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Promoting reciprocal interactions between children with developmental delays and their typical siblings through instruction in incidental teaching.

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PROMOTING RECIPROCAL INTERACTIONS BETWEEN CHILDREN
WITH DEVELOPMENTAL DELAYS AND THEIR TYPICAL SIBLINGS
THROUGH INSTRUCTION IN INCIDENTAL TEACHING

A Thesis Presented

by

TODD A. HARRIS

Submitted to the Graduate School of the
University of Massachusetts in partial fulfillment
of the requirements for the degree of

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ABSTRACT

PROMOTING RECIPROCAL INTERACTIONS BETWEEN CHILDREN WITH DEVELOPMENTAL DELAYS AND THEIR TYPICAL SIBLINGS THROUGH INSTRUCTION IN INCIDENTAL TEACHING

SEPTEMBER 1992

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Many children with developmental delays typically withdraw from and avoid social interactions with other children. Left untreated, these social interaction deficits can lead to significant adjustments problems in later years. This study evaluated the efficacy of training typical children to use incidental teaching techniques to increase reciprocal interactions with their developmentally delayed siblings. The training, which consisted of modeling, instructions, feedback, and reinforcement, occurred in the free play area of a university-affiliated preschool. Results of a multiple baseline across two sibling pairs suggested that the introduction of the training package led to increases in rates of reciprocal interactions over baseline rates. Furthermore, increases in target child verbalizations were observed. Experimenter mediation was successfully faded as rates of interactions remained above those in baseline. Generalization probes taken in the subjects' homes

demonstrated that rates of interactions were, on average, higher after the training package was introduced. Finally, data taken during monthly follow-up probes indicated that treatment effects were maintained over time. Results of this study suggest that instruction in incidental teaching is an effective way to increase reciprocal interactions between typical children and their developmentally delayed siblings.

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CHAPTER I

INTRODUCTION

Children with developmental delays often exhibit social and language deficits that impair their ability to function without support. Since these impairments seem to be most challenging to treat in children with autism, much of the research involves these children. The following introduction will discuss the characteristics and treatment of pervasive developmental disorder- not otherwise specified (PDD-NOS) and autism. A review of previous research will focus on the area of social behavior, as well as efforts toward generalization. The introduction will end with a paragraph outlining the purposes of the present study. For ease of discussion, the term "developmental delays" will be used interchangeably with autism and PDD-NOS.

Pervasive Developmental Disorder - Not Otherwise Specified

Pervasive Developmental Disorders (PDD) is described by the Diagnostic and Statistical Manual (DSM III; American Psychiatric Association [APA], 1980) as a category that contains subclasses characterized by distortions in the development of social skills, language, attention, perception, and motor skills. Included in this category are Infantile Autism, Childhood Onset Pervasive Developmental Disorder and Atypical Pervasive Developmental Disorder. In 1987, the APA incorporated the subclass of PDD-NOS

into the DSM III-R for children who do not exhibit the behaviors that characterize schizophrenia nor meet all of the criteria for infantile autism, but display a "...qualitative impairment in the development of reciprocal interaction and verbal and nonverbal communication..."

Although these children display the same uneven pattern of development as those with autism, they differ in several ways (Mesibov & Dawson, 1986). First, the age of onset is after rather than before thirty months. Second, social skills deficits are present but these children typically are responsiveness to initiations. Third, language impairment is less severe. And fourth, behavioral oddities (such as motor abnormalities) are more frequently exhibited.

Since the behaviors that characterize PDD-NOS and autism are not well defined, diagnosis is subjective and can be unreliable. For example, it is not uncommon for a child who is seen by different specialists to receive a diagnosis of PDD-NOS from one and a diagnosis of autism from others. As pointed out by Rutter and Schopler (1987), there is no recognizable separation point between autism between and similar disorders, such as PDD-NOS.

Autism

Description of Autism

As first described by Leo Kanner, autism is a syndrome that is characterized by social withdrawal, impaired or delayed

language acquisition and/or comprehension, sensory disturbances, stereotypic behaviors, resistance to changes in the environment, attention deficits, and an inability to develop age appropriate play behaviors (Kanner, 1943).

Among these characteristics, the most obvious deficiencies are lack of socialization and language development (Newsom & Rincover, 1989). Many children with autism often prefer to be alone for long periods of time and rarely show interest in others. They also can be unresponsive and may react to initiations from others by avoiding eye contact, crying, screaming, pulling away, and/or walking away (Schreibman, Koegel, & Koegel, 1989). People, including family members, are often viewed as objects or tools (Schreibman, Koegel, Charlop, & Egel, 1990). For example, a child with autism will grab the hand of an adult and walk toward a desired object. The child will then push the adult hand toward that object until the adult retrieves it for him/her. As a result of social withdrawal, these children are much less likely to develop meaningful relationships with others including parents and siblings.

Approximately half of these children do not expressively speak or use gestures, but rather communicate in aberrant ways (Newsom & Rincover, 1989). Tantrums, for example, are used to escape demand situations or obtain desired items. When speech develops, it is often qualitatively different from the speech of other

children. Differences include immediate echolalia, delayed echolalia, and pronomial reversal (Schreibman et al., 1989).

Schreibman (1988) describes two types of clinical onset. In one type, the characteristics mentioned above are displayed within the first several months of a child's life. In the second type, the child appears to be normally developing but then rapidly begins to lose previously acquired skills such as language and play behaviors. This deterioration usually occurs between the first and second year of life. By definition, age of onset must occur before 30 months.

In an epidemiological study conducted by Victor Lotter (1966) in the County of Middlesex, England, the prevalence of autism for children between 8 and 10 years of age was 4.5 per 10,000 births. Schreibman and Mills (1983) have suggested that the prevalence rate is between 3.1 and 5.0 per 10,000 births. Further data indicate that males are much more likely than females to have autism. Although Lotter's data indicated that males were two to three times more likely to have autism, Wing (1981) found a 15:1 male-female ratio.

Recent Theories of Etiology

Although the cause of autism has yet to be determined, evidence supports a biological etiology. Schreibman (1988) suggests that there is not one singular biological determinant but rather several contributing biological factors. Those include

difficulties with pregnancy and/or labor, genetic predisposition, neurological correlates, and biochemical processes. For each individual with autism, one or several of these factors may be involved in the development of the syndrome.

Several studies (Gillberg & Gillberg, 1983; Links, Stockwell, Abichandani, & Simeon, 1980) have suggested that children with autism have more prenatal complications than typical children. These complications include mothers' experiencing generalized edema, pre- or post-mature delivery, medication, and uterine bleeding during pregnancy. Increasing maternal age is also associated with an increased prevalence of autism.

Genetic factors may also contribute to the etiology of autism. Folstein and Rutter (1977) studied 21 sets of same sex monozygotic and same-sex dizygotic twins. In each set of twins at least one child was diagnosed as having autism. Results indicated that there was a much higher concordance for autism in the monozygotic twins. Bartak, Rutter and Cox (1975) sampled families and found speech delays in 25 percent of the parents and siblings of children with autism. These findings support a genetic influence in the development of autism.

Most of the attention in research on neurochemical factors has centered on the neurotransmitter serotonin (Schreibman, 1988). It has been found that mean serotonin levels were higher in approximately 40 percent of children with autism than in typical

children the same age (Mesibov & Dawson, 1986; Sahley & Panksepp, 1987; Schain & Freedman, 1961). Ritvo, Freeman, Geller, and Yuwiler (1983) administered the medication fenfluramine to outpatients with autism to determine its effects on serotonin levels. Results indicated that serotonin levels decreased 51 percent on average when the medication was taken. Furthermore, clinical improvements were observed while subjects were taking fenfluramine and a deterioration in behavior occurred when a placebo was administered in place of fenfluramine.

Recent evidence also suggests that people with autism may have structural abnormalities within the brain. Bauman and Kemper (1985) conducted a histoanatomic comparison of the brain of an adult who was autistic to that of an age- and sex-matched subject. Abnormalities were found in the forebrain of the subject with autism that included reduced neuronal size and increased cell packing; both abnormalities are indicative of an immature brain. Due to the limited sample size of this study, however, these results should be viewed with caution.

These studies represent advances in the understanding of autism as a biological syndrome. However, further research is needed to determine the precise etiology of the condition. Regardless of cause, however, considerable progress has been made in the treatment of people with autism. Much of the research in

this area of has focused on the analysis and remediation of social deficits.

The Social Behavior of Children with Developmental Delays

Social withdrawal during childhood is problematic since interactions between children provide a context in which other critical learning experiences occur (Powell, Salzberg, Rule, Levy & Itzkowitz, 1983). Strain and Odom (1986) point out that social interaction deficits, which are observed among all categories of developmentally delayed children, become more debilitating when left untreated. Furthermore, presence of these deficits during childhood is one of the most accurate predictors of significant adjustment difficulties during adulthood and tends to inhibit language development.

Key among the social skills of young children is their ability to play with other children. Limitations in play and other social skills can influence the extent to which children with developmental delays interact with their typical peers. Therefore, closely examining play behavior can be seen as a first step in understanding social acceptance in early childhood. Research in this area has emphasized both description and experimental analysis of the success of specific interventions.

Descriptive Studies

Recent observational studies in preschool settings have investigated what social behaviors will lead to acceptance and

friendship status with developmentally delayed and typical children (Strain, 1985). For example, Strain (1983) assessed the relationship between interactive play behaviors and sociometric ratings among 80 handicapped and nonhandicapped preschool children. Results indicated that more highly regarded handicapped children displayed specific behaviors such as play organizing, sharing, showing affection, and assisting others more frequently than handicapped peers who were not as highly rated. Furthermore, children who displayed negative social initiations were rated lower by their peers than those who did not.

In a subsequent study, Strain (1985) found that children with higher sociometric ratings were more responsive to social initiations by their peers. These children were also more likely to receive positive responses from their peers during interactions. Data also suggested that a number of nonsocial variables may influence how a child is rated: Physical attractiveness; toy play skills; athletic skills; and level of disruption (as evaluated by classroom teachers).

Tremblay, Strain, Hendrickson, and Shores (1981) produced a set of normative data that could be used to identify socially withdrawn children as well as assist in the selection of target behaviors for intervention. Sixty-one typical preschool children ranging in age from 3 years, 0 months to 5 years, 9 months were observed during six-minute daily samples. Based upon conditional

probability data, several approach behaviors were seen to most likely set the occasion for a positive response: rough and tumble play, sharing, play organizing, and assisting others.

These and other descriptive studies have led to a better understanding of what social behaviors displayed by children lead to acceptance by other children. As an extension of this work, a great deal of attention has been devoted to designing interventions that increase interactions between developmentally delayed and typical children.

Interventions Designed to Increase Interactions Between Typical and Developmentally Delayed Children

In addition to the observational research conducted in the area of social behavior, a great deal of attention has been given to techniques designed to increase interactions between children. One approach is teaching peers to initiate interactions and/or respond positively to teacher prompted interactions with developmentally delayed children (Brady, Shores, McEvoy, Ellis, & Fox, 1987; Gunter, Fox, Brady, Shores, & Cavanaugh; 1988; Hendrickson, Strain, Tremblay, & Shores, 1982a; McEvoy, Nordquist, Heckaman, Wehby, & Denny, 1988; McGee, Almeida, Sulzer-Azaroff & Feldman, in press; Odom, Hoyson, Jameson, & Strain, 1985; Odom & Strain, 1986; Ragland, Kerr, & Strain, 1978; Shafer, Egel, & Neef, 1984; Strain, 1985; Strain, Kerr, & Ragland, 1979; Strain & Odom, 1986).

In a follow-up to Tremblay et al. (1981), Hendrickson, et al. (1982a) assessed the effectiveness of teaching a typical peer how to use play organizing, sharing, and assisting with three of their socially withdrawn classmates. After being trained to use the three approach behaviors, the peer was requested to get one of the three targeted children to play with her using "asking", "sharing", and "helping". During five-minute sessions, the experimenter provided prompts to the peer when their interactions were absent for 15 seconds. Reinforcement in the form of edibles and star stickers were delivered to the peer following sessions and at the end of the day. The results suggested that this intervention was effective in increasing both the frequency of the typical peers' initiations and the frequency of positive responses to these initiations. However, a return to baseline demonstrated that the results achieved during the intervention condition were not maintained when experimenter prompts and reinforcement were withdrawn.

Brady et al. (1987) investigated the effects of a peer training procedure on the rates of interactions between typical children and those with autism. Nine typical peers were taught to initiate towards two target children by sharing materials, organizing activities and providing assistance. These peers were also trained to recognize and respond to initiations by the target children. For both target children, increases in the rates of their initiations to

trained peers were observed, while increases in the rates of initiations to untrained peers were observed in one of the target children. Additionally, increases in the rates of peer initiations towards both target children were observed during training, and follow-up data for one of the target children indicated that peer initiations were maintained above or at baseline levels. Due to a lack of across-peer generalization, follow-up data for the second target child were not taken.

Shafer et al. (1984) evaluated the efficacy of a peer-training strategy, consisting of direct prompting and modeling, on rates of interactions between children with autism and their typical peers. The results demonstrated that the direct prompting procedure produced an immediate increase in interactions between peer-trainers and their classmates with autism. Furthermore, increases in interaction rates were observed in a "generalization setting" after the training was implemented. Finally, untrained peers also began to interact more frequently with their classmates with autism.

In reviewing previous studies, Odom & Strain (1986) found peer initiation interventions effective in increasing the social responses of children with autism, but the initiations made by these children tended to remain at a low rate. Reinforcing a child with autism for engaging in positive interactions has also produced increases in interactions; however, it was noted that the delivery of

reinforcement abbreviated these interactions. Therefore, they designed a study comparing the effectiveness of two strategies in increasing reciprocal interactions: (1) A teacher-antecedent condition: The target child (i.e., child with autism) was prompted by the teacher to initiate interactions with a peer who had received training on how to appropriately respond to these initiations; and (2) A peer-initiation condition: Peers were trained, prompted, and reinforced for initiating interactions with target children. Results indicated that the peer-initiation strategy led to increases in responses by the autistic children; however the teacher-antecedent strategy led to increases in both responses and initiations by the target children.

Although these results suggest that a teacher-antecedent strategy may produce higher rates of initiations by the target children than the peer-initiation strategy, the teacher-antecedent strategy may also have limitations. As reported by Shafer et al. (1984), these strategies have a tendency to lead to frequent but brief social interactions which bear little resemblance to typical patterns of interactions between children. Furthermore, treatment gains often do not generalize to nontraining environments, nor have they tended to be maintained over time. Consequently, more naturalistic approaches to teaching are needed.

In an attempt to enhance generalization, several techniques designed to increase language have focused on use of the natural

environment for treatment. Included in these techniques is incidental teaching.

Incidental Teaching

Developed by Hart and Risley (1968) as a technique to facilitate language development, incidental teaching makes use of child initiations, response-produced reinforcement, and instruction in natural settings to teach typical and handicapped children a variety of skills (McGee, Krantz, & McClannahan, 1985). Teaching opportunities are maximized by arranging the natural environment to attract children to desired materials and activities. Access to these reinforcing materials is then made contingent upon the child emitting a desired response. To facilitate generalization, all teaching occurs within the daily routine of the child. For example, teaching colors may happen during a painting activity. When a child reaches for more paint, the teacher would request the child to name the desired color.

Incidental teaching procedures have been demonstrated effective in increasing the use of nouns, adjective-noun combinations, and compound sentences by disadvantaged preschoolers (Hart & Risley, 1968; Hart & Risley, 1974); and in increasing the use nouns and compound sentences directed to other children as well as teachers (Hart & Risley, 1975). In one of the first applications of incidental teaching among developmentally disabled children, McGee, Krantz, Mason, and McClannahan (1983)

used these techniques to teach receptive language skills to two children with autism. Four sets of objects used during daily lunch preparation were targeted. Results demonstrated that incidental teaching was an effective method of teaching children with autism receptive language skills. Not only did the children acquire these skills in the training environment, but generalization to an area outside of the training environment was observed.

In another study, McGee et al. (1985) compared incidental teaching and traditional teaching procedures. Three children with autism were taught expressive use of three prepositional pairs, with members of each pair being randomly assigned to one of the procedures. Although acquisition and retention of prepositional use was approximately equal for both procedures, the results suggested that incidental teaching produced greater generalization across settings, teachers, and positions of training stimuli.

In an extension of previous studies, McGee, Krantz, and McClannahan (1986) demonstrated that incidental teaching can be effective in teaching skills unrelated to communication. Two children with autism were taught to visually discriminate between written words using incidental teaching techniques. Both acquisition and generalization of sight-word responses were observed.

McGee et al. (in press) evaluated the use of peer incidental teaching as a strategy for increasing reciprocal interactions

between peers and children with autism. The experimenters trained the peer tutors to use incidental teaching with their classmates with autism by using instruction, modeling, assistance, and feedback, within a "free play" area. The three peer tutors ranged in age from 4 years, 5 months to 4 years, 11 months, while the three target participants ranged in age from 3 years, 7 months to 5 years, 11 months.

In early training sessions, the experimenter provided instruction and modeled the steps involved in incidental teaching for the typical children. As these children began to demonstrate mastery of these techniques, feedback conveyed by use of a checklist gradually replaced modeling. Experimenter mediation was systematically faded in two phases. In the first phase, the experimenter sat away from the children while in the same room. Prompts were delivered only when there was an absence of interactions for one minute. Occasional praise was also delivered when the children were interacting. In the second phase, the experimenter was not in the room with the children. To start these sessions, a classroom teacher delivered the toys and indirectly prompted the children to play together.

Results suggested that peer incidental teaching was effective in increasing reciprocal interactions between target children and their peers. Furthermore, adult supervision and assistance were successfully faded yet the treatment effects were maintained.

These and other studies have provided empirical evidence that incidental teaching techniques may not only lead to acquisition and retention of new skills, but also to generalization of these skills to non-training environments. As McGee et al. (in press) point out, incidental teaching procedures may facilitate generalization since training occurs in the context of environmental conditions under which the response will later be used. However, to provide supplementary support for the use of incidental teaching as a way to increase interactions between children, additional research in the form of direct and systematic replications is warranted.

Parent Training

In addition to involving trained peers in the treatment of children with developmental delays, training non-professionals who live in the home environment has become increasingly popular. Parent training, for example, is a technology with a relatively long history (Schreibman, 1988).

Koegel, Schreibman, Britten, Burke, & O'Neill (1982) compared parent training and direct treatment by trained clinicians. Results suggested that parent training produced as much initial and desirable improvement with 25 to 50 hours of training as 225 hours of direct clinical treatment.

One of the most significant advantages to parent training interventions is that parents can provide the child with a contiguous treatment environment. Treatment effects achieved in

other environments (i.e., schools, clinics) can then be supported at home. Therefore, parent involvement often leads to greater generalization across environments and people (Schreibman, Koegel, Mills, & Burke, 1984).

Sibling Interventions

Siblings, like parents, are a naturally present resource within the home (Weinrott, 1974). While parent training techniques have received increasing amounts of attention, comparatively little emphasis has been placed on training the siblings of developmentally delayed children.

Many studies also have focused on training typical children to implement task-specific behavioral techniques with their exceptional siblings (Cash & Evans, 1975; Colleti & Harris, 1977; Celiberti & Harris, 1990; Lobato & Tlaker, 1985; Miller & Cantwell, 1976; Schreibman, O'Neill, & Koegel, 1983; Swensen-Pierce, Kohl, & Egel, 1987). Beyond acquisition of new skills by the handicapped siblings, anecdotal reports suggest that this type of training may also benefit the typical siblings by teaching them ways to elicit positive responses from their siblings, thereby making interactions more reinforcing. For example, Schreibman et al. (1983) demonstrated that prior to the behavioral training intervention, most typical siblings in their study expressed neutral or occasionally negative comments about their handicapped siblings. Those comments, which were reported to the experimenters by the

parents, became more positive after the training. In a study by Miller & Cantwell (1976), it was reported that sibling training led to a decrease in family arguing and an increase in positive interactions between siblings. Swenson-Pierce et al. (1987) reported that, overall, the siblings indicated that they enjoyed participating in the study.

Although some anecdotal reports indicate that an important collateral effect of sibling training is increased interactions between siblings, only a few studies have systematically evaluated interventions primarily designed to increase these interactions.

James and Egel (1983) attempted to increase reciprocal interactions between handicapped children and typical siblings by use of a direct prompting and modeling strategy. In response to low rates of initiations by the target sibling, the experimenters also decided to train the typical siblings in incidental teaching techniques. Three sibling dyads served as subjects in this study, along with two typical peers who were not trained. Behavioral training consisted of modeling and practice with feedback. Reciprocal interactions were defined as one child's positive initiation followed by the partner's positive response within three seconds. Data taken indicated that baseline levels of reciprocal interactions were low (perhaps due to a long history of unreinforced initiations by the nonhandicapped siblings), however, implementation of the training package led to immediate increases

in all three dyads. These treatment effects generalized to larger play groups and across settings, and follow-up data taken six months later revealed that reciprocal interactions continued to occur at high rates. Furthermore, the typical peers increased levels of initiations towards the target siblings in the absence of direct training. Finally, the handicapped children increased initiations towards their siblings, but not towards the untrained typical peers. Since instruction in incidental teaching may lead to acquisition of skills that evoke initiations, lack of initiations towards typical peers may have been a result of peers being untrained in these techniques.

In another study, Powell et al. (1983) assessed the efficacy of a social interaction training package for parents in ways to increase interactions between their typical and developmentally disabled children. Participants in this study included four developmentally disabled children ranging in age from 4 years, 4 months to 9 years, 2 months, three typical siblings ranging in age from 4 years, 7 months to 6 years, and four mothers, all of whom had participated in earlier behavioral training programs. A multiple-baseline design across families was used to determine the effects of parent training on the interactions of sibling pairs. Following a baseline period, parents were requested to encourage their children to play together. No training or feedback was provided during this condition. Parents were then taught to

identify appropriate interactions, deliver reinforcement, prompt, and select toys and activities that would promote interactions. Some verbal feedback was also provided to the parents during this condition. Results indicated that parents in the study rarely used prompts and verbal praise before being trained. However, increases in the use of these skills were observed after the training was completed. As these increases occurred, so did play interactions between their children.

Celiberti and Harris (1990) evaluated a training package that was designed to increase cooperative play between children with autism and their typical siblings. Modeling, feedback, and reinforcement were used to teach typical children to deliver instructions, prompts, and reinforcement to their siblings with autism. Results indicated that introduction of the training package was associated with increases in the use of these skills by the typical children. Unfortunately, generalization of these skills to the home environment was not assessed. The question of whether or not acquisition of these skills led to increases in responding by the children with autism was also left unanswered.

Conclusions and Purpose Statement

In summary, one of the most significant deficits displayed by children with developmental delays is lack of social skills. Research designed to increase interactions between typical children and those with developmental delays has generated a host of

promising interventions. However, many of these interventions fail in the endeavor to obtain transfer of new skills to environments outside of the training environment.

One way to facilitate generalization is to use naturally maintaining contingencies during treatment (Stokes & Baer, 1977). Incidental teaching is a technique that makes use of these contingencies by requiring children to request an item before receiving it. Furthermore, the "loose structure" built into incidental techniques also promotes transfer (Schreibman, et al., 1990).

Another way to facilitate generalization is to train sufficient exemplars (Stokes & Baer, 1977). For example, the use of peers, parents, and siblings should assist in promoting transfer across people. Additionally, this strategy would provide continuity across treatment environments.

The purpose of the present study was to evaluate the efficacy of instructing children in incidental teaching techniques as a way to increase reciprocal interactions with their siblings with developmental delays. Modeling, feedback, and reinforcement were also included in the training package. Generalization of the training effects were assessed by taking probes in a home environment, and maintenance of treatment effects were measured by taking follow-up probes. This evaluation was completed by systematically replicating the procedures used by McGee et al. (in press).

The most basic difference between this study and that of James and Egel (1986) was that the latter used instruction in incidental teaching as only part of the training package; while incidental teaching was the sole focus of sibling training in the present study. Another important difference was that James and Egel (1986) involved two children with cerebral palsy and one mentally retarded child as subjects (conditions where social deficits may not necessarily be quite as severe), while the present study included one child with autism and one with PDD-NOS.

CHAPTER 2

METHOD

Participants

To recruit participants, Walden Learning Center family liaisons were asked to inform parents of developmentally delayed children about the study. Interested parents were requested to contact the experimenter, and two sets of parents wished to have their children participate. Prior to beginning, the parents were informed about the procedures and goals of the study and then invited to sign an informed consent form (see Appendix A).

Both children in Sibling Pair 1 were enrolled in an integrated preschool, the Walden Learning Center. The child with developmental delays (the target child) was a boy who was 2 years, 10 months at the onset of the study, and diagnosed as having autism by a psychologist with expertise in the area of developmental disabilities. He communicated with others through one- and two-word phrases such as "want help" and "more juice," as well as gestures and vocalizations. He also had the ability to verbally imitate others when prompted, although his speech was sometimes difficult to understand. The child demonstrated normal levels of engagement with toys appropriate for someone his age (such as trucks, musical instruments, bubbles), and appeared to enjoy attention from adults and other children.

Prior to and during the study, he had been exposed to the incidental teaching techniques that served as part of the curriculum of the Walden Learning Center. The parents also had been trained in incidental teaching techniques within the parent training program provided by the Center.

His sister was 3 years, 11 months at the onset of the study. As a student at the same program, she had been taught new words and sentence structures by teachers who were using incidental teaching techniques. She occasionally attempted to use incidental teaching with her brother and other children in the classroom before the study began.

In order for the children in Sibling Pair 2 to participate in this study, a weekly commute that lasted two hours each way was necessary. The target child in Sibling Pair 2 was a 4 year, 7 month old boy who was attending a different integrated preschool when the study began. A psychiatrist assigned him a diagnosis of pervasive developmental disorder (not otherwise specified). He used clear and complete sentences and enjoyed playing board games such as "Cooties", "Perfection!" and "Don't Break The Ice", as well as games that involved letters and numbers. Although he was sometimes socially withdrawn, he often sought adult attention.

His sister was 6 years, 9 months when the study began and attended the first grade. Throughout the study, the parents participated in the family program provided by the Walden

Learning Center. As part of this participation, they received training from a family staff person about how to use incidental teaching techniques.

Due to scheduling conflicts, only the mothers of the children were actively involved in this study. However, both fathers were interested in their children's progress and were periodically apprized of progress by the experimenter.

Settings

All training sessions occurred in the free play area of the Center. The Walden Learning Center is an integrated laboratory preschool that provides educational services to both typical children and those with autism. The classroom area was approximately 24 feet by 22 feet and consisted of three tables, 12 to 15 chairs, benches, shelving, and a variety of toys.

Apparatus and Materials

A videotape camera was used to record all sessions and probes. Sessions were scored by viewing videotapes using a video cassette player and a monitor. Materials used for sibling training included a small clipboard with performance feedback checklists. These checklists contained picture prompts of each incidental teaching step to be trained (McGee et al., in preparation). Rewards for the children, such as stickers and edibles, also were used.

Based upon completion of a toy preference assessment (Shafer et al., 1984), toys chosen by the children with

developmental delays were used during sessions (see Appendix B for toy preference assessment protocol). These were provided by the experimenter or the Center.

Games used during sessions contained multiple parts and typically called for interactions between players, such as turn-taking. These games included "Don't Break the Ice", "Perfection!", "Cooties", and "Big Mouth".

Research Personnel and Responsibilities

The experimenter was responsible for training the typical siblings in incidental teaching techniques, as well as delivering feedback and tangible rewards following the completion of a session. Additional responsibilities included scheduling and coordinating sessions, training undergraduate research assistants, scoring sessions, and conducting the toy preference assessments.

Two undergraduate research assistants (R.A.s) were responsible for taping and scoring the sessions. They also assisted with the toy preference assessments. The R.A.s were recruited from within a university psychology department through posted position announcements as well as announcements made by the experimenter in psychology classes. One R.A. was selected based on her experience with scoring data; the other as a function of her interest and knowledge in applied behavior analysis.

Observation and Measurement

The social interaction codes used in the study conducted by McGee et al. (in preparation) were also used to assess the levels of reciprocal interactions between sibling pairs in the present study (refer to Table 1 for response definitions). Adapted from observational systems used by Strain (1977) and Shafer et al. (1984), this system codes child responses into two general classes: (1) initiations; and (2) responses to initiations and/or responses. Initiations and responses were further scored as being emitted by the target or typical children. For ease of scoring, only the first instance of each response category was recorded during each interval. Reciprocal interactions were defined as one child's response to an initiation or response from the other child within three seconds, and further were scored as prompted or unprompted. Behaviors were further defined as being either positive or negative, and data on target child verbalizations were taken.

Five-minute videotaped sessions were conducted throughout all experimental conditions. In addition to these sessions, five-minute generalization probes were taken at least twice during each condition. These videotapes were then scored using a continuous 10-second partial interval recording system (Sulzer-Azaroff & Mayer, 1991). Sessions were divided into intervals by a computer generated timing program that produced audio cues every ten

Table 1. Response Definitions

Social Interactions-Response Definitions

Note: The following response definitions are applicable to children and adults. All responses are scored using a partial-interval time-sampling system.

Behavior	Definition
Initiations	Any behavior that has not been preceded, in previous 3 seconds, by a social interaction from the child to whom the initiation was directed.
Response	Any behavior that follows in close continuity (3 seconds) the initiation or response from the child to whom a response was directed.
Examples:	<p>All physical contact with another child while "physically oriented" to that child. Any waving, extension of arms towards other child; placing hands on any material or object being manipulated by other child.</p> <p>All verbalizations emitted while a child is directly facing other child or all vocalizations by virtue of content (e.g., proper name, "hey you") and accompanying motor-gestural movements (e.g.,</p>

Continued, next page

Table 1 continued

waving, pointing) that indicate the child is directing the utterance toward another child within or beyond three seconds.

Positive/Neutral

Examples:

Patting, hugging, kissing, holding hands with another child; all cooperative responses involved with sharing a toy or material. Touching another child.

All vocalizations directed to another child excluding negative vocalizations/verbalizations as described below (e.g., asking for a toy or for assistance in completing a task, verbal statement indicating affection, praise).

Negative Examples:

Hitting, pushing, kicking, sticking out tongue, taking unoffered objects, destroying others constructions; any movement/gesture that is directed towards another child and/or his/her activity that involves "intrusion" (e.g., non-cooperative) or taking over.

Screams, shouts, crying, calling another child an ugly name or other utterances that are accompanied by gestures that indicate rejecting, oppositional or aggressive behavior.

Continued, next page

Table 1 continued

Reciprocal Interactions	One child's response to an initiation or response from the other child within three seconds. Reciprocal interactions are scored as being prompted if there a direct prompt to interact from an adult in the preceding three seconds.
Target Verbalizations	Any audible words spoken by the target child. Words do not have to be meaningful or said in context, nor do they have to be clearly articulated. Vocalizations (e.g. screams without words, noises) are not scored as verbalizations.

seconds. Length of interactions was estimated by counting the number of consecutive intervals containing reciprocal interactions. To calculate mean length of reciprocal interactions, the number of consecutive intervals was then divided by the number of reciprocal interactions.

While videotaping sessions, R.A.s were instructed to remain as stationary as possible and stay approximately 20 feet away from both children. When it was not possible to include both children within the range of the camera, the R.A. followed the target child.

Observers were trained to score videotapes by reviewing the written description of the social interaction code, viewing and discussing videotapes with the experimenter, and scoring videotaped sessions. Before scoring experimental sessions, the observers obtained 80 percent indices of agreement with master test videos over three consecutive sessions. Subsequently, agreement data were taken for at least 25 percent of all sessions in each experimental condition.

Indices of agreement were calculated on an interval-by-interval basis, with agreement being defined as each observer circling the same responses on the data sheet during a particular interval. The following formula was used:

$$\frac{\text{Agreements}}{\text{Agreements} + \text{Disagreements}} \times 100 = \% \text{ of agreement}$$

Table 2 displays the data on interobserver agreement for child initiations and responses. Overall agreement for these responses ranged from 89.9% to 97.3%. As indicated in this table, indices of agreement on the occurrence of target child initiations was less than those observed in other response categories. This may be due to the low frequency of this response.

Table 3 shows interobserver agreement data for target child verbalizations, positive and negative responses, and prompted and unprompted reciprocal interactions. Total agreement for these responses ranged from 90.4% to 99.5%.

Experimental Design

A multiple-baseline design (Baer, Wolf & Risley, 1968) across sibling pairs was used to evaluate the effects of instruction in incidental teaching techniques, modeling, feedback, and reinforcement on the rates of interactions between target and typical siblings. The baseline condition for Sibling Pair 1 and Sibling Pair 2 lasted six and nine sessions, respectively.

Procedures

Training sessions were conducted after all other children had completed the school day and had exited the preschool upon (around 3 p.m.), or on weekends. Sometimes during sessions, Walden Learning Center staff were in the area performing general cleaning tasks.

Table 2. Mean Percentages of Interobserver Agreement for Initiations and Responses

	TARGET CHILD INITIATION			SIBLING RESPONSE			SIBLING INITIATION			TARGET CHILD RESPONSE		
	O	N	T	O	N	T	O	N	T	O	N	T
SIBLING PAIR 1	100	99.9	99.9	77.7	99.2	97.7	85.0	88.4	87.7	88.2	97.3	95.7
SIBLING PAIR 2	56.5	96.4	94.2	87.2	93.5	92.1	84.2	91.4	92.6	84.4	91.3	89.5
TOTAL	72.2	95.9	97.3	84.6	96.9	95.3	84.7	89.8	89.8	86.2	94.8	93.0

Note. O = Occurrence; N = Nonoccurrence; T = Total.

Table 3. Mean Percentages of Interobserver Agreement for Verbalizations, Positive and Negative Responses, and Prompted and Unprompted Interactions

	TARGET CHILD VERBALIZATIONS			POSITIVE/NEGATIVE RESPONSES	PROMPTED/ UNPROMPTED INTERACTIONS
	O	N	T		
SIBLING PAIR 1	89.0	95.1	94.2	99.0	81.4
SIBLING PAIR 2	95.7	84.9	89.7	100	96.9
TOTAL	93.6	91.7	92.2	99.5	90.4

Note. O = Occurrence; N = Nonoccurrence; T = Total.

Generalization probes for Sibling Pair 1 were conducted in an area of the participant's home where the children played. Since Sibling Pair 2 traveled approximately two hours to participate in this study (as well as the family program offered by the Walden Learning Center), generalization probes were taken at the home that the participant's visited while in Amherst. As with Sibling Pair 1, the probes occurred in a room where the children typically played.

Since the second sibling pair had a long commute, multiple sessions were conducted during each visit. Typically, three to four sessions separated by five to ten minute breaks were completed within a sixty minute period. Occasionally, when the mother of the first sibling pair had additional time, two to three sessions were completed within a forty minute period.

Baseline

Prior to the introduction of sibling training, the experimenter invited both children into the free play area. Once they entered, the experimenter introduced a basket of toys and asked the children to play together. At this point, the experimenter sat in the corner of the room while the research assistant began videotaping the session. The experimenter interacted with the children only when necessary to ensure that both were safe and remained in the area. If one initiated an interaction toward the experimenter, he

gave a brief positive response and gently redirected the child back to playing.

Sibling Training

Instruction of the sibling in incidental teaching occurred in the context of a tutorial session. As in baseline, the siblings were asked to go into the free play area and told that it was time to play together. Once the toys were introduced and the session began, the typical sibling was provided with as much instruction in and modeling of incidental teaching techniques as needed.

The following sequential components were emphasized during training: (1) Wait for your brother/sister to reach for a toy; (2) hold on to the toy and ask your brother/sister to tell you what the toy is; and (3) explain to your brother/ sister that he/she did a good job ("That's right. It is a bear." or "Good Job! You tried to say bear.") and give the toy to your brother/sister. To increase the likelihood of successful teaching, only words already known by the target child were prompted.

As the typical sibling began to demonstrate mastery of the teaching components, a checklist with picture prompts gradually replaced experimenter modeling (Appendix C displays the checklist). Once the checklist was introduced, it was used to provide performance feedback to the typical sibling. During training sessions, the experimenter would review the checklist with that sibling and place stickers next to each step completed

following teaching trials. Verbal praise also was delivered. Reviewing the checklist during sessions not only allowed for immediate feedback, but also built in a natural pause between teaching episodes.

Typical children also were trained to prompt their siblings to share toys and take turns. The experimenter first modeled how to retrieve toys from the target children during sessions by saying "It's my turn now." If the toy was not handed over within three seconds, the prompt would be repeated and the experimenter gently retrieved the toy. The experimenter then requested the typical children to follow these steps and assisted when necessary. Teaching this skill permitted an increased number of incidental teaching interactions, since the typical children retrieved a preferred toy from their siblings and then requested another response before returning the toy.

Following completion of each session, the experimenter sat down in the free play area and joined the sibling pair in a small snack and juice. The experimenter then discussed the session with the children. Feedback delivered at this time was positive and specific (making use of examples), and the checklists were once again reviewed. Stickers also were delivered to both children for participating in the session.

After the training phase began, the parents were requested to inform the experimenter of any attempts by the typical children

to use incidental teaching with their siblings outside of the training environment. The experimenter then casually mentioned what the parents had reported and praised the typical sibling ("I heard you were teaching Billy how to say 'apple' in the grocery store yesterday. That's great!").

Fading of Experimenter Mediation

In an attempt to promote generalization to the home environment, one of the parents was included in the sessions while the experimenter's involvement was systematically faded. In order for fading to begin, at least ten training sessions needed to be completed and a criterion of at least three consecutive sessions with unprompted reciprocal interactions occurring in 20% or more of intervals had to be met.

Fading 1. After introducing the toys, the experimenter moved to a corner of the room. He then provided either instructions to the typical sibling when more than 60 seconds had passed without an interaction occurring, or verbal praise when a reciprocal interaction occurred within that 60 second period. Only four such prompts or verbal praise statements were allowed. If the typical sibling looked at the experimenter seeking support or approval, the experimenter would nod and smile. The experimenter responded to initiations by either child in the same manner as during baseline. Use of the checklists and tangible rewards were discontinued. After each session, the experimenter

would provide a general praise statement to the children, such as "You both did great today. Good job."

Fading 2. After the established criterion was met for three consecutive sessions during the first fading condition, the second fading condition began. The experimenter did not provide instructions or praise during the session. Prior to the beginning of each session, the experimenter told the typical siblings that he was going to be busy and they should teach and play with their siblings. The experimenter then sat in the corner of the room and began to look at a book.

Fading 3. Prior to beginning this condition, the experimenter met with the mother and discussed the steps of incidental teaching as well as possible situations that might occur during the session and how they should be handled. The mothers then assumed the role previously played by the experimenter during sessions. Before each session, the experimenter and the mother discussed the best way for the her to prompt and reinforce interactions during sessions. She started the session by presenting the basket of toys to the children and saying, "Why don't you play with each other?" The mother was asked to remain in the room and interact with the children in the same way as the experimenter had in the first fading condition, while the experimenter observed through a one way mirror. Following each session, the experimenter met with the mother and provided her with positive feedback on her

performance as well as suggestions on what she might try during the next session.

Generalization Probes

As mentioned previously, five-minute generalization probes were conducted to assess whether increased rates of interactions between siblings were maintained outside the environment in which training occurred. During these probes, parents were requested to "act busy" while in the same room as the children. The experimenter was also present in the room. If one of the children approached a parent during the probe, the parent was asked to redirect the child back to playing.

Follow-up Probes

Following completion of the study, data were taken in the home of the first sibling pair at the end of one month, two months, and three months to determine whether increased rates of interactions were maintained over time. Due to equipment malfunctions and time constraints, only one such probe (at the end of the first month) was taken for the second sibling pair. These probes were conducted in the same way as the generalization probes and each lasted five minutes.

Social Validation

To measure consumer satisfaction (Wolf, 1978), parents were given a Likert scale questionnaire following the completion of their children's participation in the study. This questionnaire (see

Appendix D) was designed to assess the extent of change in the quantity and quality of interactions between the siblings as perceived by the parents. Also assessed was the parents' satisfaction with the study and its outcomes, as well as their opinions about the children's levels of enjoyment in participating in the study and the benefits the children received from this participation.

To assess the effects of the training package on the quality of interactions, a group of four people were invited to watch eight videotaped segments. Included in this group were two doctoral level psychologists, a doctoral level speech therapist, and a parent of both a typical child and a child with autism.

The videotaped segments were developed by dubbing the first two minutes of the first and last sessions in baseline and the second fading conditions onto different videotapes for both sibling pairs. These segments were then presented one at a time to each individual separately, and the sequence was altered to avoid an order effect. At the end of each segment, a Likert scale questionnaire (see Appendix E) was completed by each individual.

CHAPTER III

RESULTS

Session Data

Reciprocal Interactions

Figure 1 illustrates the total percentage of intervals with reciprocal interactions as well as the proportion of those that were unprompted. The introduction of the sibling training package was associated with increases in reciprocal interactions over baseline for both sibling pairs. Furthermore, those gains were maintained as feedback and tangible reinforcement were discontinued and experimenter prompting was systematically reduced during the first fading condition.

When experimenter mediation was eliminated during the second fading condition, rates of unprompted reciprocal interactions for Sibling Pair 1 decreased compared to those in the first fading condition. However, these rates were on average 17.7 percent higher than those observed during baseline. Use of a mean rate may be misleading due to the presence of a downward trend during the second fading condition. Nevertheless, there was still an average increase of 9.5 percent once the data stabilized during the last three sessions.

A decrease in unprompted reciprocal interactions was also observed in Sibling Pair 2. However, these data points fall within

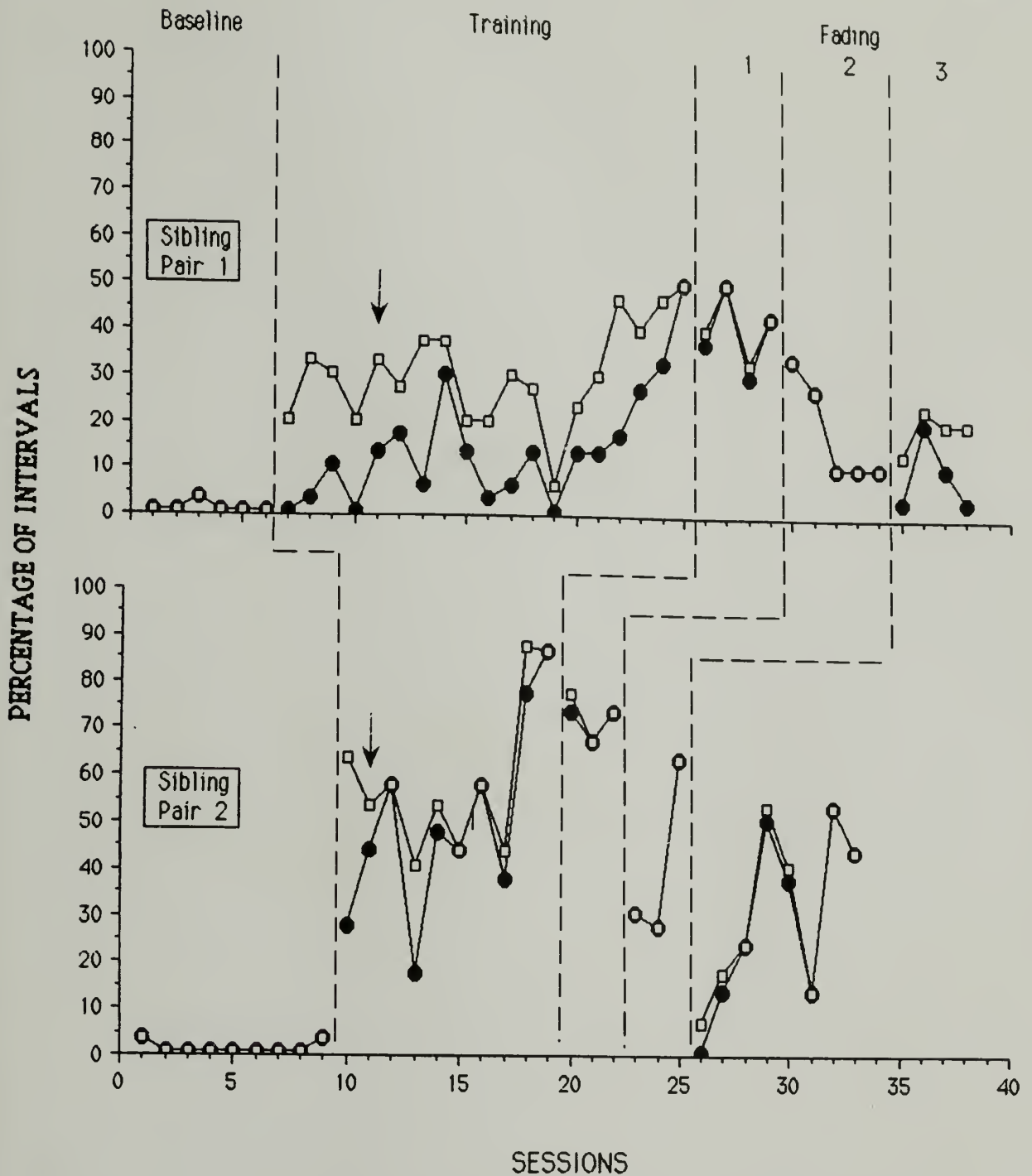


Figure 1. Percentage of Intervals with Reciprocal Interactions and Unprompted Reciprocal Interactions Per Session. Open Squares Represent Reciprocal Interactions; Closed Circles Represent Unprompted Reciprocal Interactions; Arrows Represent Introduction of Checklist.

the range of those observed during training and represent an average increase of 39.4 percent compared to baseline rates.

Rates of unprompted reciprocal interactions were reduced once the mothers were introduced during the third fading condition compared to the second fading condition. For Sibling Pair 1, unprompted reciprocal interactions decreased from an average of 9.0 percent in Fading 3 compared to an average of 18.2 percent in Fading 2. For Sibling Pair 2, rates of unprompted reciprocal interactions were also decreased (29.0 percent in Fading 3 compared to 40.0 percent in Fading 2).

Figure 1 also illustrates the difference between sibling pairs in the level of experimenter prompting required during sibling training. The typical child in Sibling Pair 1 seemed to rely on experimenter prompting throughout most of the training while the child in Sibling Pair 2 appeared relatively independent of prompts after the fifth training session.

Table 4 shows the mean percentages of reciprocal interactions, unprompted reciprocal interactions, and target child verbalizations per condition for each sibling pair. These data indicate substantial increases for all three measures during training and fading conditions compared to baseline for both pairs.

Target Child Verbalizations

As demonstrated in Table 4, introduction of the training package was correlated with increases in the percentage of

Table 5. Mean Percentage of Intervals During Generalization Probes

Condition	Sibling Pair 1			Sibling Pair 2		
	Reciprocal Interactions	Unprompted Reciprocal Interactions	Target Child Verbalizations	Reciprocal Interactions	Unprompted Reciprocal Interactions	Target Child Verbalizations
Baseline	0	0	0	1.0	1.0	13.0
Training	8.6	7.6	1.0	22.3	22.3	35.6
Fading	14.3	14.3	13.3	12.0	9.6	22.3
Follow-up	15.3	15.3	22.3	27.0	27.0	----

intervals with target child verbalizations compared to baseline rates for both sibling pairs. Figure 2 represents a further analysis of target child verbalizations. These data reveal that the target child in Sibling Pair 1 emitted verbalizations in only two of the intervals during baseline. Once sibling training began, however, mean rates remained above those seen in baseline during each subsequent condition. This same effect also was observed in Sibling Pair 2, although inspection of Figure 2 suggests an increasing trend during baseline.

Target Child Initiations

Figure 3 represents mean averages of target child initiations per condition for both target children. The target child in Sibling Pair 1 displayed no initiations toward his sister in baseline or in the last fading condition. However, increases were observed during training and in the first two fading conditions. The target child in Sibling Pair 2 exhibited substantially more initiations in training and fading conditions compared to baseline.

Interestingly, the trend in the data for target child initiations was completely different between sibling pairs as experimenter mediation was faded. After increases were observed following the beginning of sibling training, decreases were seen during fading for Sibling Pair 1 while increases occurred during the first two fading conditions for Sibling Pair 2. Once the mothers were introduced into sessions during the third fading condition, there were no

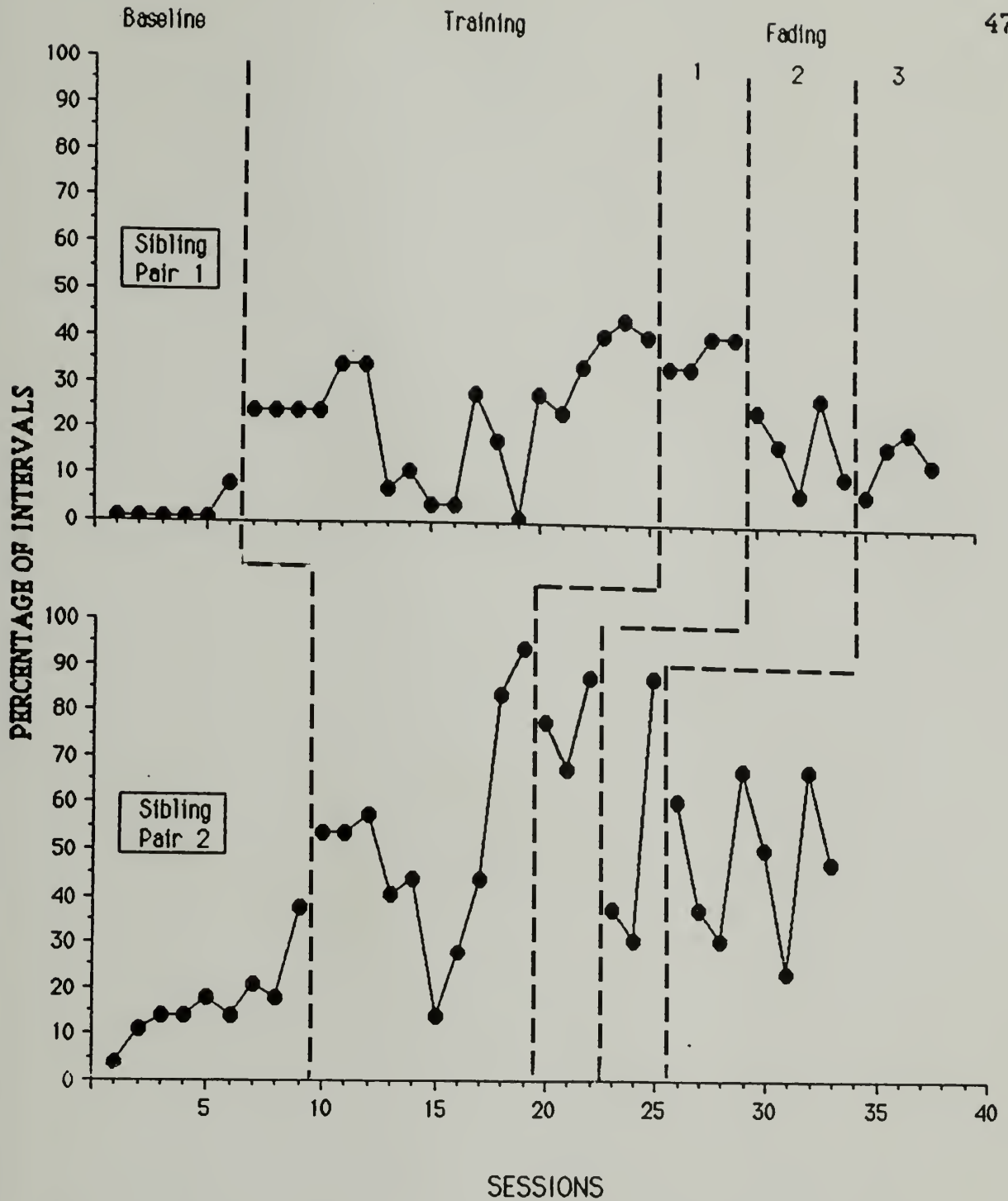


Figure 2. Percentage of Intervals with Target Child Verbalizations Per Session.

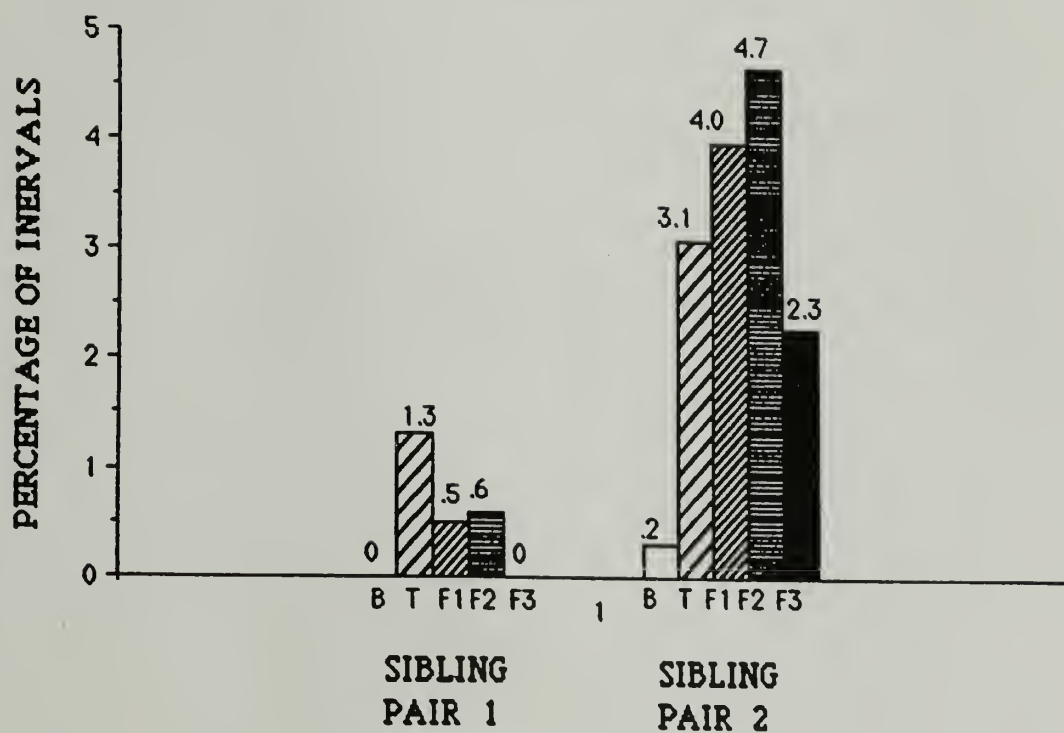


Figure 3. Mean Percentage of Intervals with a Target Child Initiation Per Condition During Sessions.

target child initiations observed in Sibling Pair 1 and rates dropped off sharply for Sibling Pair 2.

Length of Reciprocal Interactions

Figure 4 illustrates the mean length of reciprocal interactions during each condition for both sibling pairs. Mean length of interactions was a minimum of one interval during baseline for both pairs. However, there were increases in the mean length upon introduction of sibling training. Furthermore, these increases remained above baseline throughout fading conditions.

Positiveness of Responses

During experimental sessions, 87.8 percent of responses emitted by the target child in Sibling Pair 1 was scored as being positive, while 98.2 percent of his sister's responses were scored this way. The responses emitted by the target child in Sibling Pair 2 were scored positive 99.1 percent of the time, while his sister's responses were all judged to be positive. There did not appear to be any meaningful differences in positive responding across conditions for any of the children.

Generalization Data

Unprompted Reciprocal Interactions

Figure 5 represents the percentage of intervals with unprompted reciprocal interactions during generalization probes. As these data indicate, there were increases in rates of unprompted interactions in the home environment once sibling

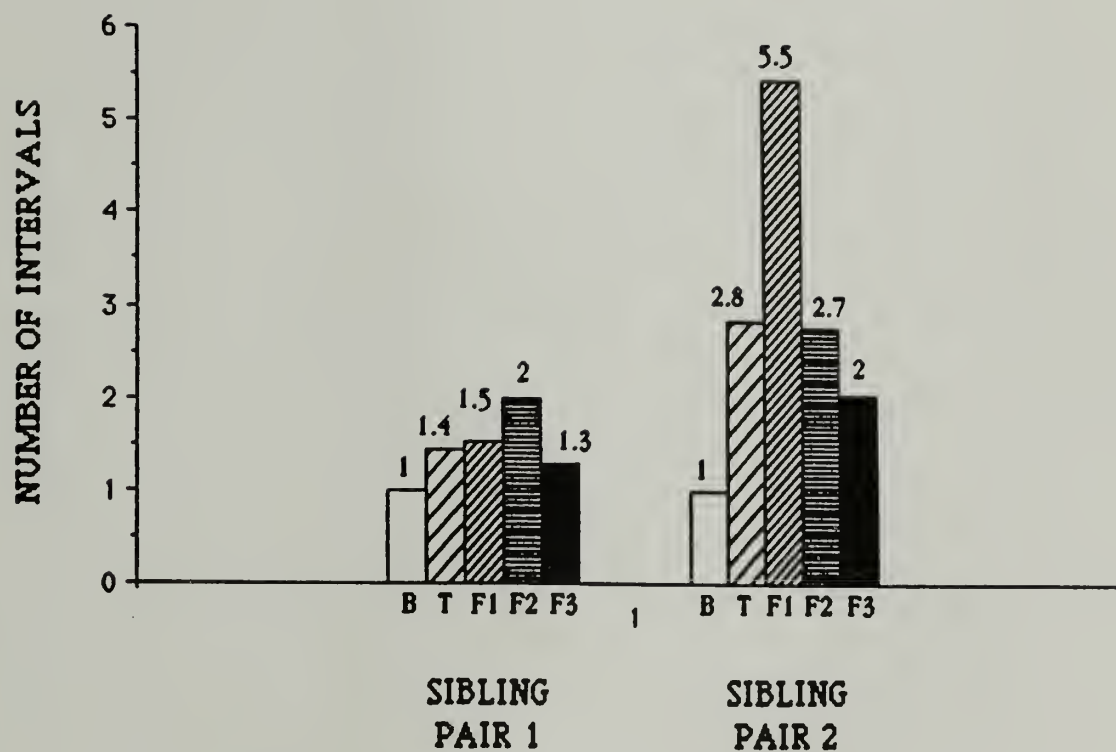


Figure 4. Mean Length of Consecutive Intervals with Reciprocal Interactions Per Condition During Sessions.

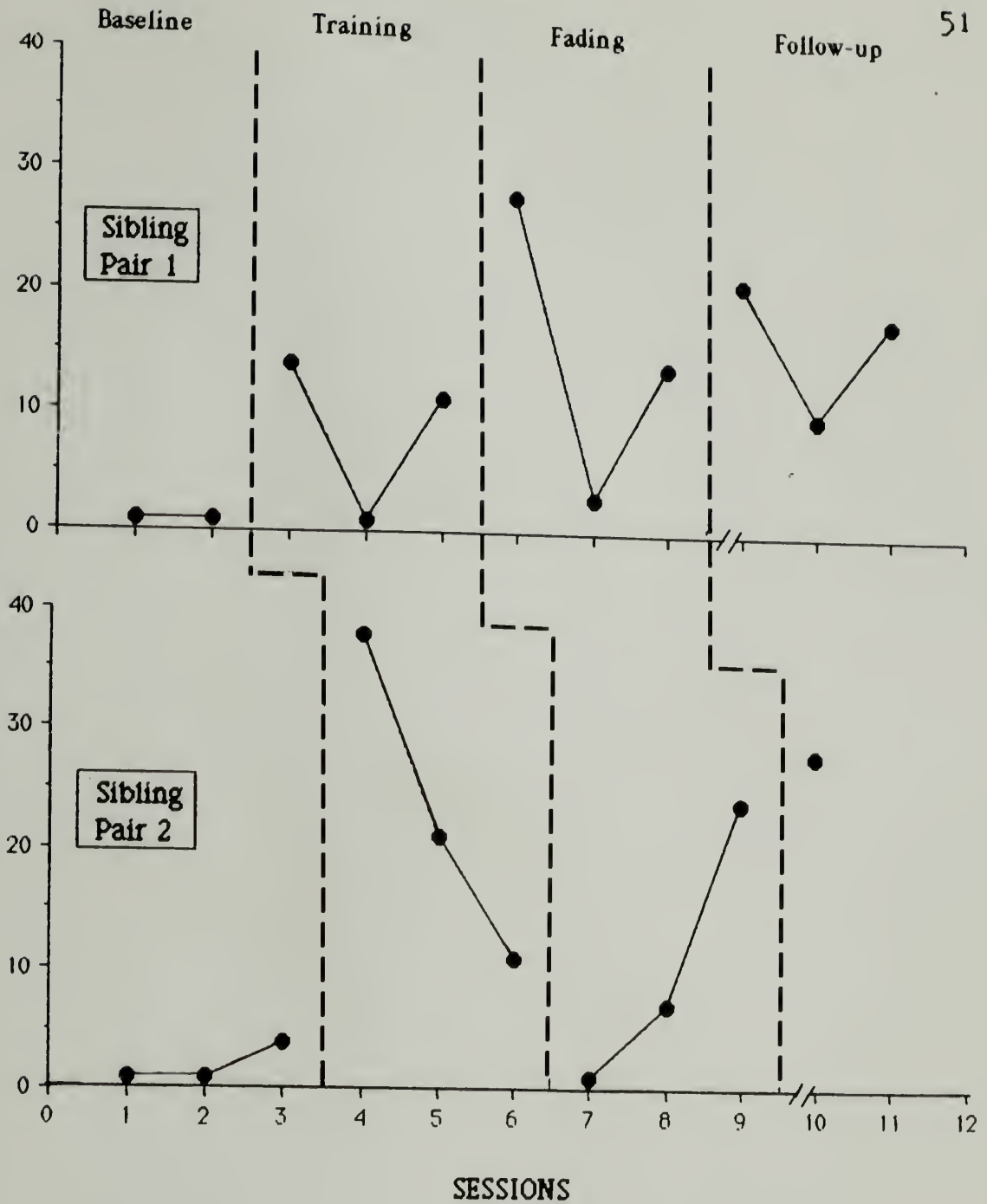


Figure 5. Percentage of Intervals with Unprompted Reciprocal Interactions During Generalization Probes.

training began. Additionally, these increases were maintained as experimenter mediation was faded during experimental sessions, as well as during follow-up probes.

A further analysis of these data is presented in Table 5, which displays mean percentage of intervals per condition. Also presented are mean percentages for total reciprocal interactions and target child verbalizations. As these data illustrate, unprompted reciprocal interactions on average remained well above baseline rates during training, fading and follow up probes.

Target Child Verbalizations

As mentioned, Table 5 presents data on the mean percentage of intervals with target child verbalizations during generalization probes. On average, rates of verbalizations remained higher than those in baseline once sibling training was implemented in experimental sessions. These rates continued to be higher during fading conditions.

Positiveness of Responses

During generalization probes, 88.0 percent of the responses displayed by the target child in Sibling Pair 1 were scored as being positive, while 100 percent of his sister's responses were judged this way. In Sibling Pair 2, 80.0 percent of the responses emitted by the target child were judged positive while 100 percent of his sister's responses were scored this way.

Table 4. Mean Percentage of Intervals During Experimental Sessions

Condition	Sibling Pair 1			Sibling Pair 2		
	Reciprocal Interactions	Unprompted Reciprocal Interactions	Target Child Verbalizations	Reciprocal Interactions	Unprompted Reciprocal Interactions	Target Child Verbalizations
Baseline	0.5	0.5	1.1	0.6	0.6	15.8
Training	28.4	14.8	22.6	58.2	49.1	50.5
Fading 1	41.5	40.0	31.5	72.3	72.3	77.0
Fading 2	18.2	18.2	16.8	40.0	40.0	51.3
Fading 3	19.0	9.0	14.0	31.0	29.0	47.6

For both target children, all negative responses were observed in probes taken during sibling training. It is possible that some of the responding may have been related to the typical children still not being fully training in incidental teaching techniques.

CHAPTER IV

DISCUSSION

Results suggest that this study was successful in attempting to systematically replicate the effects achieved in McGee et al. (in press). Introduction of the sibling training package was associated with increases in the percentage of intervals with unprompted interactions for both sibling pairs. Furthermore, increases were observed in rates of target child verbalizations and initiations, as well as length of reciprocal interactions.

To assess whether rates of reciprocal interactions were brought up to acceptable levels, it would be necessary to compare these rates to those of typical sibling pairs. Unfortunately, it does not appear that comparable normative data has been collected. However, McGee et al. (in press) collected normative data on reciprocal interactions between preschool peers in unstructured free-play sessions. These data reveal that the mean percentage of intervals with reciprocal interactions ranged from 14 percent to 35 percent across five children. When comparing these data to the data collected in this second fading condition of the present study (which can also be described as an unstructured free-play situation), the mean percentage of intervals with reciprocal interactions for Sibling Pair 1 fall into the normative range (at 18.2 percent) while the mean for Sibling Pair 2 exceeds this range (at

40.0 percent). This is particularly encouraging since one might expect normative data on peer interactions to be somewhat higher than normative sibling data.

Along with increases in interactions, increases in the rates of target child verbalizations were also observed for both sibling pairs once sibling training was introduced. Although verbalizations were not the primary dependent variable, this effect was very important since expressive language plays a significant role in social interactions. These results were anticipated because incidental teaching is a technique that was designed to increase the expressive language of children.

Another anticipated effect when using incidental teaching is an increase in target child initiations. Although results suggest that this effect was observed in the present study, increases in target child initiations for Sibling Pair 1 seemed relatively minimal compared to those observed in Sibling Pair 2. There are at least two possible explanations for this difference. First, the typical child in Sibling Pair 1 often prompted before an initiation from her brother could occur. And second, as training continued, she began to show her brother toys to elicit an initiation. Once he reached for the toy she was holding, she would prompt for a response. Showing a toy to the target child constituted a sibling initiation according to the observation system. However, some would consider the target child reaching for the toy to be the initiation in

this type of interaction. Therefore, the small percentage of target child initiations scored for Sibling Pair 1 may have been caused in part by a limitation in the observation system.

Increases in the mean length of reciprocal interactions also were observed for both pairs once sibling training began. As with target child initiations, however, relatively large differences in these data were observed between sibling pairs (length of interactions was higher for Sibling Pair 2).

Data taken during the first fading condition revealed that gains achieved during sibling training were maintained substantially above baseline rates on average. Examination of baseline and Fading 2 data may offer a pre- and post-training comparison since there is only a temporal difference between the two conditions. This examination indicates that rates of all dependent variables were higher on average in the second fading condition compared to baseline, although gains were not typically maintained at the levels found in the first fading condition.

It is likely that naturally reinforcing contingencies are in large part responsible for rates of reciprocal interactions remaining above baseline in the second fading condition. For example, a natural outcome of the typical children being trained to use incidental teaching techniques was that they now had a way to elicit verbal responses from their brothers. Training also led to increases in initiations from the target children to their typical

siblings, which were essentially absent during baseline. One might speculate that these increases were due to the typical children becoming discriminative stimuli for access to desirable toys.

Maintenance may have also been facilitated by systematically fading experimenter mediation. Research in the area of peer interactions has demonstrated that rates of interactions return to baseline levels following abrupt removal of interventions (Nordquist & Bradley, 1973; Strain, Shores, & Kerr, 1976). However, Fox, Shores, Lindeman, and Strain (1986) demonstrated that a response dependent fading procedure could enhance maintenance. In the Fox et al. study, the experimenter first abruptly removed teacher prompts and praise and found that rates of interactions returned to those observed in baseline. After the return to baseline, the experimenters then reinstituted the intervention until interaction rates returned to levels achieved during the first training phase. A response dependent fading tactic was then employed. This procedure led to maintenance of interactions above those in baseline while teacher mediations was reduced and eventually withdrawn.

Along with maintenance of treatment gains, generalization of these gains to a non-training environment was observed. Data taken on probes conducted in the participants' homes indicate that rates of reciprocal interactions and target child verbalizations

during training and fading conditions remained above baseline rates, on average.

Several factors may have been responsible for the transfer of treatment effects to the home environment. One may have been the use of naturally maintaining contingencies and "loose structure" (Stokes & Baer, 1977), both of which are built into incidental teaching techniques. As mentioned previously, the mothers were asked to inform the experimenter of any teaching episodes that occurred outside of the training environment. The experimenter would then praise the typical child for using incidental teaching with her sibling. This type of delayed reinforcement may have influenced rates of unprompted reciprocal interactions observed during probes.

Another factor that may have facilitated generalization was that parents were previously trained to use incidental teaching techniques. Therefore, incidental teaching was probably occurring in the home prior to beginning the study and the typical siblings represented another exemplar in that environment.

The presence of the mothers in the experimental sessions during the third fading condition may have assisted transfer in two ways. First, the mothers received instructions and feedback on how to set up a sibling incidental teaching session, how and when to provide prompting, and how to shape and reinforce appropriate responses from the children. It is possible that the mothers used

these new skills in their homes since their concerns over lack of interactions between their children is what prompted their involvement in this study. And second, the mothers may have acquired some discriminative stimulus properties for sibling interactions when running experimental sessions.

Although presence of the mothers in sessions may have facilitated generalization, it is noteworthy to point out that rates of unprompted reciprocal interactions were on average less during Fading 3 (when mothers were present) than in Fading 2 for both sibling pairs. This effect, however, appears consistent with research in the area of sibling interaction patterns. For example, Corter, Abramovitch, and Pepler (1983) found that the overall levels of sibling interactions were reduced when the mothers of children were present. Additionally, data revealed that interactions tended to be more negative in nature in the presence of mothers. The latter effect was not observed in this study.

These and other variables potentially led to transfer of training effects to the home environment. When conducting any type of training, transfer of learned skills to the appropriate environments is the ultimate goal. However, unless these behaviors are maintained over time in these environments, training cannot be considered successful. Therefore, collecting follow-up measures is essential in assessing the long-term effects of a training program.

Results of the follow-up measures taken during this study reveal that rates of reciprocal interactions were maintained above those observed in baseline for both sibling pairs. Interestingly, rates of interactions during follow-up probes were also above those observed in other generalization conditions for the first sibling pair. Although the one follow-up probe taken for the second sibling pair was above other condition means, additional follow-up data is needed before any conclusions can be made.

As discussed, it is crucial to take generalization and maintenance measures when evaluating the effects of any procedure. Another way to evaluate treatment effects would be to solicit the opinions of those directly involved in the procedure. Therefore, the experimenter asked the mothers to complete a Likert-scale questionnaire in an attempt to assess social validity.

Results of this assessment indicate that the mothers were pleased with the outcomes of this study. They both believed that the children benefited from participating and were interacting more frequently compared to before the study began. Furthermore, they felt the quality of interactions between their children had improved and indicated that they would recommend this intervention to other parents with similar concerns.

Soliciting the opinions of people with knowledge in the area of study is another way to subjectively assess the effects of the procedure. Therefore, a group of four people (two doctoral level

psychologists, one speech pathologist, and a parent of both a typical and handicapped child) were asked to view samples from pre- (i.e., baseline) and post-training (i.e. Fading 2) tapes. After watching each tape, they were asked to complete a Likert-scale questionnaire designed to assess the quality of interactions between sibling pairs. Raters compared the interactions to those of typical siblings of similar ages in terms of frequency, length, reciprocity, and positiveness.

The outcomes of this questionnaire suggested that the quality of interactions was higher during the second fading condition compared to baseline for both sibling pairs. Mean ratings on frequency, length, reciprocity, and positiveness of interactions were "below average" for both sibling pairs during baseline samples. During the second fading condition, however, mean ratings of "average" or "slightly above average" were found for all four categories.

Although results suggest that this intervention was successful in the attempt to increase interactions between siblings, it has several limitations. One was the amount of variability observed in the data, not only between sibling pairs, but also within each pair.

It is likely that some of the variability in the data across sibling pairs was due to developmental differences between the two typical children (the child in Sibling Pair 1 was 3 years 11

months at the onset of the study compared to the child in Sibling Pair 2, who was 6 years, 9 months).

One way these differences may have been manifested behaviorally was that the typical child in Sibling Pair 1 appeared more dependent on tangible rewards, instructions, and prompts. For example, she would often ask the experimenter about stickers and juice before and during sessions. She would also occasionally refuse to give up a toy after an appropriate verbal response from her brother. Furthermore, she had difficulty waiting for an initiation from her brother before delivering a prompt, and often prompted for toys that she was interested in rather than following her brother's preferences.

In contrast, the typical child in Sibling Pair 2 became relatively independent of experimenter instruction and prompts by the fifth training session. She also took a more active role in deciding the goals of teaching sessions. For example, she informed the experimenter that her brother needed to say "thank you" and "please" more frequently and asked if she could teach him to do so during sessions. She was also curious about the overall goals of the study, and frequently asked questions about the procedure.

Another possible source of variability in data between sibling pairs would be differences between the two target children. As with the typical children, there was also a difference in the ages of the target child (the child in Sibling Pair 1 was 2 years 10

months at the onset of the study, while the child in Sibling Pair 2 was 4 years, 7 months).

Another important and likely related difference was in the area of expressive language skills. The target child in the first pair typically expressed himself by labelling objects or using "I want..." sentences. In comparison, the child in the second pair was able to participate in interactions by requesting items, asking questions, and making comments. Thus, this difference could substantially influence the length of reciprocal interactions as well as rates of verbalizations.

A difference in the toy preferences of the target children may also have led to different results between sibling pairs. For example, the target child in Sibling Pair 1 enjoyed mostly playing with one-piece toys, such as trucks, dinosaurs, musical instruments, and bubble pipes.

The child in Sibling Pair 2, however, often wanted to play games with multiple pieces. This allowed for more teaching opportunities since there was a continuous need to request another piece. These games also required turn-taking between siblings, which also led to additional interactions. One game that was found to be particularly effective in promoting reciprocal interactions with Sibling Pair 2 was "Don't Break the Ice". During sessions, the typical child would hold the ice cubes while her brother was putting the cubes together in a frame. After putting an ice cube in

the frame, he would request another. Once all of the pieces were in the frame, they would take turns playing the game. "Perfection!" was another game that allowed for continuous interactions, as well as the teaching of shapes.

Therefore, it appears that toy preferences influenced the frequency and length of interactions, as well as probably impacting on the frequency of verbalizations and target child initiations. Shifts in toy preference also could have influenced the rates of these measures. For example, the preferences for the target child in the second pair were relatively stable. However, the preferences of the child in the first pair changed frequently; often several times in a session. This led to loss of reinforcer control as he sometimes became satiated within a session, which resulted in much fewer teaching opportunities.

Although two toy preference assessments were completed (one in baseline and one in training), the above discussed problem points out the importance of assessing toy preference immediately before each session. Dyer (1987) systematically demonstrated the need for frequent toy preference assessment assessments by comparing the rates of spontaneous speech with preferred versus nonpreferred materials. Results indicated the rates of speech were higher when a preference assessment was conducted prior to the start of a session.

In addition to variability of results between sibling pairs, there was also variability in data within both sibling pairs, probably caused by uncontrolled variables. For example, setting factors such as interactions between children or between the children and their parents prior to a session or probe would likely affect rates of interactions (Sulzer-Azaroff & Mayer, 1991; Wahler & Fox, 1981).

Another uncontrolled factor that may influence variability would be the presence of establishing operations, such as hunger and fatigue (Sulzer-Azaroff & Mayer, 1991). For example, the effects of the two-hour commute on Sibling Pair 2 likely influenced rates of interactions during sessions and probes.

As discussed earlier, the characteristics of the toys used in sessions appear to influence rates of interactions. Therefore, use of different toys from session to session (or within sessions) might have led to some variability in the data.

Distractions during sessions and probes may have also impacted on the data. For example staff occasionally walked in and out of the room where sessions were taking place. Some stayed in the room cleaning, while others sometimes came in to ask the experimenter a question. During generalization probes with Sibling Pair 2, the presence of a close friend of the typical child within the same house also seemed to serve as a distraction (especially since they were only able to visit with each other once a week).

Another possible confound might have been the mothers intermittent inconsistency in following the requests of the experimenter, especially during generalization probes and the third fading condition. For example, one mother would occasionally attempt to prompt interactions during generalization probes. In one of the sessions during Fading 3, one mother spent a majority of time conversing with her children rather than providing brief prompts or praise statements.

Although these types of variables are not always under the control of the experimenter, several steps could have been taken to minimize their impact on the data. For example, sessions could have been scheduled earlier in the day after a snack or meal. This step could have limited the influence of establishing operations. Sessions and probes could have also been scheduled at a time when others not involved in the study were not present, thereby reducing the possibility of outside distractions. To increase the consistency of the mothers following protocols, a checklist could have been developed that allowed for task clarification and a more formal way to deliver feedback to the mothers.

Taking the above precautions hopefully would lead to a reduction in the variability of data observed in this study. Another step that probably should have been taken prior to the beginning was the development of a screening tool to assess whether the

participation of a child with autism would be appropriate in this study.

Development of a screening assessment occurred when a third sibling pair's participation was determined inappropriate after two training sessions. During these training sessions, it became evident that the target child would not be receptive to incidental teaching as he would run in the opposite direction if the experimenter and/or his brother approached him. Furthermore, his levels of engagement with toys were very low, leaving few opportunities for incidental teaching.

Based on this experience, the experimenter developed a screening tool to be used with potential participants. This involved the experimenter attempting to elicit ten appropriate verbal responses from a target child within 15 minutes using incidental teaching. The criterion for involvement in the study was seven appropriate responses out of ten trials. The rationale was based on the belief that if the experimenter was unable to produce reliable responding from the target child, it would not be reasonable to expect his or her sibling to do so.

To test the validity of this assessment, the experimenter administered it in a post-hoc fashion to the target children involved in the study as well as the third target child. Results of these administrations demonstrated some evidence of validity as

the first two target children easily met criterion, while the third did not.

Since this assessment appeared to be valid, it was used with an additional child. Unfortunately, this child did not meet criterion. Therefore, only two sibling pairs participated.

The inclusion of only two sibling pairs posed problems with use of a multiple-baseline design. As Sulzer-Azaroff and Mayer (1991) point out, this design makes use of baselines that differ in length. By doing this, history, maturation, reactions to being measured, and other time-dependent extraneous variables are hopefully controlled. Traditionally, the multiple-baseline design is used across at least three subjects (or pairs of subjects). With only two, the power of this design was diminished.

Although the present study had some limitations, it demonstrated the utility of incidental teaching in increasing reciprocal interactions between typical and handicapped children. However, extensions of this research are needed to develop a more refined training methodology: One might be to examine generalization issues more closely. For example, it would be important to analyze the effects of training locations on generalization. Training conducted in a school setting could be compared to training completed in the homes of the participants. Generalization could then be measured by taking probes in a different room of the house.

It also would be interesting to have the parents run training sessions throughout the course of the study. The experimenter's role would be to train the parents how to run sessions and provide feedback on their performance. Ideally, sessions would occur in the home and, as above, generalizations probes would be taken in a different room.

Related to generalization issues would be factors that influence maintenance. A closer examination of the factors that influence maintenance would appear critical. One aspect that could be analyzed would be the manner in which reinforcement contingencies are faded.

As Fox et al. (1986) demonstrated, an appropriate fading procedure is crucial in maintaining treatment gains. During the present study, reinforcement was faded relatively rapidly. It may have proved helpful to fade reinforcement more gradually, perhaps removing only one class of reinforcers at a time. Fading, when done in this manner, should enhance maintenance of treatment effects.

Although some research has been conducted (Hendrickson, Strain, Tremblay, & Shores, 1982; Hulston, 1980; Levine & McColoum, 1983), additional research on the relationship between toy characteristics and rates of interactions is needed. An important question would be to what extent does the nature of the toys and games used during sessions affect rates of interactions.

This question may be answered by systematically manipulating the types of toys during sessions while other variables are held constant. One might speculate that games with multiple parts that call for turn-taking would lead to more interactions compared to one piece toys. Since there were many factors that influence the rates of interactions in this study, however, it would not be possible to determine the impact of toy characteristics.

There is also a need to collect normative data on the reciprocity of sibling interactions. Without this normative data, it was difficult to determine what rates of interactions between siblings in the present study would be acceptable. Peer interaction data was used in the absence of sibling interaction data, however, it is expected that peer interactional patterns may be quite different. For example, in a free play situation peers are free to interact with whomever they choose; siblings do not have this choice. Furthermore, siblings typically spend more time together than peers and may often compete for the attention of their parents rather than interacting together. These and other differences indicate that use of normative peer data should be done with caution when evaluating sibling interactions.

In conclusion, results of the present study indicate that introduction of the sibling training package was associated with increased rates of unprompted reciprocal interactions and increases in verbalizations by the target children. Furthermore,

these rates were maintained above those observed in baseline as experimenter mediation was faded. Probes taken in the participants' homes indicated that the effects of the intervention transferred to a non-training environment. And finally, the parents of the children indicated that they were satisfied with the outcomes of the study.

Although the implementation of this intervention led to positive results, much research that still needs to be conducted on this topic. A more thorough examination of the variables that influence the maintenance and generalization of treatment effects would be very useful. Furthermore, it would be helpful to assess what types of toys lead to increased interactions between handicapped and typical siblings and peers. Finally, different types of techniques designed to increase interactions between handicapped and nonhandicapped siblings deserves exploration.

APPENDICES

APPENDIX A

INFORMED CONSENT FORM

The goal of this study is to increase interactions between children with autism and their typical siblings. This goal was chosen for the following reasons: (1) autism is a condition that is characterized by social withdrawal, (2) this withdrawal is especially problematic since interactions between children provide the context in which either critical learning experiences occur, and (3) most children spend a great deal of time interacting with their siblings and learn from these interactions.

This study is designed to determine whether instructing a typical child how to use incidental teaching with their sibling with autism will increase interactions between the sibling pair. Incidental teaching is a technique that is used to facilitate language development and involved four steps (1) Wait for a child to reach for a toy, (2) hold on to the toy and ask the child to tell you what it is, and (3) verbally praise the child and explain to him/her why their response was correct, then give him/her the toy.

During the study, your children will be videotaped as they play together. These videotaped sessions will last five minutes each and will mostly occur at Walden Learning Center, although some sessions will occur at your home. Near the end of the study, parents will be instructed on how to best promote interactions between their children. One of the parents will then be requested to participate in several sessions at the Walden Learning Center. I will be responsible for scheduling home sessions at a mutually convenient time, however you will be responsible for transporting your children to Walden.

If you consent to allow your children to participate in this study, a summary of the study will be given to you upon its completion. Data from the study will be used partially to fulfill my graduate school requirements and may be used for publication in professional journals and/or for presentation at professional conferences. Neither the participants' names nor identifying characteristics will be made public from this study.

Your children's participation in this study is completely voluntary and may be withdrawn at any time during the study. For each sibling pair, participation should last approximately three to four months. In addition to this time, one session per month for three consecutive months will occur at your home after the study has been completed. These sessions will help determine if interactions between your children are being maintained.

If you have any questions, please feel free to call me at one of the phone numbers provided below. Thank you for your cooperation.

Todd A. Harris

Psychology Department

University of Massachusetts

Amherst, MA 01003

(413) 545-5956 (office)

(413) 259-1812

I have read the above and agree to allow my children to participate in this study. I understand that I may withdraw my children from the study at any time.

Todd A. Harris

(413) 545-5956

name

signature

date

name

signature

date

APPENDIX B
TOY PREFERENCE ASSESSMENT

To complete the toy preference assessment, follow these steps:

- (1) In the free play area, place a variety of toys and games out on several tables.
- (2) Bring the child into the room and inform him/her that he/she may play with any of the toys in the room.
- (3) Then begin to write down the order of the toys with which the child plays for the next ten minutes. In order for a toy to be considered "played with," the child must hold onto and look at the toy for a minimum of five seconds.
- (4) If a child plays with a toy for longer than two minutes, inform the child that the toy has to be put away for awhile. Then gently retrieve the toy and place it out of the child's reach. (Please note what toys have to be retrieved on the data sheet.)

APPENDIX C
INCIDENTAL TEACHING CHECKLIST

Wait



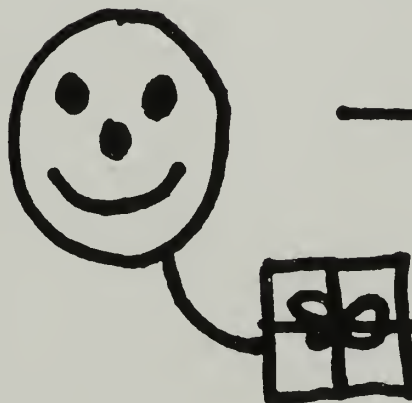
—

Ask



—

Give toy
and
Say
"Good job!"



—

APPENDIX D

SOCIAL VALIDATION QUESTIONNAIRE FOR PARENTS

This questionnaire is designed to measure the extent of change in the quantity and quality of interactions between your children during their involvement in this study. Your feedback will also be used as a guide in future clinical applications of this procedure. Please circle the number that most closely corresponds to your answer for each question. Upon completion, the questionnaire can be placed in the stamped envelope provided and mailed to me. It is not necessary to provide your name on this form. Thank you so much for your time and cooperation.

1. Interactions between my children increased during their participation in this study.

1	2	3	4	5
strongly disagree	somewhat disagree	I don't know	somewhat agree	strongly agree

2. Interactions between my children improved qualitatively during their participation in this study.

1	2	3	4	5
strongly disagree	somewhat disagree	I don't know	somewhat agree	strongly agree

3. I feel that my children benefited from participation in this study.

1	2	3	4	5
strongly disagree	somewhat disagree	I don't know	somewhat agree	strongly agree

4. I feel that both of my children enjoyed participating in this study.

1	2	3	4	5
strongly disagree	somewhat disagree	I don't know	somewhat agree	strongly agree

5. If asked by another parent, I would recommend this intervention as a way to increase interactions between siblings.

1	2	3	4	5
strongly disagree	somewhat disagree	I don't know	somewhat agree	strongly agree

6. The experimenter made himself available to answer our questions and concerns about the study.

1	2	3	4	5
strongly disagree	somewhat disagree	I don't know	somewhat agree	strongly agree

7. What suggestions do you have on improving the intervention that was assessed in this study?

8. Please list some examples of your typical child using incidental teaching with your child with autism outside of Walden Learning Center.

APPENDIX E

GROUP SOCIAL VALIDATION QUESTIONNAIRE

The following questionnaire is designed to assess the effects of a training package on the quality of interactions between typical and developmentally delayed siblings. Please view the following eight two-minute tapes and circle the most appropriate answers to the following questions after the completion of each tape.

Compared to the interactions of typical siblings between the ages of 3 and 7, I felt that the interactions of these siblings were (circle most appropriate answer) in terms of:

1. Frequency of interactions

<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
much below average	below average	slightly below average	about average	slightly above average	above average	much above average

2. Length of interactions

<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
much below average	below average	slightly below average	about average	slightly above average	above average	much above average

3. Reciprocity of interactions

<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
much below average	below average	slightly below average	about average	slightly above average	above average	much above average

4. Positiveness of interactions

<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>
much below average	below average	slightly below average	about average	slightly above average	above average	much above average

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