus on the effectiveness of feedback packages when using peers or siblings as communication partners. Third, because treatment was not assessed outside of Amy's home, future research should include more than one setting, such as school and public recreational settings. Finally, this study did not include any additional measures that may have provided information about potential changes in other behaviors. Future researchers



should identify and evaluate potential behaviors that may improve after facial orientation is treated such as appropriate affect, on-topic responses, and sustaining conversations.

In summary, this feedback package was an effective intervention to increase the facial orientation in a young girl with autism. These increases reached similar durations as displayed by typically-developing peers and was judged by independent raters to be similar to those peers. Furthermore, facial orientation maintained after the intervention was terminated, perhaps through natural communities of social reinforcement. Finally, the participant's facial orientation generalized from facial orientation while she spoke to facial orientation while the adults spoke after treatment began in the first baseline.

Table 1. Studies Reviewed Using Experimental Manipulation to Increase Eye Contact from 1967 to 1993

	Participants diagnosis	Normative data	Context	Definition	Criteria	Measures	Treatment	Increase	Interaction partner	Maintenance	Generalization
Blake & Moss (1967)	4 year old girl with developmental disabilities	None	Discrete trial "look at me"	Looking in experimenter direction	Any duration	% of trials	Ice cream & light upon orientation, & dark (lights off) upon no orientation	Yes, to 100%	Experimenter	Not assessed	Across setting & tasks with "look at me"
Elias-Burger, Sigelman, Danley, & Burger (1981)	Adults with mental retardation	None	Simulated interview	Gazing at the interviewer	Not specified	% of time in 45 minute sessions	Either watched video of performance or verbal feedback; model; rehearse	Yes, modest increase	Not specified	Not assessed	Not assessed
Frame, Matson, Sonis, Fialkov, & Kazdin (1982)	10 year old boy with mental retardation	None	Role play scenes	Look the interviewer in the eyes at any time while giving a verbal response	During entire answer	Frequency in 20 minute session	Discrimination training; model response; role play until correct; praise	Yes, from 10.3 to 2.4 mean frequency poor eye contact	Psychology intern	Yes, 4 months later	No
Matson (1982)	Adults with mental retardation and depression	Yes, People with mental retardation	Question and answer about depression	Looks the therapist in eye the entire period while giving a verbal response	Occurs or does not occur during the entire verbal response	Rate during 40 minute sessions	Feedback on answer content; tokens for good answers; repeat answer if missed; food	Yes, from near-zero rates to teens & twenty	Masters level psychologist	Yes, 4 to 6 months later	Not assessed
Hamlet, Axelrod, & Kuerschner (1984) <sup>a</sup>	Two 11 year old typically developing children	N/A	Requests during school class periods	Face oriented to face sharing same line of vision	During entire time an instruction is given	Not reported <sup>a</sup>	"Look at me" with firm voice before direction or look away	Not reported <sup>a</sup>	Teacher	Not assessed	Not assessed

<sup>a</sup> Eye contact was used as a means to increase compliance. Specific data were not reported on eye contact. Rather,

"Demanded Eye Contact" was listed as the treatment on graphs depicting compliance.

(table continues)

Table 1. Studies Reviewed Using Experimental Manipulation to Increase Eye Contact from 1967 to 1993

	Participants diagnosis	Normative data	Context	Definition	Criteria	Measures	Treatment	Increase	Interaction partner	Main tenance	General ization
Volkmar, Hoder, & Cohen (1985)	19 children and young adults with Autism	None	Educational & daily living programs, group activities	Direction of gaze to staff	Not specified	Percent of episodes reported as group means in ANOVA	Vary number of staff to residents & activity type- 1:1 education, 1:2 daily living, 1:3 group	Yes, slight increase	Residential staff	Not assessed	Not assessed
Santarcangelo & Dyer (1988)	6 children with autism and autism with PDD ADHD, or tourettt's	None	Discrete trials "look at me"	Orienting toward the teacher's face sharing the same line of vision	More than 3 seconds in duration	Percent of trials	Voice inflection during gaze & praise	Yes, modest increase	Teacher	Not assessed	Not assessed
Taras, Matson, & Leary (1988)	9-10 year old children with autism & mental retardation	None	Question and answer	Looking at therapist while speaking	While speaking	Frequency per 5 and 15 minute sessions	Model answer; feedback on answer; role play; praise & edible	Yes, slight increase	Therapist	No	Across behavior to sitting
Williams (1989)	Six 9 year old children with autism	None	Recreational games, role Play, & modeling	Not Specified	Not specified	Standardized questionnaire	Gentle reminder to look at person talking to	No	After school staff	N/A	N/A
Rolider, Cummings & Van Houten (1991)	24 year old male schizophrenia, mental retardation, psychosis; 14 year old female prader willi	None	Discrete trials, receptive labeling, simple requests	Eyes open & oriented to the therapist at start of trial for a minimum of 3 seconds	3 second minimum	Percent of trials in 15 to 30 minute sessions	DRO 5m; reprimand and restraint; or exercise such as stand, sit, upon inappropriate behavior	Yes, great increase	Therapist	Not assessed	No
Koegel & Frea (1993)	Teens with autism	None	Conversation	Gaze in direction of adult for more than 3 seconds	3 seconds of look away not scored	Percent of 10 second intervals	Checkmarks for target response; preferred activity access	Yes, great increase	Doctoral level clinician	14 session after treatment faded	Across behavior to topic perseveration

Table 2. Range and Overall Interobserver Agreement on Duration Categories of Facial Orientation

Facial Orientation				
Condition	Child Speaking		Adult Speaking	
	Range	Overall	Range	Overall
Social Questions				
Baseline T1 <sup>a</sup>	0-100	73.1	0-100	90
Baseline T2 <sup>a</sup>	92.3-100	89.4	50-100	76.6
Treatment T1	91.3-100	96.1	77.7-100	91.6
Treatment T2	50-82.6	86.1	50-90.9	91.3
Baseline 2 T1	60-100	77.4	44.4-100	92.3
Baseline 2 T2	0-100	76.4	57.1-100	83.3
Pretend Play				
Baseline T1	71.4-100	89.7	33.3-100	93.8
Baseline T2	80.6-100	85.7	83.3-100	90.7
Treatment T1	66.6-100	88	50-100	88.6
Treatment T2	69.2-100	85.1	56-100	89.1
Baseline 2 T1	77.7-100	88.6	60-97.9	95.9
Baseline 2 T2	20-100	89.7	60-100	86.5

<sup>a</sup> T1= Therapist 1 and T2= Therapist 2

Table 3. Interobserver Agreement on Each Duration Category of Facial Orientation when the Child Speaks

Facial Orientation when Child Speaks						
Social Questions						
	No Orientation	Fleet	Glance	Sustained	Prolonged	Overall
Baseline T1 <sup>a</sup>	86.2	33.3	0	100	100	73.1
Baseline T 2 <sup>a</sup>	92.3	100	100	100	100	95.2
Treatment T1	100	91.3	100	100	100	96.1
Treatment T2	66.6	50	82.6	77.7	50	86.1
Baseline 2 T1	60	66.6	93.3	77.7	100	77.4
Baseline 2 T2	85	100	93.3	0	100	76.4
Pretend Play						
Baseline T1	96.4	71.4	90	100	100	89.7
Baseline T2	80.6	92.8	90	100	100	85.7
Treatment T1	85.7	66.6	96.2	60	100	88
Treatment T2	69.2	71.4	88.8	100	100	85.1
Baseline 2 T1	77.7	100	83.3	100	100	88.8
Baseline 2 T2	20	100	91.6	60	80	89.7

<sup>a</sup>T1=Therapist 1 and T2=Therapist 2

Table 4. Interobserver Agreement on Each Duration Category of Facial Orientation when the Adult Speaks

Facial Orientation when Adult Speaks						
Social Questions						
	No Orientation	Fleet	Glance	Sustained	Prolonged	Overall
Baseline T1 <sup>a</sup>	93.3	85.7	0	100	100	90
Baseline T 2 <sup>a</sup>	80	0	50	100	100	76.6
Treatment T1	95.2	100	77.7	100	100	91.6
Treatment T2	50	60	90.9	50	50	91.3
Baseline 2 T1	76.4	44.4	76	100	100	92.3
Baseline 2 T2	95.2	57.1	91.6	100	100	83.3
Pretend Play						
Baseline T1	97.3	100	33.3	100	100	93.8
Baseline T2	90.6	92.8	83.3	100	100	90.7
Treatment T1	90.9	77.7	95.2	50	100	88.6
Treatment T2	56	91.6	77.7	100	100	89.1
Baseline 2 T1	88.8	60	94.7	66.6	75	95.9
Baseline 2 T2	68.4	100	76.2	33.360	60	86.5

<sup>a</sup>T1=Therapist 1 and T2=Therapist 2

Table 5. Average numbers of Duration Categories of Facial Orientation Observed

Glances				
Condition	Baseline	Intervention	Baseline 2	Probe
Social Questions Therapist	8.83	32.97	30.66	31
Pretend Play Therapist	12.27	30.60	34.33	29
Social Questions Grandmother	8.76	40.25	27.66	18
Pretend Play Grandmother	15.28	34.25	26.33	28

Sustained Facial Orientations				
Condition	Baseline	Intervention	Baseline 2	Probe
Social Questions First Author	.33	19	12	12
Pretend Play First Author	1.33	8.73	17	7
Social Questions Grandmother	1.14	9.75	10.66	4
Pretend Play Grandmother	1.70	9	11	4

(table continues)

Table 5. Average numbers of Duration Categories of Facial Orientation Observed

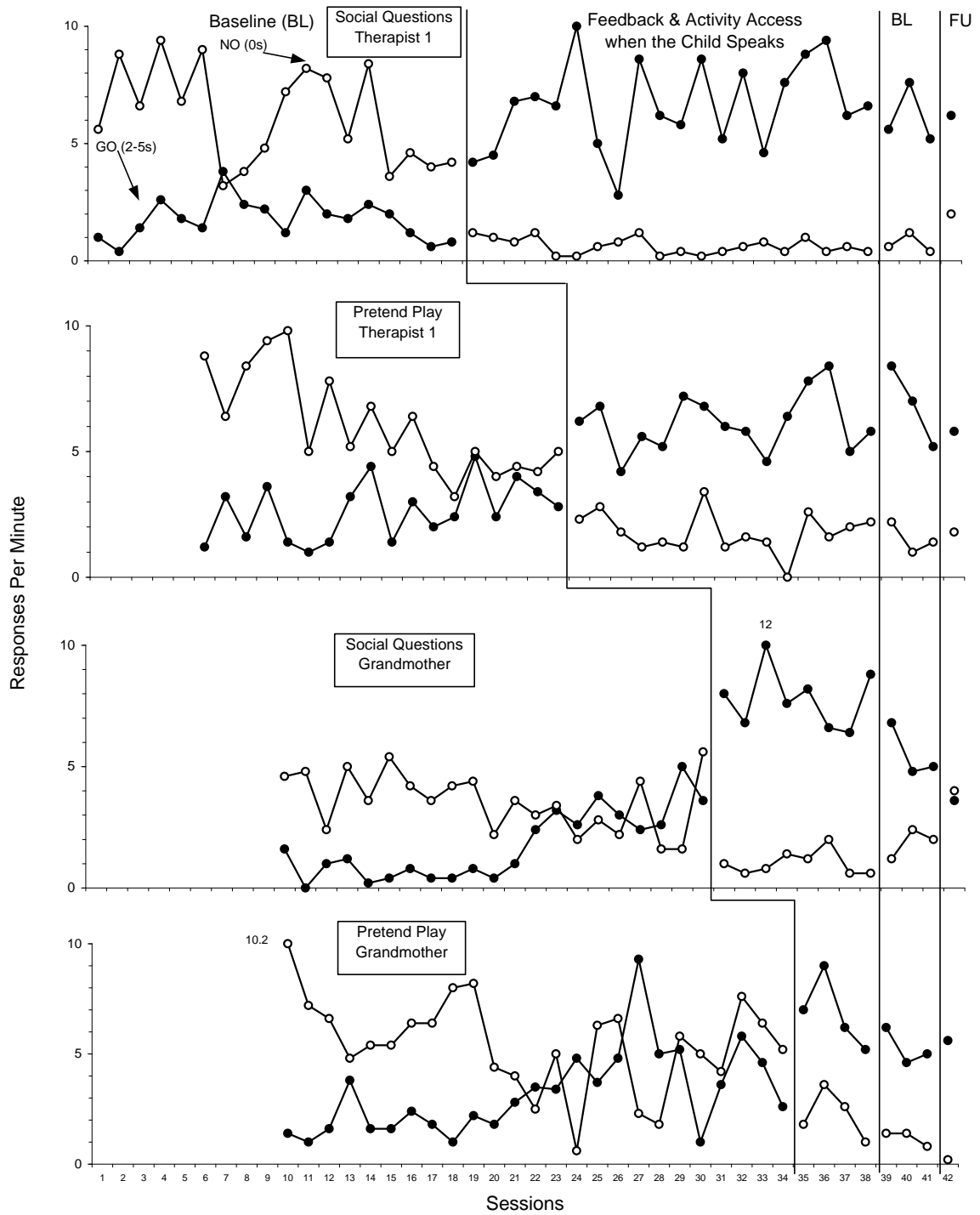
Verbalizations without Facial Orientations				
Condition	Baseline	Intervention	Baseline 2	Probe
Social Questions First Author	30.88	3.16	3.66	10
Pretend Play First Author	30.44	8.90	7.66	9
Social Questions Grandmother	17.76	5.12	9.33	20
Pretend Play Grandmother	27.04	11.25	6	1
Prolonged Facial Orientations				
Condition	Baseline	Intervention	Baseline 2	Probe
Social Questions First Author	.11	3.77	5.66	0
Pretend Play First Author	0	1.80	3	4
Social Questions Grandmother	.38	5.25	3.33	0
Pretend Play Grandmother	.28	1.5	8.33	5



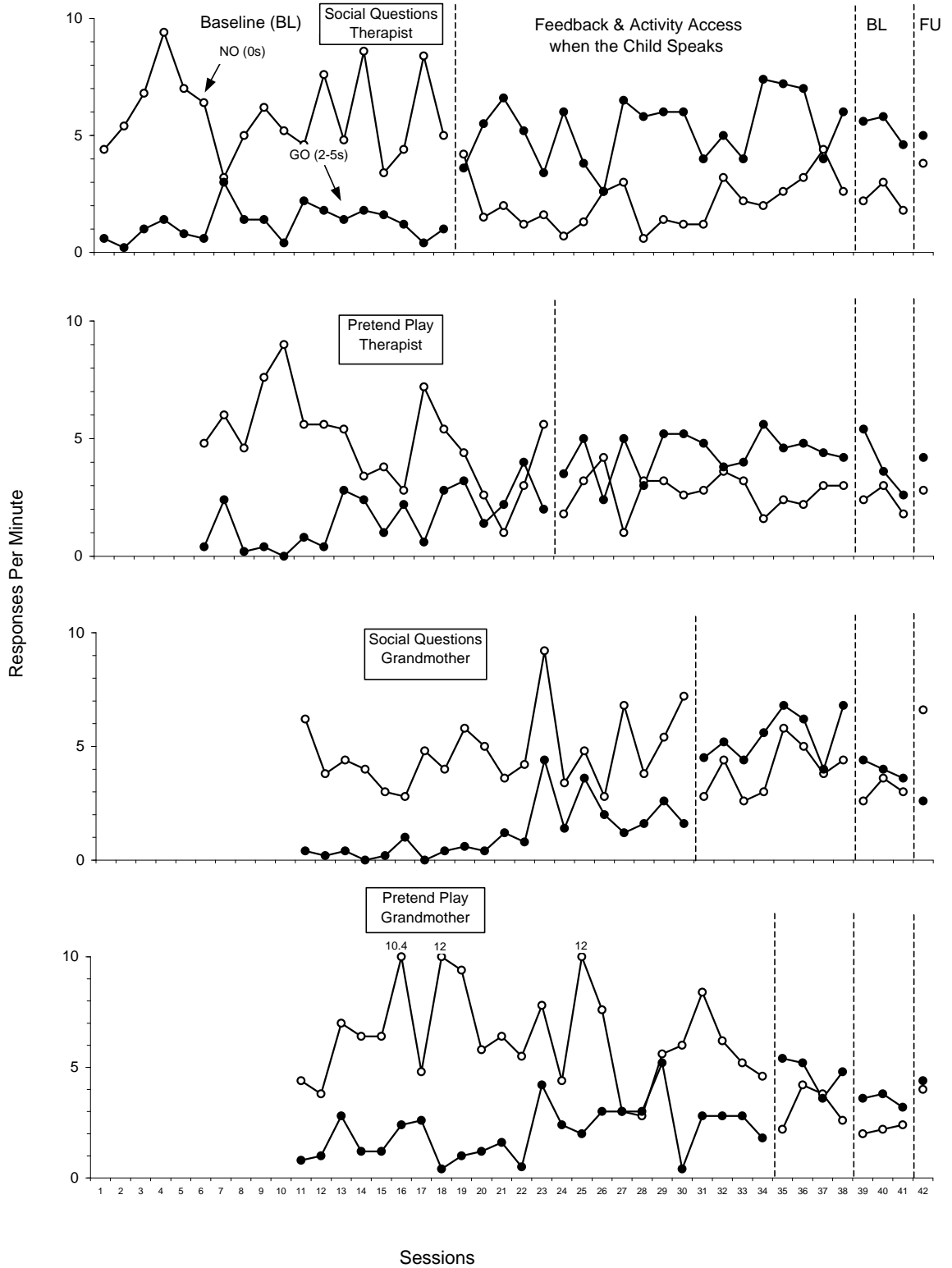
Table 6. Order and content of videos watched for each of the 10 observers

Social Validity					
Social Questions			Pretend Play		
Observer/Video	Clip Order	Topic	Observer/Video	Clip Order	Theme
O1/V1	Typical 2	Lunch	O6/V4	Typical 1	Spiderman: city
	Typical 1	Spiderman		Posttreatment	Rugrats
	Pretreatment	Family		Typical 2	Spiderman: country
	Posttreatment	Arthur		Pretreatment	Stranded on desert
O2/V3	Posttreatment	Barney	O7/V2	Typical 1	Batman
	Typical 2	Bugs Bunny		Typical 2	Cops & Robbers
	Pretreatment	Molly		Posttreatment	Bull & Matador
	Typical 1	T-ball		Pretreatment	Mom & Dad
O3/V3	Typical 1	T-ball	O8/V4	Typical 2	Spiderman: country
	Posttreatment	Barney		Pretreatment	Stranded on desert
	Typical 2	Bugs Bunny		Typical 1	Spiderman: city
	Pretreatment	Molly		Posttreatment	Rugrats
O4/V1	Typical 2	Lunch	O9/V2	Pretreatment	Mom & Dad
	Pretreatment	Family		Typical 1	Batman
	Typical 1	Spiderman		Posttreatment	Bull & Matador
	Posttreatment	Arthur		Typical 2	Cops & Robbers
O5/V1	Posttreatment	Arthur	O10/V2	Pretreatment	Mom & Dad
	Typical 2	Lunch		Typical 1	Batman
	Pretreatment	Family		Posttreatment	Bull & Matador
	Typical 1	Spiderman		Typical 2	Cops & Robbers

Figure 1. Glance (GO) and No Orientation (NO) when the Child Speaks



**Figure 2.** Glance (GO) and No Orientation (NO) when the Adult Speaks



**Figure 3.** Sustained Orientation (SO) when the Child Speaks

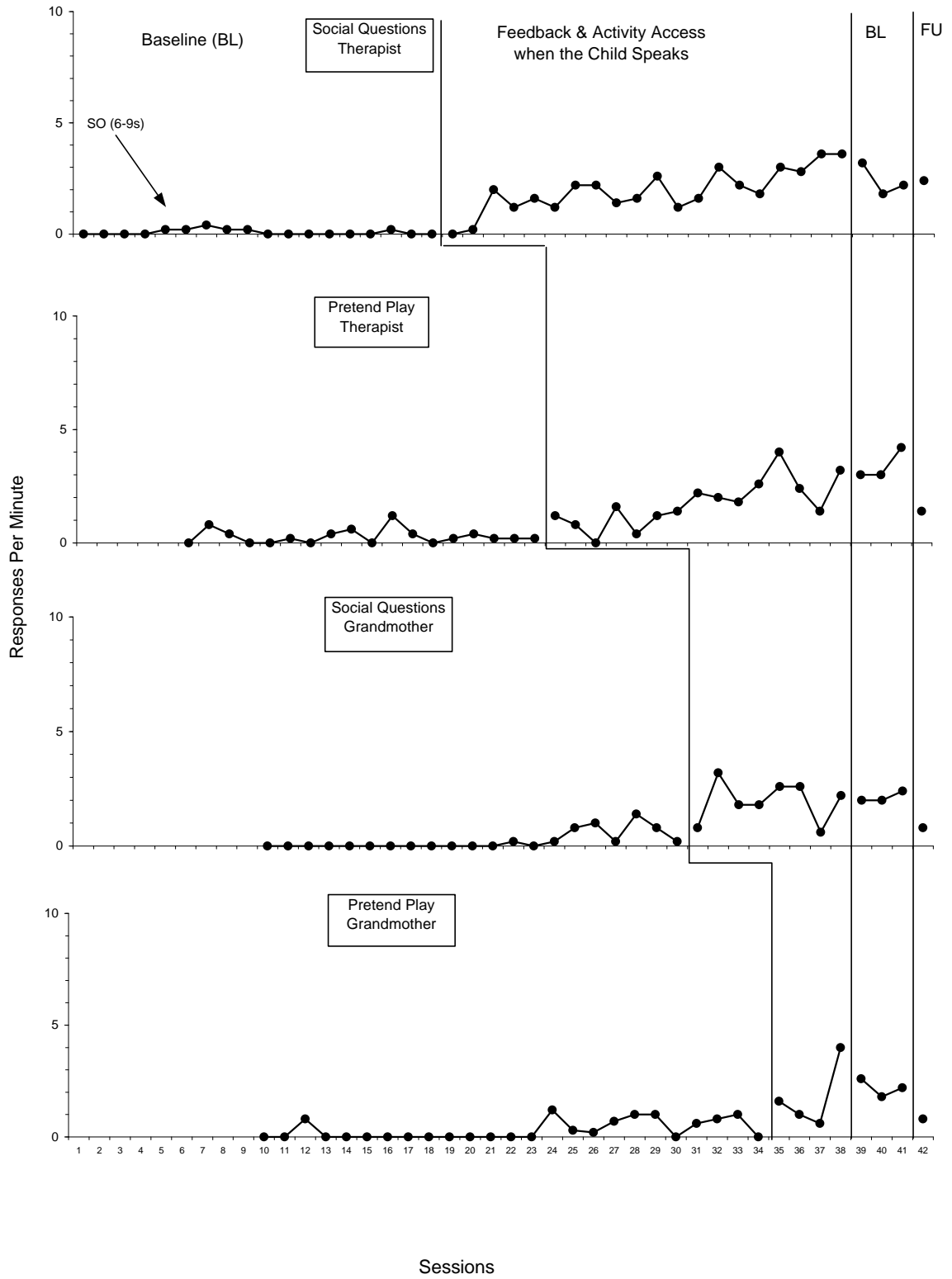
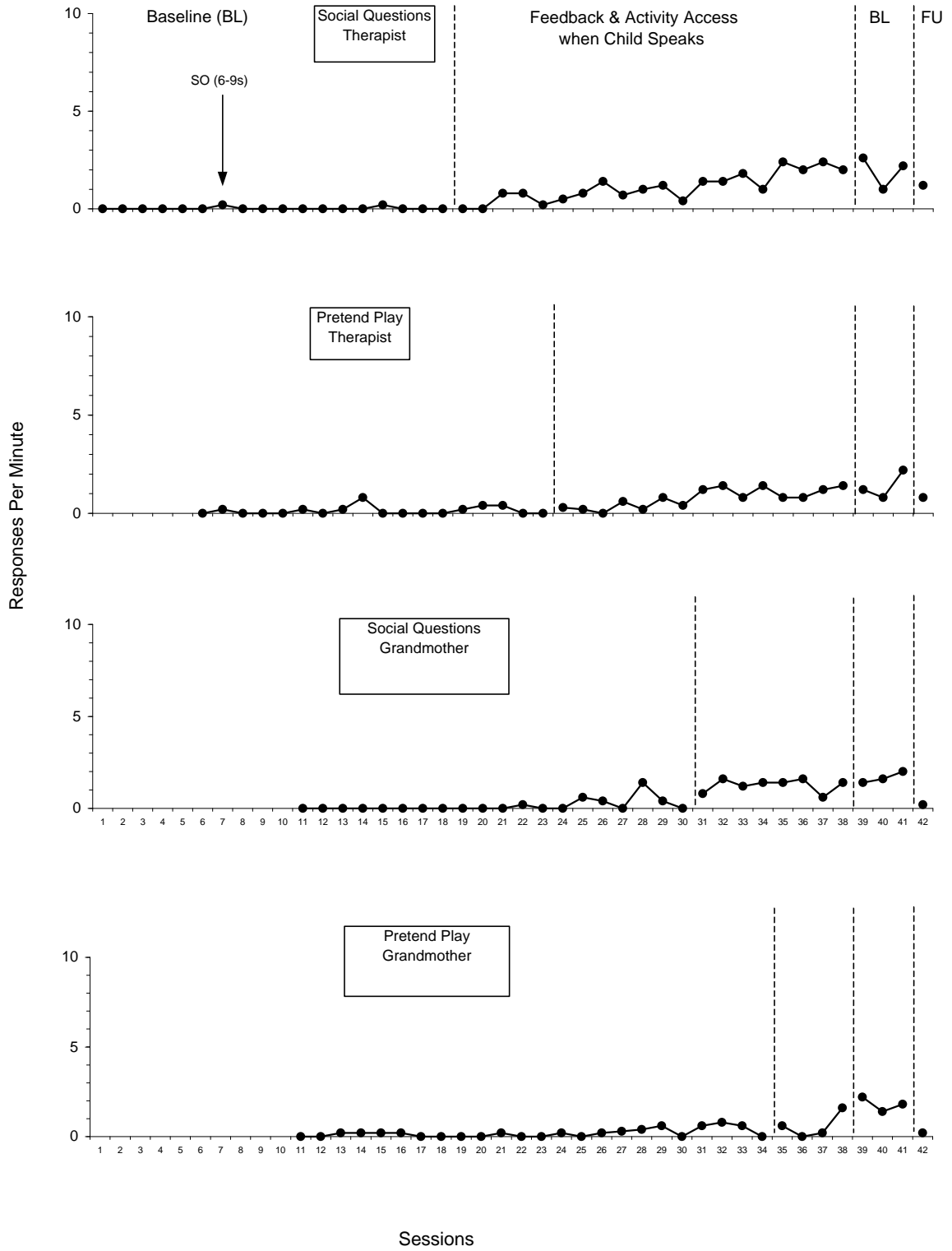
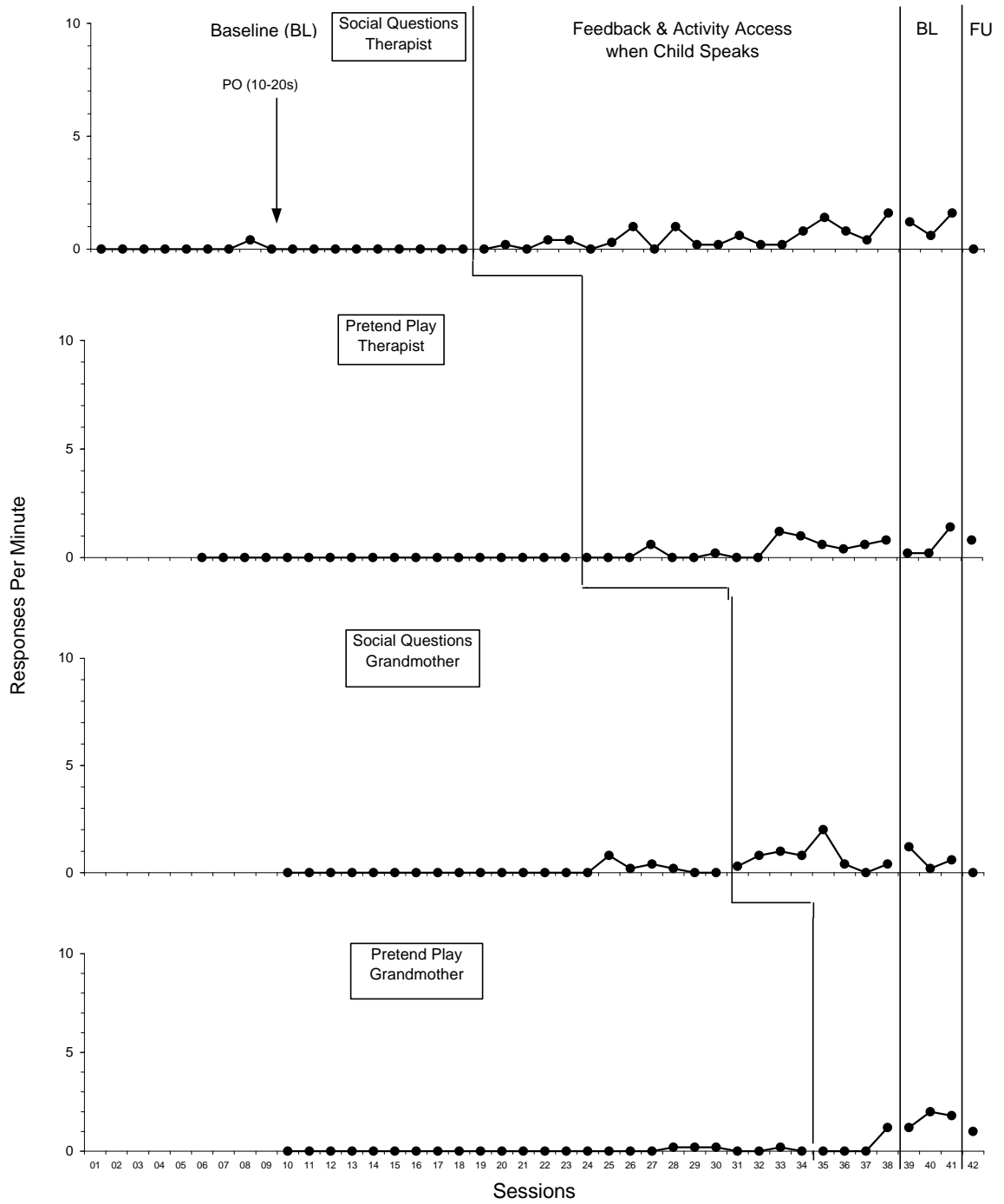


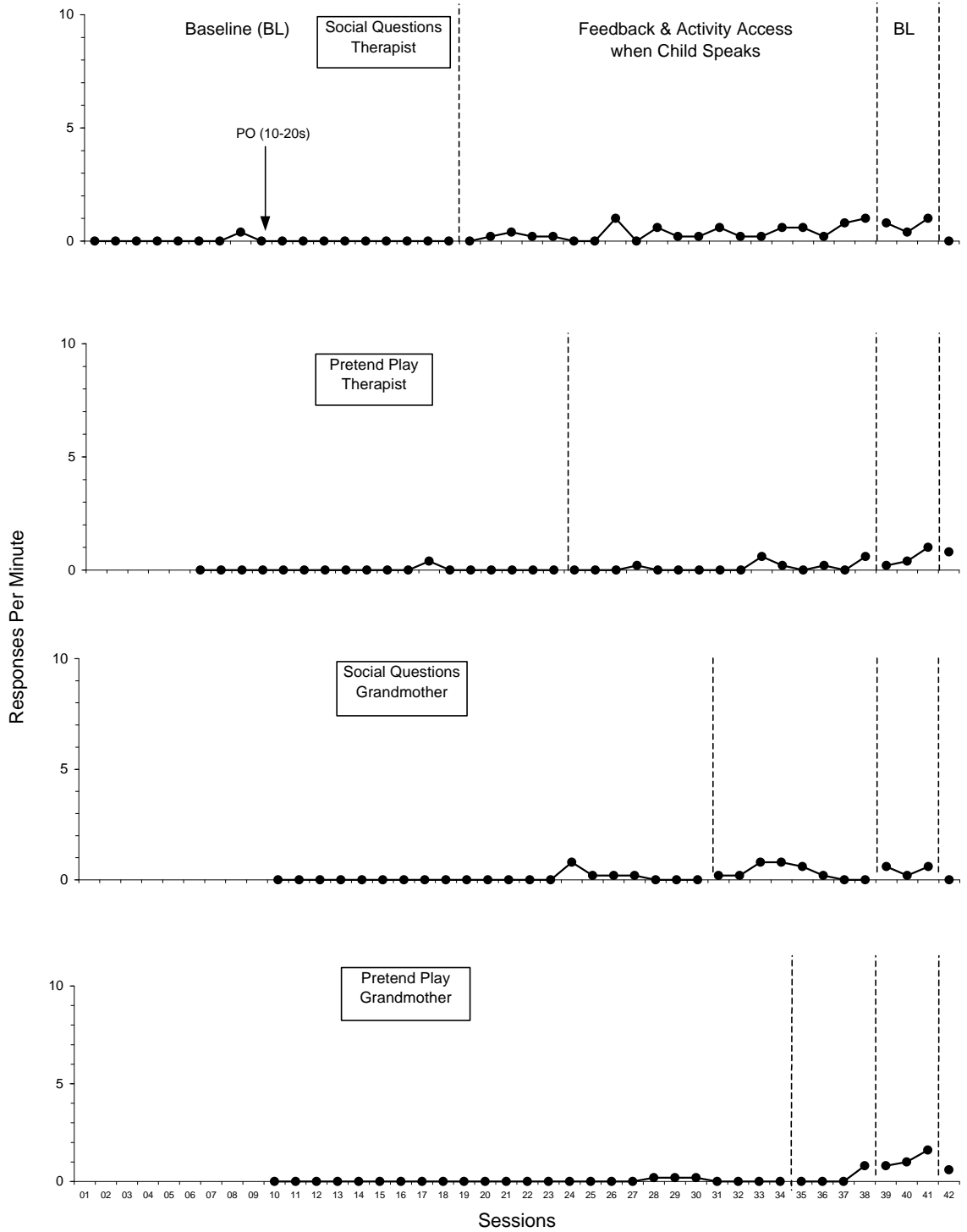
Figure 4. Sustained Orientation (SO) when the Adult Speaks



**Figure 5.** Prolonged Orientation (PO) when the Child Speaks



**Figure 6.** Prolonged Orientation (PO) when the Adult Speaks



**Figure 7.** Fleet Orientation (FO) when the Child Speaks

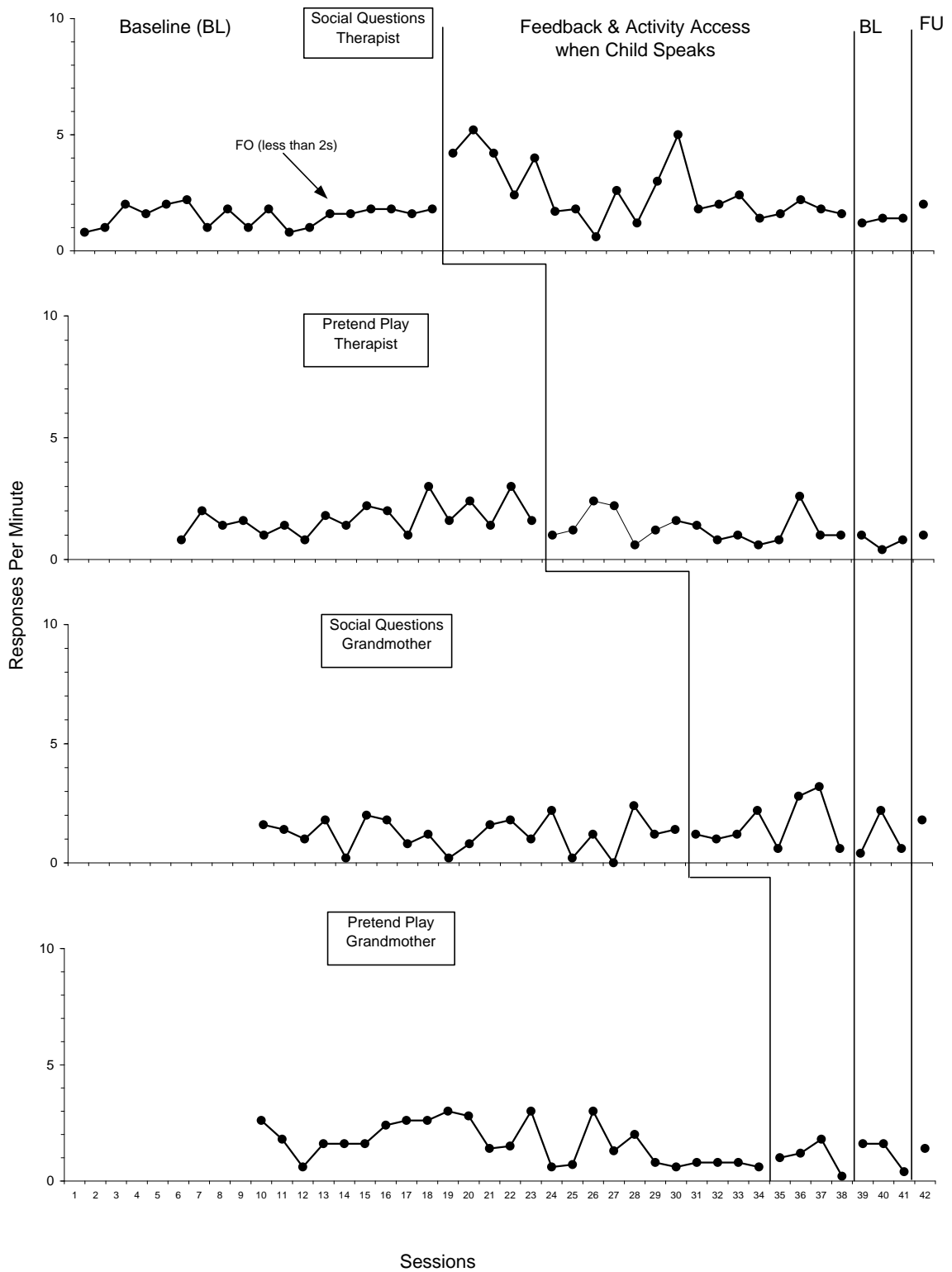




Figure 8. Fleet Orientation (FO) when the Adult Speaks

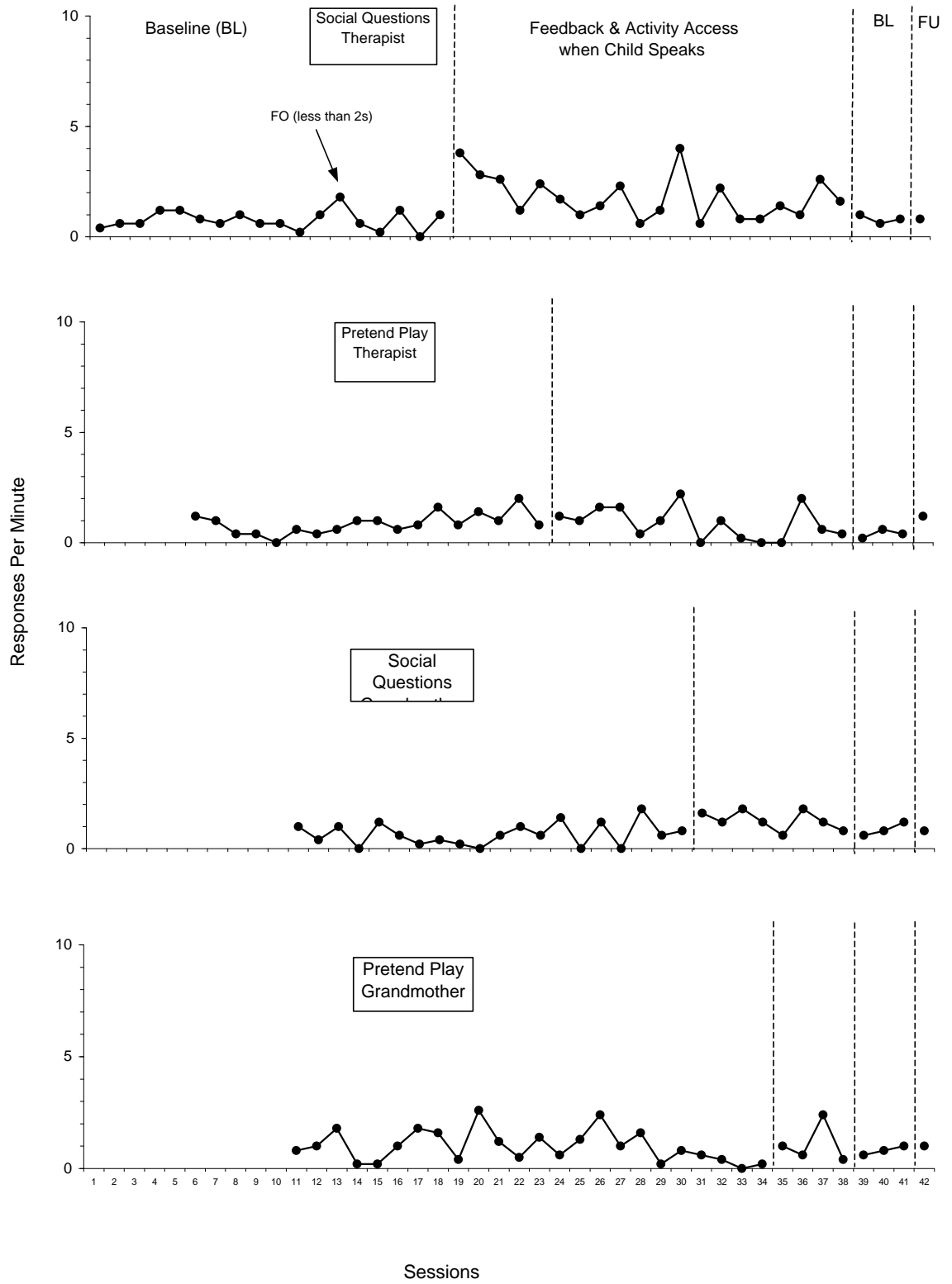
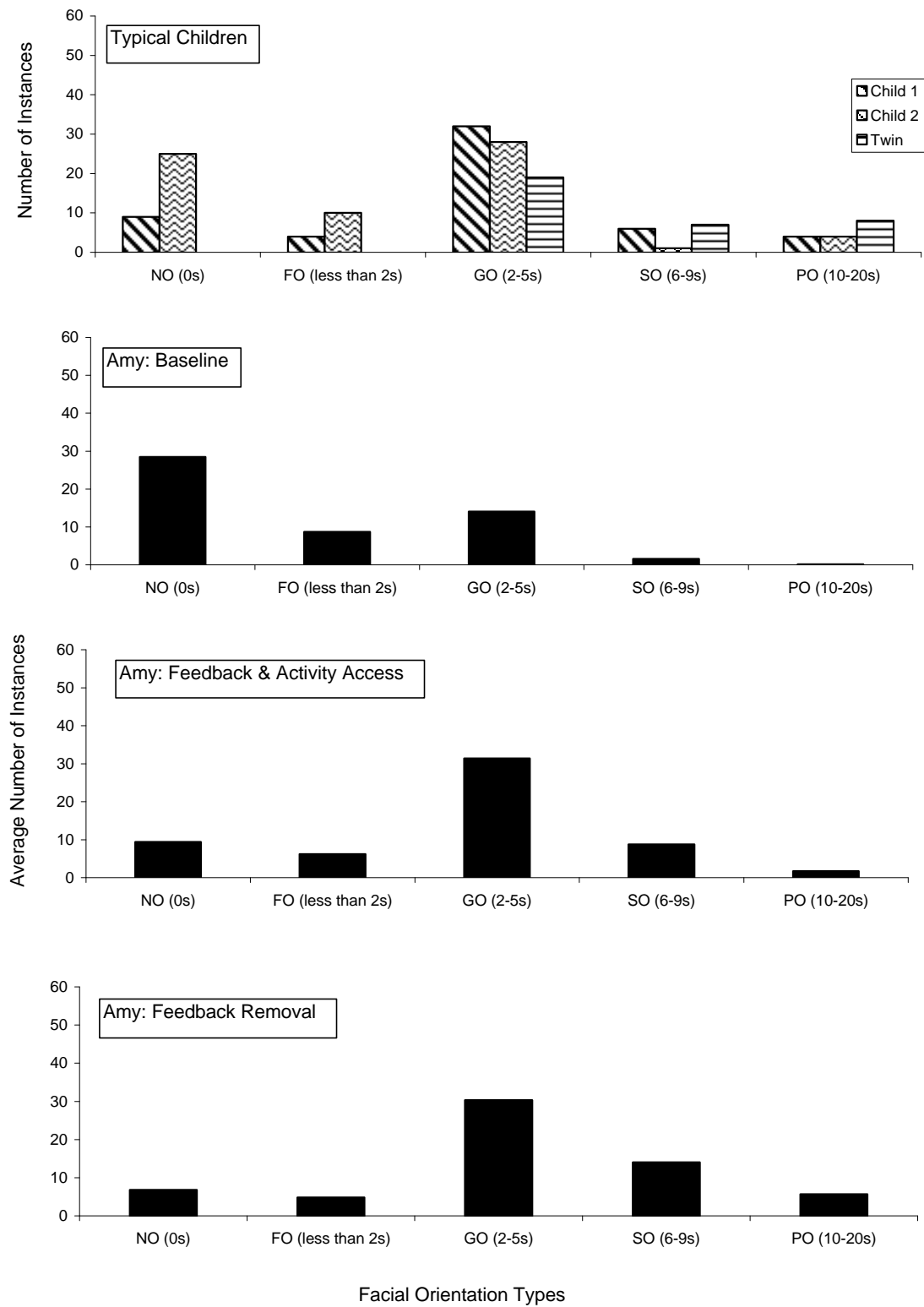


Figure 11. Amy and Typical Children during Pretend Play when Child Speaks



**Figure 10.** Amy and Typical Children during Social Questions when Adult Speaks

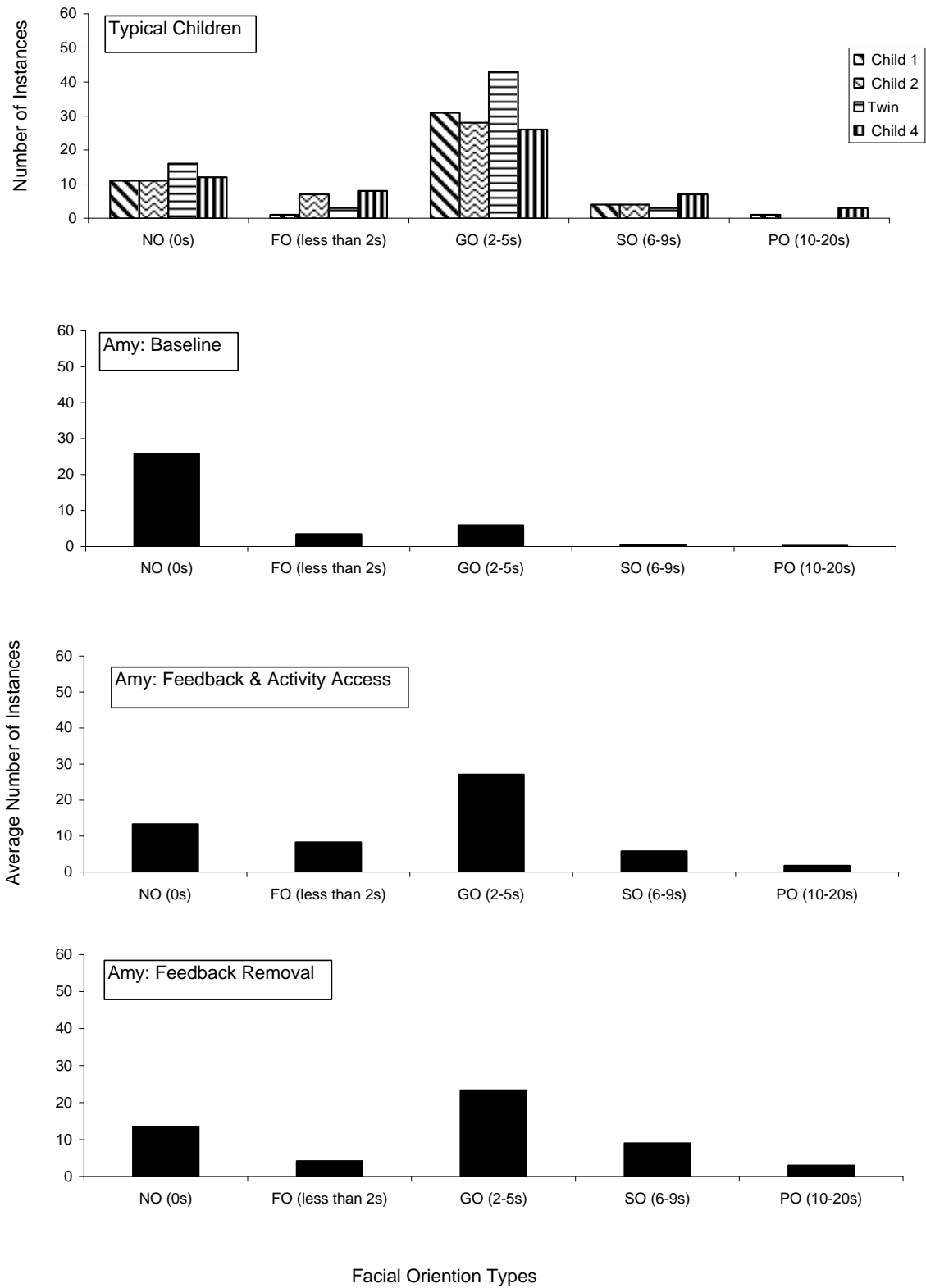


Figure 11. Amy and Typical Children during Pretend Play when Child Speaks

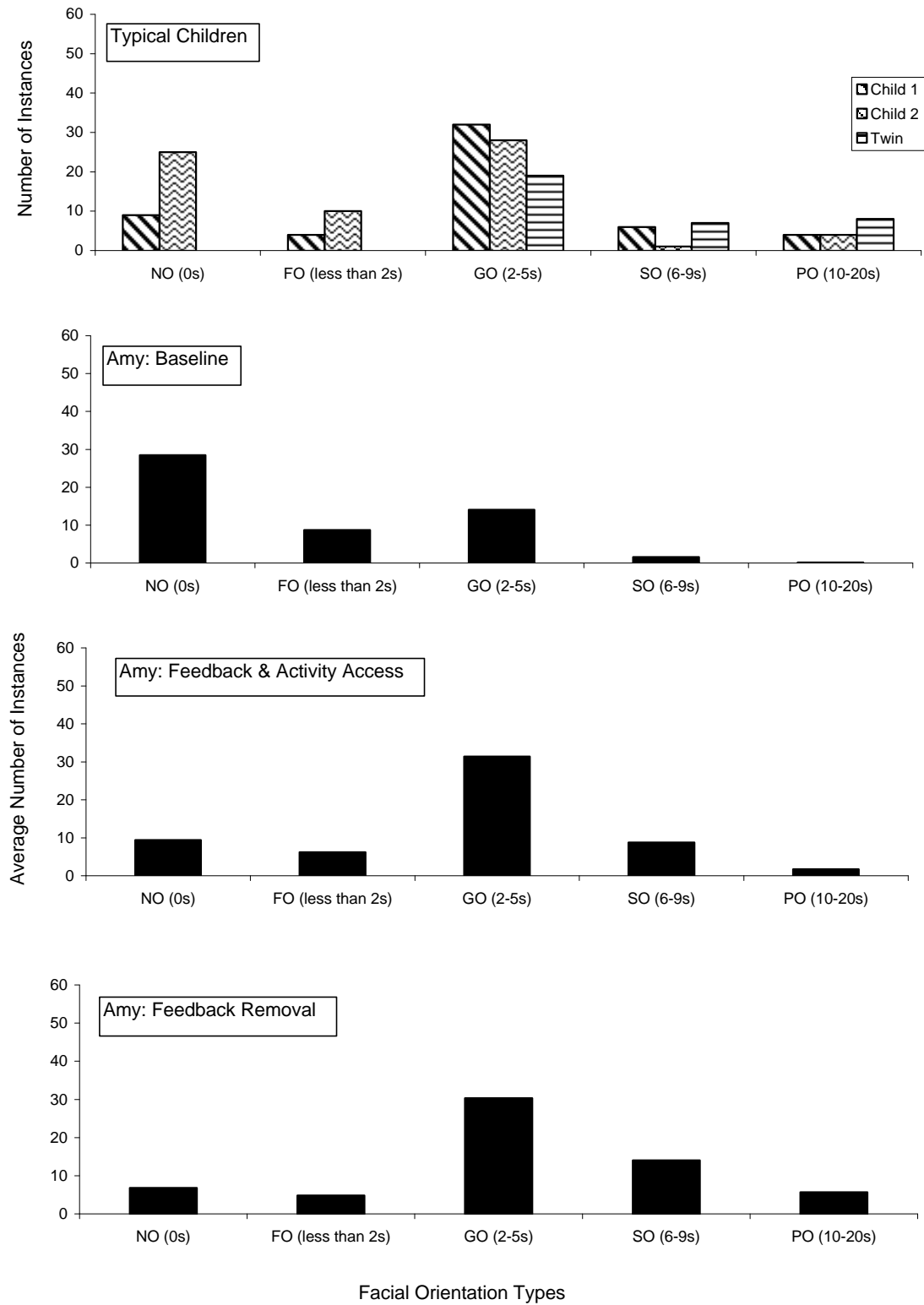
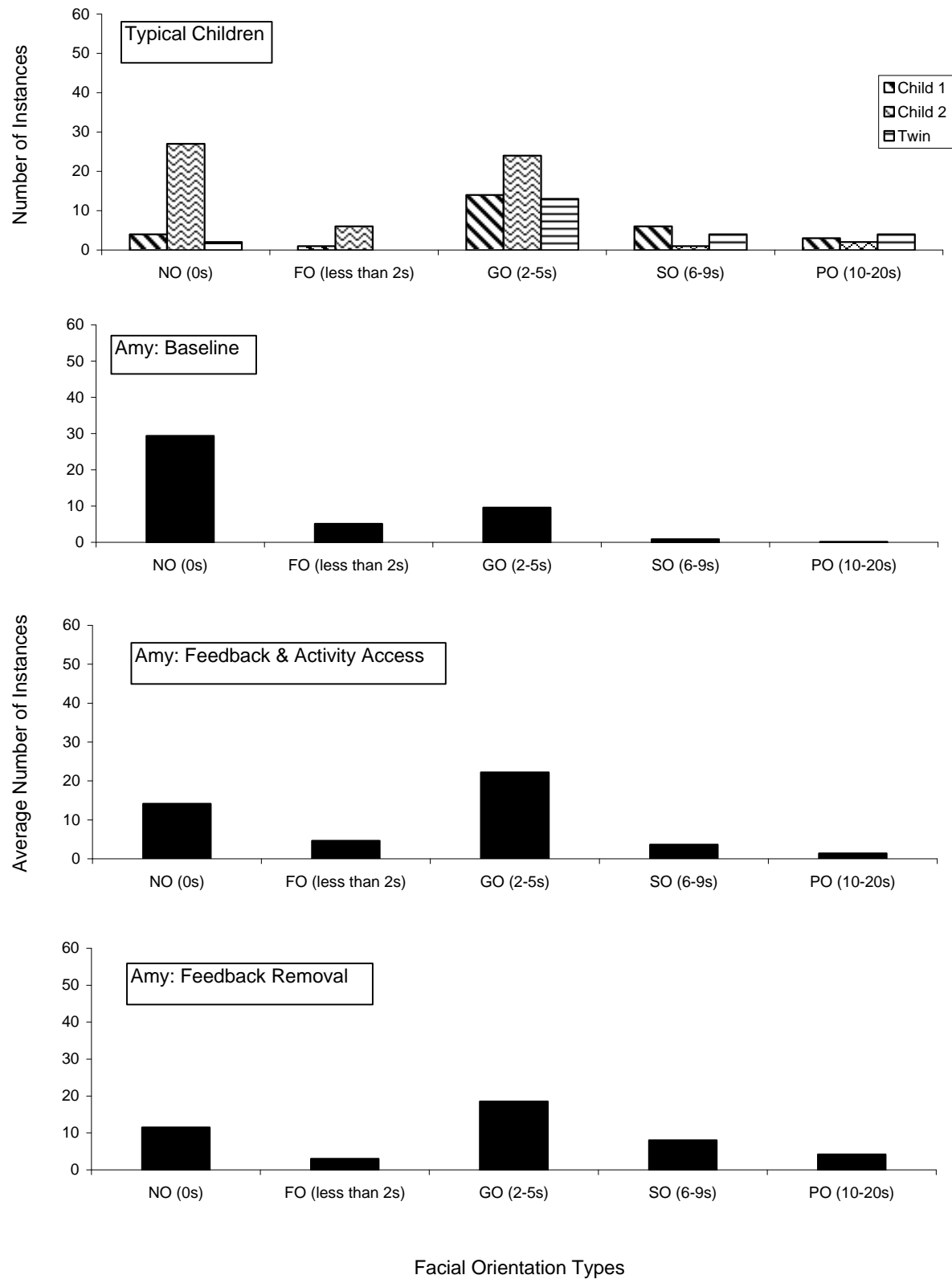


Figure 12. Amy and Typical Children during Pretend Play when Adult Speaks



**Figure 13. Observer's Social Validity Ratings for Amy and Comparison**

Children for all Questions Targeting Desirable Outcomes.

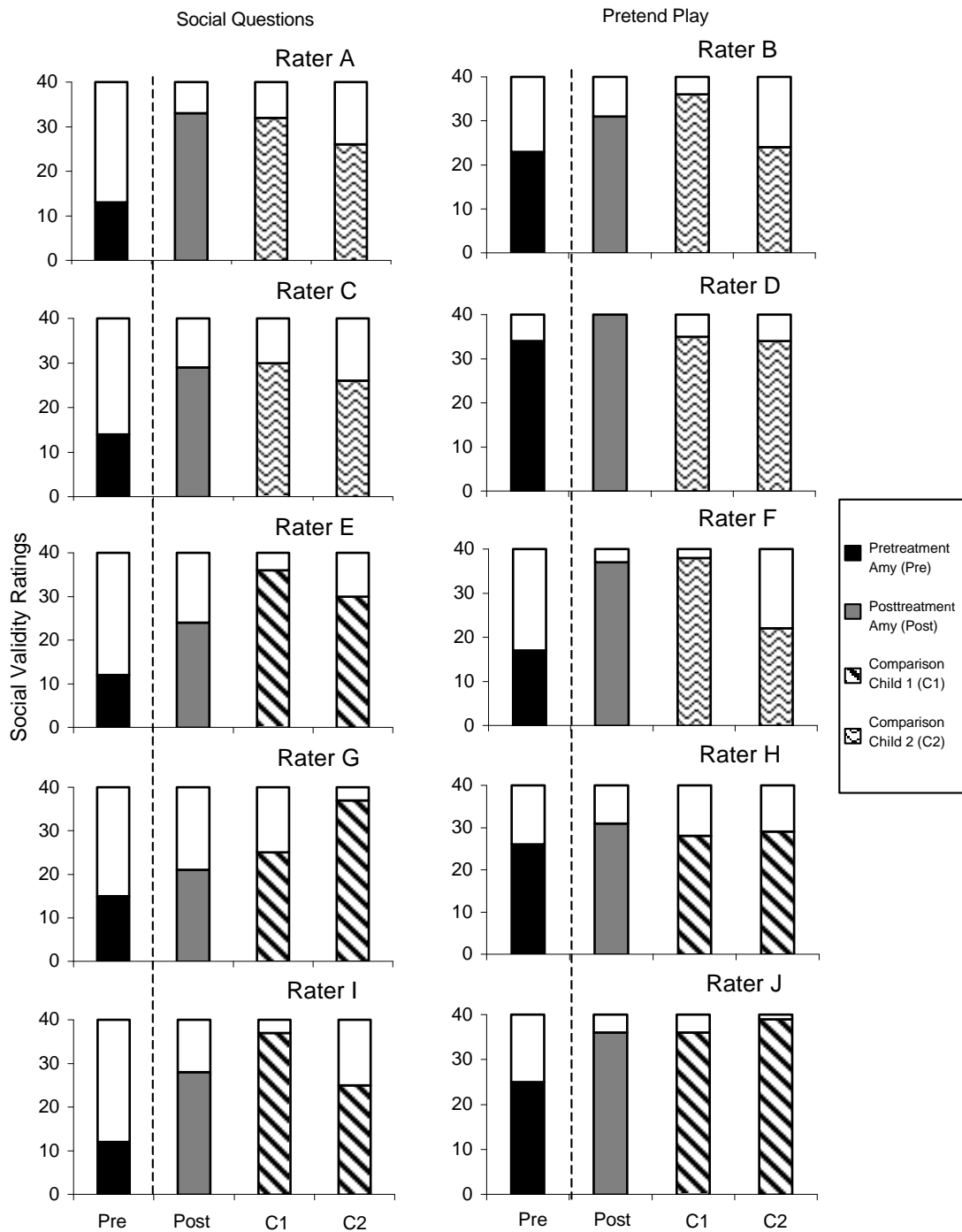
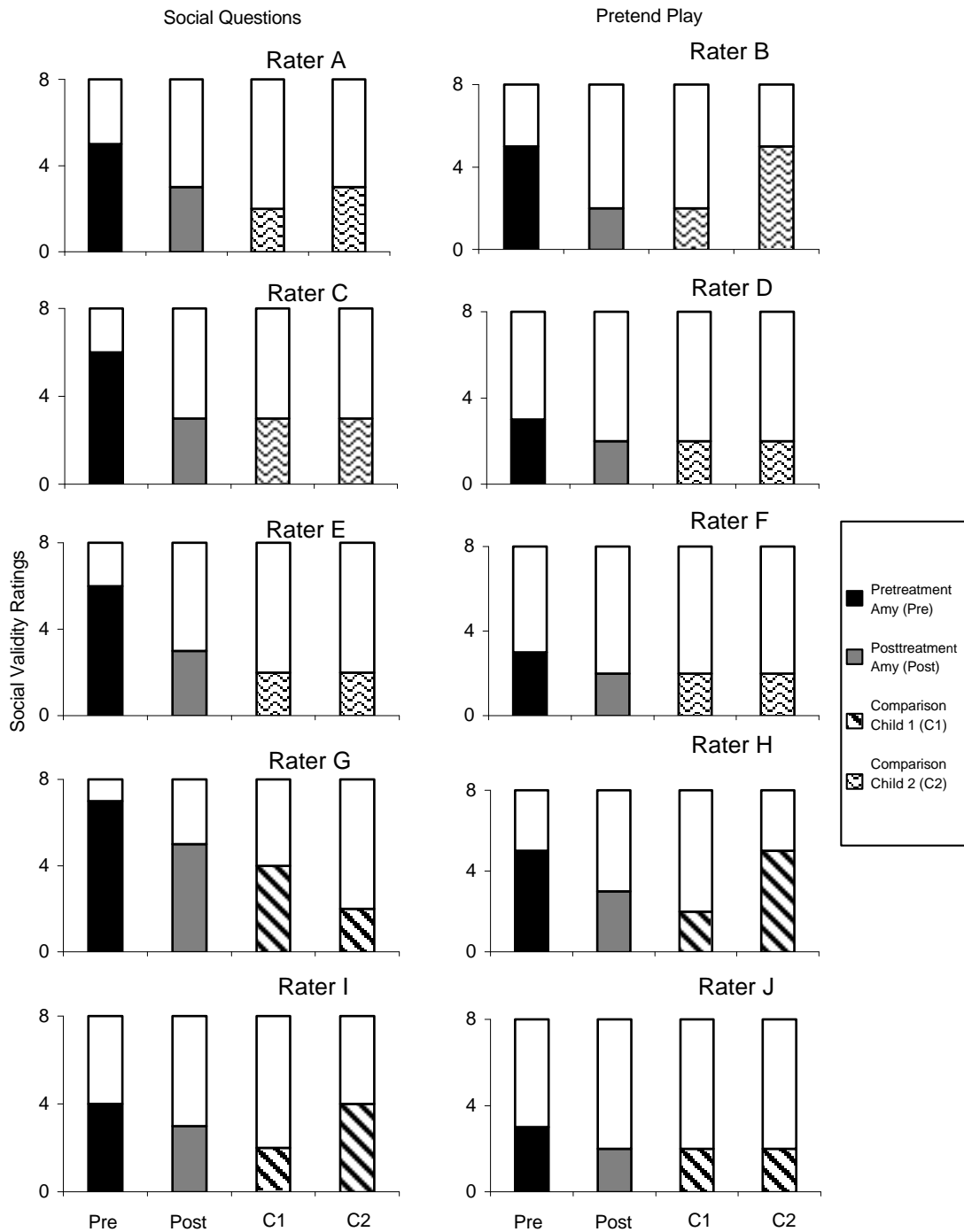


Figure 14. Observer's Social Validity Ratings for Amy and Comparison

Children for all Questions Targeting Undesirable Outcomes.



APPENDIX A  
EYE CONTACT FEEDBACK SHEET





APPENDIX B

OBSERVATION PROTOCOL, RESPONSE DEFINITIONS, DATA SHEET

### Scoring facial orientation

The start of a session was verbally announced by the experimenter saying “One, two, three, start”. After the experimenter announced the start of the session, a timer was set for 5 minutes and observers began recording. When the timer sounded, observers stopped scoring.

The onset of a facial orientation was scored at the point in which the child’s face moved right, left, up or down to meet with the adult’s face (unless her face was already oriented toward the adult’s face) including complete or partial orientation of the child’s eyes to the adult’s eyes. If the child’s face was already oriented toward the adult’s face but her eyes were not visible, an abrupt eyelid movement up or down toward the direction of the adult’s eyes was scored as the onset of a facial orientation. Recording the duration of facial orientation stopped when the participant changed her face and/or eye position away from the adult’s face during the facial orientation. Observers recorded the duration of all facial orientations by counting.

Four different categories of facial orientation were scored: (a) fleet orientations less than 2 seconds (FO), (b) glance orientation of 2-5 seconds (GO), (c) sustained orientation of 6-9 seconds (SO), and (d) prolonged orientation (PO) of 10-20 seconds. No instances of facial orientation lasting in excess of 20 seconds were observed throughout the study. Observers also recorded when Amy did not give facial orientation while she or the adult spoke (NO).

### Scoring verbalizations

After the duration of a facial orientation was determined, the observer recorded the category of that facial orientation under either comment or request, or no verbal

depending upon the content of the verbalization (if any) made during facial orientation. For example, if the child had made a comment or request while orienting to the adult, facial orientation would be recorded under comment or request respectively. Similarly, if the child had oriented toward the adult without speaking, facial orientation would be recorded under the category, no verbal.

Comments were defined as any word, phrase, or complete sentence that was a description or question. For example, descriptions such as, “Oh no, Bo is coming”, questions such as, “Where is my Ariel?” or replies to social questions such as, “She has red hair” were all recorded under comments. Requests were defined as any word, phrase, or complete sentence directed to the adult asking for an item, a specific action to be completed by the adult, or permission to do something. For example, item-requests such as, “Can I have a sticker now?” adult action-requiring requests such as, “Granny, now you say, ‘oh no!’”, and permission-requests such as, “Can I get a drink?” were all recorded under requests. Protests were defined as any word, phrase, or complete sentence expressing (a) a want or warning of escape, (b) a refusal to participate, or (c) a complaint of personal physical illness. For example, escape-statements such as “I want to go home” or “I’m outta here”, refusals such as “I’m not going to do this”, and complaints such as, “I’m going to throw up” were all scored as protests. Finally, if a facial orientation was observed in the absence of any verbalization, its category was recorded under no verbal.

Each session video was scored twice, once for the child’s facial orientation during child verbalizations and once for the child’s facial orientation during adult verbalizations.

## Further exemplars and non-exemplars of possible verbalizations

Comments were:

- “Oh no, Mojo is coming”
- “Here is your (incomplete)”
- “Where is my doll?”
- “Ahhhhhhh!”
- “D.W.’s dress is pink”
- “She is a little girl.”
- “Sleep over night”
- “He has red hair & glasses.”
- “When Angelica says...”

Requests were:

- “Granny, now you say, ‘oh no!’”
- “Can I have a sticker now?”
- “I have to go to the bathroom.”
- “Can I get a drink?”
- “Can you help me?”

Protests were:

- “I don’t want to be Tommy!”
- “I give up!”
- “I’m outta here!”
- “Oh, I’m feeling sick.”
- “No, I don’t wanna draw this!”

These were not comments:

- “No, I don’t want you to be a rat!” (protest)
- “Stop it!” (protest)
- “Granny, can I hold the timer?” (request)
- “I have to go to the bathroom” (request)
- “Wendy, will you get a Hi-C?” (request)
- “Granny, can I have that toy?” (request)
- “I can’t do this.” (protest)
- “Oh, I’m feeling sick.” (protest)
- “I think I’m going to throw up.” (protest)

These were not requests:

- “Where is my doll?” (comment)
- “How are you Granny?” (comment)
- “I don’t wanna.” (protest)
- “What is Joey doing?” (comment)
- “Joe you can’t play!” (protest)

These were not protests:

- “No, he not sad!” (comment)
- “No Wen, you be the magician.” (request)
- “Granny, you count to 29.” (request)
- “She is a princess.” (comment)
- “When it beeps, it’s my turn.” (comment)

Date & Condition: \_\_\_\_\_

Adult & Topic: \_\_\_\_\_

Facial orientation category code				
0	1	2	3	4
= No facial orientation				
0	1	2	3	4
= less than 2 seconds				
0	1	2	3	4
= 2-5 seconds				
0	1	2	3	4
= 6-9 seconds				
0	1	2	3	4
= 10-20 seconds				

Directions: Record one of the codes for each instance of facial orientation (F). That is, if the participant meets the criteria for F, write a 1, 2, 3, or 4 under the appropriate verbal category. For instance, if the child says "Barney is a dinosaur" while orienting to the adult for less than 2 seconds, write a 1 under Comments. Likewise, if the participant meets the criteria of the definition for F while NOT speaking, write a 1, 2, 3, or 4 under No Verbals. Also, record all instances of child verbalizations emitted without F. For example, if the child says, "Wendy, can I get a drink of milk?" while not orienting to the adult, write a 0 under Requests. Begin writing from the top left until you reach the end of the category row (marked by shading) and begin again in the next row. When finished, sum the occurrences of each F category (0, 1, 2, 3,4) under each verbal category and record them in the last column. Also, add the total number of all F categories (0, 1, 2, 3, 4) and record them in the bottom row. In dark cells, record all totals. Draw a line under all the verbal categories to separate it from the next observation. Watch the session again, but this time record child FO categories during adult verbalizations using the boxes remaining under the line. The same rules apply except this time record child F categories for adult verbalizations. For example, if the child meets the definition for a F of 4 seconds while the adult is saying, "Who is Ariel? (asking a social question)", record 2 under Comments (adult). Also, record all instances of adult verbalizations emitted without F. For example, if the child is not orienting while the adult says, "Oh no, they are coming!", record a 0 under Comments. Summarize as before. Record these totals by drawing a slash mark after the first totals and write the second totals after the slashes.

Comments					Requests			Protests			No Verbal			Totals	
														Comment	0=
														1=	2=
														3=	4=
														Requests	0=
														1=	2=
														3=	4=
														Protests	0=
														1=	2=
														3=	4=
														No Verbal	0=
														1=	2=
														3=	4=
														Total	0=
														Total	1=
														Total	2=
														Total	3=
														Total	4=
Totals:															

APPENDIX C  
SOCIAL QUESTION TOPICS AND QUESTIONS

Amy

1. Where do you live?
2. What sports do you play?
3. Tell me about your teacher.
4. Tell me about your favorite cartoon character
5. Who is in your family?
6. How old are you?
7. Where do you go to school?
8. What is your favorite food?
9. Tell me about your best friend.
10. Tell me about your favorite game.
11. What is your favorite color?
12. Whose house do you stay overnight?
13. Where is your favorite place to eat?
14. Tell me about your favorite person.
15. What do you like to drink?
16. What do you like to do after school?
17. What do you do in school?
18. What is your favorite song?
19. What do you like to do after school?
20. How do you like your house?



Amy's bedroom

1. What toys did you play with in your room today?
2. What cartoon did you watch in your room today?
3. What pictures do you have in your room?
4. What kind of games do you play in your room?
5. Why do (don't) you like your room?
6. What did you do in your room today?
7. How clean is your room right now?
8. When you clean your room, how long does it take?
9. What did you see in your room today?
10. What did Granny do to your room today?
11. Tell me about your room.
12. What is your favorite thing in your room?
13. What did you do with the toys in your room?
14. Tell me about your bed
15. Tell me what is in your toybox.
16. How do you like your room?
17. What do you wish you could have for your room?
18. How would you decorate your room?
19. What is your bedroom like?
20. Tell me about what is fun in your room.

Amy's family

1. Who is in your family?
2. Tell me something about your Mom.
3. Tell me something about your Step Dad.
4. Tell me something about your brother Joey.
5. Tell me something about your brother Tim.
6. Tell me something about Granny.
7. Tell me something about your aunt Mary.
8. Tell me something about your cousin Madeline.
9. Tell me something about Papaw.
10. What do you like to do with your brother Joey?
11. What do you like to do with Granny?
12. What do you like to do with your Mom?
13. What do you and Granny do on Fridays?
14. What does you and everyone else do on Sunday morning?
15. What does your family do that makes you mad?
16. What does your family do that makes you happy?
17. What does your family do that makes you sad?
18. Do you want to have another brother or sister?
19. Tell me something about your other Grandma.
20. What do you do at your Grandma's house who lives far away?

## Baseball

1. Where do you play baseball?
2. Who is on your team?
3. How do you hit the ball?
4. What position do you play?
5. What is the name of your team?
6. What does your uniform look like?
7. Where do you practice?
8. Who practices with you?
9. What is a strike?
10. Who watches your games?
11. When do you swing the bat?
12. When do you practice?
13. How do you throw the ball?
14. How do you slide into home base?
15. How do you like baseball?
16. What don't you like about baseball?
17. Did you hit the ball at practice?
18. Who cheers for you when you play?
19. Tell me about the field you play on.
20. How do you make a homerun?

### Cartoon Character

1. Who is (character/cartoon name)?
2. What does (name) do when he/she is mad?
3. Why does (name) cry?
4. Why does (name) run away?
5. What food does (name) like to eat?
6. What games does (name) play?
7. What does (name) do at the beach?
8. What does (name) do at school?
9. What does (name) do when he/she is happy?
10. Who does (name) play with?
11. What clothes does (name) wear?
12. Why do you like (name)?
13. Who are (name's) friends?
14. What does (name) do when he/she is at home?
15. What does (name) do at the playground?
16. What does (name) look like?
17. Where does (name) live?
18. Tell me about (name's) friends.
19. Who is (name's) boyfriend/girlfriend?
20. What movie is (name) in?
21. Who is mean to (name)?

22. Where does (name) swim?
23. What songs does (name) sing?
24. Where does (name) sleep at night?
25. Where is (name) right now?
26. Is (name) a prince/princess?

### Barney

1. What do kids do when they want to see Barney?
2. What do Barney and the kids do together?
3. What songs does Barney and the kids sing?
4. Who are Barney's friends?
5. What does Barney look like?
6. Why do you like Barney?
7. What does Barney do that makes you happy?
8. What animals does Barney see at the zoo?
9. What did you learn from Barney?
10. What does Barney say about strangers?
11. What does Barney say about brushing your teeth?
12. What does Barney do that makes you laugh?
13. What does Barney do on his great adventure?
14. What color is the egg in Barney's great adventure?
15. Why does Barney use his imagination?
16. What does B.J. look like?

17. Who's friends with B.J.?
18. What song does B. J. sing?
19. Tell me what B. J. does when Barney is in trouble.
20. Tell me about the yellow blanket that Bay Bop likes.

### Holiday

1. Why do you like (name of holiday)?
2. What do you do for (holiday)?
3. Where do you celebrate (holiday)?
4. What is your favorite thing about (holiday)?
5. What does your family do for (holiday)?
6. Do you decorate your house for (holiday)?
7. What kind of stuff do you put up to decorate?
8. Who comes to visit you during (holiday)?
9. Do you like to see anyone special on (holiday)?
10. Tell me about (holiday).
11. What do you wear for (holiday)?
12. What do you think Barney does to have fun on (holiday)?
13. What don't you like about (holiday)?
14. What are you going to do next (holiday)?
15. What do you think of when (holiday) is here?
16. Do you watch any Barney videos about (holiday)?
17. What do you do at school for (holiday)?

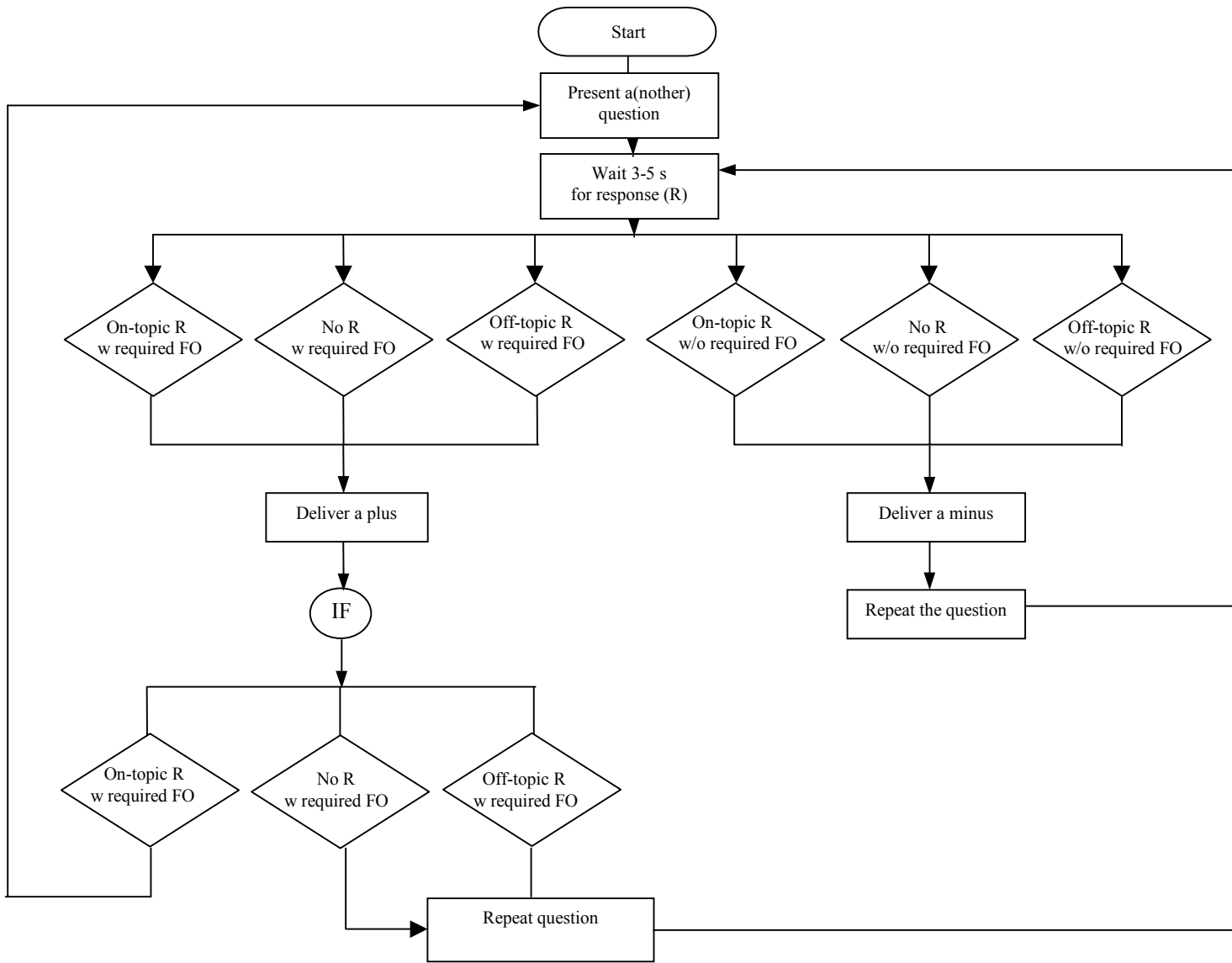
18. Do you make anything special for (holiday)?
19. What do you draw for your Mom on (holiday)?
20. What does Joey make for (holiday)?

### School

1. What did you eat for lunch today?
2. What did you do at recess today?
3. Tell me about your friend \_\_\_\_\_.
4. What did you see at school today?
5. What did you do at the computer today?
6. What did you draw at school today?
7. What clothes did you wear to school today?
8. What did you talk about at school today?
9. How did you get home from school today?
10. How did you get to school this morning?
11. What stories did you hear today?
12. What toys did you play with today?
13. What games did you play today?
14. What was your favorite thing at school today?
15. How was Mr. Tom today?
16. How was Ms. Debbie today?
17. What did you and Ms. Debbie talk about today?
18. Did you and Ms. Debbie have any fun today?

APPENDIX D  
SOCIAL QUESTIONS INTERVENTION FLOWCHART





APPENDIX E

FEEDBACK & PREFERRED ACTIVITY ACCESS DESCRIPTION

## Social Questions

Amy was asked to choose from the same 8 topics she selected in baseline sessions by deciding upon a topic verbally listed by the experimenter. Also, the list of questions for a given topic, which ranged from 15 to 20, remained the same. After Amy chose a topic, she was asked to sit down in a booster chair approximately 2 feet from the adult's position. Before each intervention session, the adult explained the contingencies to Amy. Specifically, the adult said, "Amy, I want to see how many times you can look at me while answering these questions. If you look at me while you answer, I will give you a plus on this paper (show child the feedback sheet). When you get \_\_\_ pluses, we will do what you want to do, okay?" If the timer goes off and you are not looking at me while answering, we can't stop until you answer and look one time." As in baseline, the session timer began after a count off from the experimenter, "One, two, three, start." Another timer was used between question and answer periods to ensure that all of Amy's preferred activity access periods were 5 min in length. After the start of a session, the adult either kneeled down at Amy's eye level or sat on a permanent fixture to allow eye-to-eye position during conversation opportunities.

Criteria for pluses. Each time a question was asked, the adult waited 3 to 5 s for Amy's response. When Amy responded to a question with an on-topic reply (i.e., one that is consistent with the question) conjoint with the required facial orientation, the adult informed Amy that she earned a plus (e.g., "That's a plus!") and recorded it on the feedback sheet. If Amy responded to the feedback while emitting the required facial orientation, she received another plus. When Amy responded to a question with an off-

topic reply (i.e., one that is inconsistent with the question), but produced the required facial orientation, the adult informed Amy that she earned a plus. Although the adult recorded a plus on the feedback sheet, that question was repeated to provide Amy another opportunity to give an on-topic reply. While slowly repeating the question, the adult placed emphasis on the misunderstood word(s) if necessary. For example, if the adult asked, “Where did you eat today?” and Amy said, “French fries and chocolate milk.”, the adult repeated that question adding emphasis to the critical word, *where*. If Amy still did not provide an on-topic response, but emitted the required facial orientation, another plus was rewarded and a different question was presented. Finally, if Amy did not answer a question at all within 3 to 5 s but emitted the required facial orientation, the adult still delivered a plus, but asked a different question upon the next presentation (see Appendix D).

Criteria for minuses. When Amy had not demonstrated the required facial orientation regardless of content, if any, the adult informed Amy that she received a minus (e.g., “Oops, that’s a minus, we’ll have to start over.”). Amy then lost any pluses that she had earned toward the criterion to gain access to her preferred activity. The adult repeated the question that Amy received the minus for and waited for a reply (see Appendix D). This question was repeated until Amy answered with facial orientation.

Criteria for preferred activity access. Amy had to demonstrate 3 lengths of facial orientation: (a) less than 2 s [<sup>1</sup>], (b) 2 to 5 s [<sup>2</sup>], and (c) at least 5 s or over [<sup>3</sup>], throughout intervention for a specified number of consecutive times to gain access to her preferred activities. Each type of facial orientation had to be emitted at least 2

consecutive times but not more than 4 consecutive times depending on the criterion. In addition, the aforementioned criteria had to be somewhat stable (i.e., met twice consecutively) before advancing to the next criterion. For example, Level I consists of 3 criteria: (a) 2 of +<sup>1</sup> twice, (b) 3 of +<sup>1</sup> twice, and (c) 4 of +<sup>1</sup> twice. Level II also had 3 criteria: (a) 2 of +<sup>2</sup> twice, (b) 3 of +<sup>2</sup> twice, and (c) 4 of +<sup>2</sup> twice. Finally, Level III had 3 criteria: (a) 2 of +<sup>3</sup> twice, (b) 3 of +<sup>3</sup> twice, and (c) 4 of +<sup>3</sup> twice (see Appendix F). Additionally, if Amy had met a criterion for any level, but the next criterion could not have been attempted for at least 24 hours, she had to have met that particular criterion once more before advancing to the next criterion.

After a criterion was met for access to a preferred activity, the session timer was stopped and the preferred activity 5 min timer was started. Amy and the adult then engaged in 5 min of Amy's preferred activity. After the activity timer, Amy and the adult returned for more questions and the session timer was restarted. If the session timer sounded and the last symbol on Amy's sheet was not a plus, she had to answer at least one question while emitting facial orientation (but this interaction was not counted in the data). If the session timer sounded before a criterion was met, Amy would have to start that criterion over in the next scheduled session.

### Pretend Play

Before each pretend play intervention session, Amy was asked what role she would like to play (e.g., "Who do you want to be?"). After Amy decided, she was also asked who the adult should role-play (e.g., "Who should I be?"). Finally, the adult asked Amy if she needed anything to play with (i.e., props). The use of props was limited to

non-figurine items as previous observations suggested that figurines decreased social interactions and facial orientation between play partners. After Amy chose both roles, the contingencies were explained to her as in the social questions intervention sessions. Specifically, the adult said, “Amy, I want to see how many times you can look at me when we play. If you look at me while you talk, I will give you a plus on this paper [hold up the feedback sheet]. When you get \_\_\_ plusses, we will go do what you want to do, okay? If the timer goes off and you are not looking at me while talking, we can’t stop until you talk and look at me one time.” The session timer was started after the experimenter provided the count off, “One, two, three, start”. After the session timer started, the adult and child took on their assigned character roles. Amy was free to move about the room, select more props, and direct the adult’s behavior during the 5 min session. The adult attempted to remain within 1 to 4 feet of Amy at her eye level whenever possible as Amy moved about. To maintain Amy’s control of the play scene, the adult usually spoke to Amy only after she spoke to the adult. That is, the adult was not to initiate any verbalizations to Amy during the play period. For example, if Amy had said, “You’ll never escape me, ha ha ha!”, the adult might have responded, “I will tell my friend to come rescue me!” Feedback during pretend play was delivered with the use of the feedback sheet. Each time Amy said something, the adult either told her that she earned a plus (e.g., “That’s a plus.”, or “Plus.”) or a minus (“Aww, that’s a minus.”, or “Minus”) or showed her that she earned a plus depending on pauses between verbalizations. That is, the longer the in-between verbalization pause, the more likely Amy would be given feedback verbally. Short in-between verbalization pauses

warranted the adult to show Amy that she earned a plus to avoid interrupting the flow of her verbalizations. The adult always interrupted and told Amy that she received a minus. Finally, when Amy had reached criterion, the adult waited until Amy had finished her statement before telling her that she could choose an activity.

The criteria for pretend play were exactly the same as the criteria in social questions (see Appendix F). That is, Level I: (a) 2 of +<sup>1</sup> twice, (b) 3 of +<sup>1</sup> twice, and (c) 4 of +<sup>1</sup> twice; Level II: (a) 2 of +<sup>2</sup> twice, (b) 3 of +<sup>2</sup> twice, and (c) 4 of +<sup>2</sup> twice, and Level III: (a) 2 of +<sup>3</sup> twice, (b) 3 of +<sup>3</sup> twice, and (c) 4 of +<sup>3</sup> twice were all the criteria Amy must have met to continue her preferred activity access. After Amy had met a criterion, the session timer was stopped and the activity timer was started. Amy was allowed to continue the play session as her selected activity if she wanted or play something else. After the activity timer sounded, the adult announced it was time to continue playing the pretend play session by stating the character names presently portrayed by Amy and the adult for that session. After Amy and the adult were ready, the session timer was started and session pretend play commenced. When the session timer sounded, if Amy had met the criterion, she chose an activity. If not enough session time permitted Amy to have met the criterion, she was to go on to her next scheduled activity (i.e., a therapy activity related to one of her program goals).

#### Treatment Withdrawal

Before the start of the session, the adult informed Amy that she had forgotten to bring the feedback sheet with her but that they would proceed talking and playing without it. Specifically, the experimenter said, "Oh no, I forgot to bring the plus sheet. Oh well,

we'll go ahead and do it without it." After Amy agreed, these sessions were conducted in the same manner as baseline. In social questions, Amy answered questions about a topic she chose for five consecutive minutes while the adult commented on her answers, as in baseline. For pretend play, Amy chose roles and began to play after the count for five consecutive minutes, as in baseline.



APPENDIX F  
FACIAL ORIENTATION CRITERION CHANGES

APPENDIX G  
SOCIAL VALIDITY PROTOCOLS & SCALES

Video vignettes and questionnaires were devised to assess the social validity of Amy's facial orientation within social questions and pretend play after the use of feedback and preferred activity access. Clips from the each of the four conditions (i.e., social questions and pretend play with the therapist and grandmother) from before and after treatment were chosen at random to be included on the social validity tapes. Thirty second clips were presented in a randomized order with clips of the typically-developing children to minimize bias (Quinn, Sherman, Sheldon, Quinn, & Harchik, 1992).

Observers were recruited at a local tire and automotive shop and drug store in another state. Customers who had to sit and wait for their vehicle to be repaired and drug store employees who were on break were approached by the experimenter to participate. Potential judges were asked if they would watch a video of some children and fill out a short questionnaire to obtain their opinion on the children's' social skills. Potential observers who may have: (a) had prior experience with psychology or behavior analysis, or (b) knew the experimenter or any of the children featured in the tapes were not asked to participate. Before the participants watched any videos, or completed any questionnaires, they were given the following written instructions. Thank you for participating in this survey. The information that you are providing today is very important to us. It may be shared with others in a public format so answer the questions to the best of your ability. Now, press the play button on the VCR and watch the first 30 s video clip. Please watch the entire 30 s clip before answering any questions. When the screen turns black, press the stop button, complete the questionnaire on the next page, and insert that questionnaire into the box on your right. Please use the pen provided for

you on the desk. After you have finished, press the play button again to watch the next video clip. Continue until you have completed all four questionnaires. Thank you again for your time and valuable information. In addition, the observers were provided a written description of the video they were to watch which listed the topic of social questions or the characters in pretend play. A description of Video 1 is provided below.

Below you will find a description of what you are going to watch in Video 1:

1. Video clip 1: A child answering questions about her family
2. Video clip 2: A child answering questions about Spiderman
3. Video clip 3: A child answering questions about a cartoon character, “Arthur”
4. Video clip 4: A child answering questions about what he had for lunch

After receiving written instructions, observers watched a video containing a pre-intervention and post-intervention clip of Amy in one condition and two clips of a typically-developing child in the same condition. After each survey was completed, it was to be deposited into a slit in a cardboard box labeled, “Survey”. The order and content of vignettes are presented in Table 6. After all four surveys were completed, the judges were thanked for their time and effort. Observers were not informed of the study’s purpose or the experimenter’s background unless this information was specifically requested after the completion of the questionnaires. Through these surveys, ordinary persons were able to express their opinions on the nature of Amy’s behavior and a typically-developing peer’s behavior during social questions and pretend play conditions. The actual questions posed in the survey are listed below.

## Social Validity Scale: Social Questions

1. How interested in the topic does the child appear to be?
 

1	2	3	4
Not at all	Somewhat	Interested	Very much
2. How attentive does the child appear to be?
 

1	2	3	4
Not at all	Somewhat	Attentive	Very much
3. How does the child appear to like the topic?
 

1	2	3	4
Not at all	Somewhat	Likes it	Very much
4. How much does the child appear to be enjoying the interaction?
 

1	2	3	4
Not at all	Somewhat	Enjoying it	Very much
5. How much does the child appear to like the adult?
 

1	2	3	4
Not at all	Somewhat	Likes her	Very much
6. How much does the child appear to be paying attention?
 

1	2	3	4
Not at all	Somewhat	Paying Attention	Very much
7. How much does the child appear to be participating in the interaction?
 

1	2	3	4
Not at all	Somewhat	Participating	Very much
8. How much does the child appear to be distracted?
 

1	2	3	4
Not at all	Somewhat	Distracted	Very much
9. How much does the child appear to be listening?
 

1	2	3	4
Not at all	Somewhat	Listening	Very much
10. How much does the child appear to be behaving appropriately?
 

1	2	3	4
Not at all	Somewhat	Appropriate	Very much
11. How much does the child appear to be disruptive?
 

1	2	3	4
Not at all	Somewhat	Disruptive	Very much
12. How pleasant does the child's demeanor appear?
 

1	2	3	4
Not at all	Somewhat	Pleasant	Very much

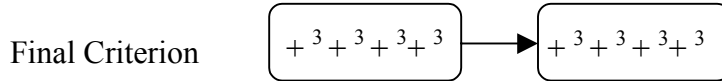
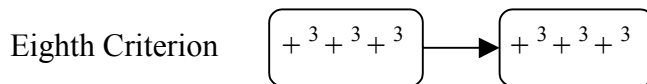
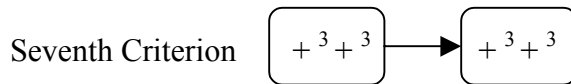
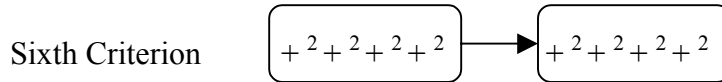
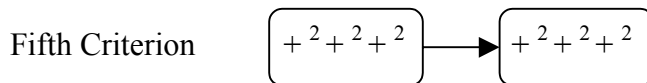
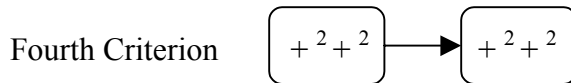
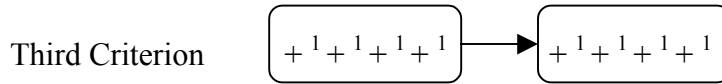
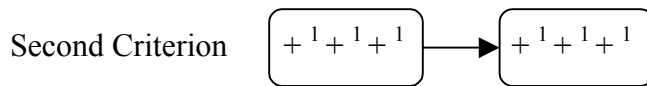
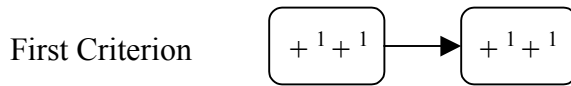
Social Validity Scale: Pretend Play

13. How well does the child appear to be participating?  
 1 Not at all                      2 Somewhat                      3 Interested                      4 Very much
14. How attentive does the child appear to be?  
 1 Not at all                      2 Somewhat                      3 Attentive                      4 Very much
15. How does the child appear to like the play scene?  
 1 Not at all                      2 Somewhat                      3 Likes it                      4 Very much
16. How much does the child appear to be enjoying the interaction?  
 1 Not at all                      2 Somewhat                      3 Enjoying it                      4 Very much
17. How much does the child appear to like the adult?  
 1 Not at all                      2 Somewhat                      3 Likes her                      4 Very much
18. How much does the child appear to be paying attention?  
 1 Not at all                      2 Somewhat                      3 Paying Attention                      4 Very much
19. How much does the child appear to be participating in the interaction?  
 1 Not at all                      2 Somewhat                      3 Participating                      4 Very much
20. How much does the child appear to be distracted?  
 1 Not at all                      2 Somewhat                      3 Distracted                      4 Very much
21. How much does the child appear to be listening?  
 1 Not at all                      2 Somewhat                      3 Listening                      4 Very much
22. How much does the child appear to be behaving appropriately?  
 1 Not at all                      2 Somewhat                      3 Appropriate                      4 Very much
23. How much does the child appear to be disruptive?  
 1 Not at all                      2 Somewhat                      3 Disruptive                      4 Very much
24. How pleasant does the child's demeanor appear?  
 1 Not at all                      2 Somewhat                      3 Pleasant                      4 Very much

Facial Orientation Criterion 1 = less than 2 s of facial orientation (+<sup>1</sup>)

Facial Orientation Criterion 2 = 2-5 s of facial orientation (+<sup>2</sup>)

Facial Orientation Criterion 3 = at least 5 s or over 5 s of facial orientation (+<sup>3</sup>)



## REFERENCES

- Arbelle, Sigman, & Kasari (1994). Compliance with parental prohibition in autistic children. Journal of Autism and Developmental Disorders, 24, 693-702.
- Baer, D.M., & Wolf, M.M. (1970). The entry into natural communities of reinforcement. In R. Ulrich, T. Stachnik, & J. Mabry (Eds.) Control of human behavior. Glenview, IL. Scott-Foresman.
- Blake, P., & Moss, T. (1967). The development of socialization skills in an electively mute child. Behavior Research and Therapy, 5, 349-356.
- Elias-Burger, S.F., Sigelman, C.K., Danley, W.E., & Burger, D.L. (1981). Teaching interview skills to mentally retarded persons. American Journal of Mental Deficiency, 85, 655-657.
- Frame, C., Matson, J.L., Sonis, W.A., Fialkov, M.J., & Kazdin, A.E. (1982). Behavioral treatment of depression in a prepubertal child. Journal of Behavior Therapy and Experimental Psychiatry, 13, 239-243.
- Hamlet, C.C., Axelrod, S., & Kuerschner, S. (1984). Eye contact as an antecedent to compliant behavior. Journal of Applied Behavior Analysis, 17, 553-557.
- Koegel, R.L., & Frea, W.D. (1993). Treatment of social behavior in autism through the modification of pivotal social skills. Journal of Applied Behavior Analysis, 26, 369-377.
- Kohler, F.W., & Greenwood, C.R. (1986). Toward a technology of generalization: the identification of natural contingencies of reinforcement. The Behavior Analyst, 9, 19-26.
- Matson, J.L. (1982). The treatment of behavioral characteristics of depression in the mentally retarded. Behavior Therapy, 13, 209-218.
- Miranda, Donnellan, & Yoder (1983). Gaze behavior: a new look at an old problem. Journal of Autism and Developmental Disorders, 13, 397-409.
- McConnell, S.R. (1987). Entrapment effects and the generalization and maintenance of social skills training for elementary school students with behavior disorders. Behavior Disorders, , 252-263.



- Quinn, Sherman, Sheldon, Quinn, & Harchik. (1992). Social validation of component behaviors of following instructions, accepting criticism, and negotiating. Journal of Applied Behavior Analysis, 25, 401-413.
- Rimland, B (1964). The syndrome of early infantile autism: background, course, diagnosis and prognosis. In Elliot, Lindzey, & MacCorquodale (Eds.), Infantile autism: the syndrome and its implications for a neural theory of behavior Englewood Cliffs, N.J. : Prentice Hall (pp.5-22).
- Rolider, A., Cummings, A., & Van Houten, R. (1991). Side effects of therapeutic punishment on academic performance and eye contact. Journal of Applied Behavior Analysis, 24, 763-773.
- Santarcangelo, S., & Dyer, K. (1988). Prosodic aspects of motherese: effects on gaze responsiveness in developmentally disabled children. Journal of Experimental Child Psychology, 46, 406-418.
- Schloper, E., Reichler, R., & Remler, B. R. (1986). The childhood autism rating scale (CARS) for diagnostic screening and classification of autism. New York: Irvington Publishers.
- Schreibman, L. (1988). Autism. Newbury Park, CA: Sage Publications, Inc.
- Stokes, T.F., & Baer, D.M. (1977). An implicit technology of generalization. Journal of Applied Behavior Analysis, 9, 349-367.
- Taras, M.E., Matson, J.L., & Leary, C. (1988). Training social interpersonal skills in two autistic children. Journal of Behavior Therapy and Experimental Psychiatry, 19, 275-280.
- Tiegerman, E. & Primavera, L.H. (1984). Imitating the autistic child: facilitating communicative gaze behavior. Journal of Autism and Developmental Disorders, 14, 27-38.
- Volkmar, F.R., Hoder, E.L., & Cohen, D.J. (1985). Compliance, 'negativism', and the effects of treatment structure in autism: a naturalistic, behavioral study. Journal of Child Psychology and Psychiatry, 26, 865-877.
- Williams, T.I. (1989). A social skills group for autistic children. Journal of Autism and Developmental Disorders, 19, 143-155.