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Teaching Children with Autism to Ask Questions In Integrated Preschool Settings: A Comparison of Constant and Progressive Time Delay

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A dissertation submitted in partial fulfillment of the requirements for the degree of

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Abstract

Teaching Children With Autism to Ask Questions In Integrated Preschool Settings: A Comparison of Constant and Progressive Time Delay

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Recent communication interventions for children with autism have addressed their difficulty with pragmatic skills such as asking questions. Receiving explicit instruction in asking questions seems to be particularly relevant for children with autism who often fail to make spontaneous verbal initiations, thereby decreasing their learning and social opportunities. Other behavioral characteristics often associated with autism such as stimulus overselectivity, aberrant behavior in the face of repeated errors, and prompt dependency indicate that great care needs to be given in transferring stimulus control from explicit prompts to naturally occurring stimuli. In this study, an adapted alternating treatments design was used to compare a standard constant and an adapted progressive time delay procedure in teaching preschoolers with autism to ask What and Where questions in their integrated preschool classroom. The progressive time delay procedure was modified so that increases in the delay intervals were contingent on only unprompted correct responses. After the transfer of stimulus control in the initial 1 s adapted progressive time delay interval, a continuous schedule of reinforcement with a limited hold was systematically extended as a means of permitting the participants to respond in a manner more consistent with that of their typically developing peers. The results indicated that both prompting procedures were effective; however, considering that the transfer of stimulus control seemed complete after the 1 s adapted progressive time delay interval, a further comparison of the 1 s adapted progressive interval and 4 s constant time interval demonstrated that a 4 s constant time delay was slightly more efficient in teaching children with autism to ask questions. Implications for future research in the use of time delay procedures for children with autism are discussed.

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CHAPTER 1

INTRODUCTION AND REVIEW OF THE LITERATURE

Language Characteristics of Children with Autism

During the first year of life, typically developing children do not speak, but the groundwork is laid for their speech development and for their communicative uses of language (Dore, 1985). In contrast, very little is known about language development in the first year of a child with autism. While there are no clear data on the emergence of babbling and speech of an infant with autism, it is known that the social context for language is not clearly established for some children with autism (Koegel, Valdez-Menchaca, & Koegel, 1994). Several authors have reported that the key characteristic of language in autism is the "asynchrony between form and function" (Lord, 1985, p. 266). Although the acquisition of a phonemic system, semantics, and syntax does not reveal fundamental problems specific to autism, there are clearly differences in the ways language is used by these children.

While children with autism seem to acquire language despite their deficits in various aspects of intentional communication, there is a difference in the way they use language to communicate with others. Osterling and Dawson (1994) observed in videotapes of the first birthday celebrations of children later diagnosed with autism that pragmatic deficits, including the failure to use language to request or show information, continue to present themselves in this population. Wetherby (1986) asserted that the process of pragmatic development in children with autism is very different than that of typically developing children. In typically developing children, language development is

"guided by prelinguistic accomplishments in both social and nonsocial goals" (Lord, 1985, p. 267). Wetherby (1986) reported that there was a sequential acquisition of nonsocial to social communication in children with autism while typically developing children demonstrate a simultaneous pattern of development in this regard. One hallmark of language development in children with autism is that they appear to acquire the functions of language one at a time, initially demonstrating a more limited repertoire of communicative functions than their typically developing peers (Lord, 1985). For example, while typically developing children often learn to simultaneously use words and gestures to express their intentions, children with autism seem to learn the two forms in isolation and may require explicit instruction to learn to pair the two communicative behaviors in socially meaningful ways.

Prizant (1983) also argued that, unlike most typically developing children, children with autism acquire language in a gestalt, not analytic manner. Such adherence to routines and specific rules of language would seem to set children with autism apart from their typically developing peers. While not all children with autism may display language development that is markedly different from their peers, the fact that most, if not all, children with autism fail to use their language to its fullest communicative intent seems to say that practitioners and educators should not rely solely on typical developmental processes when designing language interventions for a child with autism.

Many researchers have hypothesized that deficits in social communication interaction are the underlying causes of autism (Koegel et al., 1994; Rutter, 1978). One of the most prominent language characteristics in children with autism is their failure to

acquire appropriate spontaneous speech (Charlop, Schreibman, & Thibodeau, 1985). The lack of self-initiated verbal interaction that tends to persist in autism can be significantly limiting in terms of the natural social opportunities with which these children can come in contact (Koegel, Camarata, Valdez-Menchaca & Koegel, 1998). Stimulus overselectivity (Koegel & Lovaas, 1978) and the apparent lack of social awareness that are common in children with autism can interfere with the identification and subsequent attention to environmental events that serve as discriminative stimuli for self-initiated language in typically developing children (Matson, Sevin, Box, Francis & Sevin, 1993). Definitions of stimulus overselectivity and discriminative stimuli are found in Table 1.

Communication Intervention for Children with Autism

Recent communication interventions for children with autism have addressed their apparent difficulty with pragmatic skills. L.K. Koegel (1995) categorized pragmatics into four areas: paralinguistic features, extralinguistic or nonverbal features, linguistic intent, and finally social competence. Making requests for information, that is question-asking behavior, seems to be rooted primarily in linguistic intent. Linguistic intent has been defined as involving the "use of utterances in the context of social discourse" (Koegel, 1995, p. 20). Dore (1975) classified communicative or linguistic intent for young children into the following categories: requesting information, requesting actions, responding to requests, commenting, and regulating conversational behaviors.

Children with autism have difficulty using appropriate linguistic intent for a

variety of reasons, one of which is the fact that they often do not adequately attend to their communicative partner(s) and, therefore, have difficulty participating in exchanges. In contrast to their typically developing peers, children with autism typically lack the social motivation to communicate with others and do not seem to view their communicative partner as a potential source of information. In the past, early language interventions for children with autism tended to rely heavily on verbal imitation instruction in attempts to teach the child to speak by attending to and repeating the speech of others (Fay & Schuler, 1980; Lovaas, 1977). As researchers and clinicians reported that children with autism failed to generalize language learned purely in verbal imitation situations to the natural environment, a different language paradigm was developed that applied an emerging trend of natural language intervention to the repertoires of individuals with autism (Koegel, 1995). This approach to language intervention emphasized the reciprocal interactive nature of the communication interaction.

Researchers shifted much of their concern from antecedents and consequences to procedures directly associated with the child's response (Kaiser, Yoder & Keetz, 1992). Techniques like the natural language paradigm (NLP), incidental teaching (Hart & Risley, 1968), mand model (Warren, McQuarter & Rogers-Warren, 1984) and in-context teaching (Camarata & Nelson, 1992) are all considered milieu teaching procedures (see Table 1). These interventions build upon arranging the environment to increase a child's opportunities to use their language. The milieu strategies share several common features, the first of which is that instruction follows the child's lead or interest. Children with autism have been shown to be more successful in learning language (Koegel, et al., 1998;

Koegel, O'Dell & Koegel, 1987; Rule, Losardo, Dinnebeil, Kaiser, & Rowland, 1998) as well as engaging in longer periods of sustained conversational interaction (Koegel, Dyer & Bell, 1987) when their interests are considered. Milieu teaching strategies also use multiple, naturally occurring examples to teach language as a means of facilitating generalization (McGee, Krantz, & McClannahan, 1984; Rule et al., 1998; Warren & Kaiser, 1986). The fact that child production of language is often explicitly prompted is a third important similarity among milieu teaching procedures. It is of significant importance that children with autism experience relationships between their behavior and the consequences of their behavior. The use of direct and natural consequences appear to be the key to language intervention with children with autism (Koegel, 1995; Koegel et al., 1998; Koegel, Frea, & Smith 1995; McGee, Almeida, Sulzer-Azaroff, & Feldman, 1992; McGee, Krantz, Mason, & McClannahan, 1983; McGee, Krantz, & McClannahan, 1985, Rule et al., 1998)

Acquisition of Question-Asking Behavior in Children

The rationale behind the NLP and other milieu teaching strategies seems particularly well suited for teaching children with autism to request information. To achieve such a goal, language learning must rely on the child's initiations. The child must learn to "initiate interactions that will result in language learning from any given environment with any communicative partner" (Koegel, 1995, p.29). An important component of research in the area of initiations involves teaching queries. Queries, or requests for information, are among some of the first utterances to emerge in typically developing children (see Table 1). Queries provide the necessary reciprocal interactions

that further language development (Koegel, 1995). Schwabe, Olswang, and Kriegsmann (1986) reported that "approximately 10% of a child's utterances during a typical conversation are requests for information and Wh- question forms serve the primary means for linguistically coding these requests" (p. 40). During the second year, "What's that?" emerges as a specific cue for the caregiver to label an item. "Where" questions also develop during a child's second year with "Who" and "Why" co-emerging next. "When", "How", "How many", Whose", and "Which" are the last question forms to emerge (Miller, 1981, Schwabe et al., 1986).

Question-asking is a language strategy that provides individuals with information about almost any topic or activity in which they participate (Warren, Baxter, Anderson, Marshall & Baer, 1981). The acquisition of such interrogative behavior represents a developmental milestone. The ability to ask questions is one of the skills often identified by classroom teachers as essential for successful participation in regular education settings. Asking questions not only promotes a child's participation in instructional activities, but also provides feedback to teachers concerning specific skill acquisition (Knapczyk, 1991). Learning to ask questions then, seems to be particularly important for children with autism who lack the ability to make verbal initiations and who typically fail to develop question-asking behavior in the absence of direct intervention (Koegel, 1995; Koegel et al., 1998; Wetherby & Prutting, 1984). As the question-asking behavior of their typically developing peers becomes more sophisticated throughout development, the learning and social opportunities of children with autism can become increasingly more restrictive.

The acquisition of question-asking behavior of children in general has received a great deal of attention. In both structured and unstructured situations, modeling is a strategy found to enhance a child's curiosity and ability to request information (Schwabe et al., 1986). In the case of teaching children to make queries, modeling involves providing specific examples of the questions to be asked by the child. The definition of modeling is included in Table 1. Researchers have used a variety of modeling strategies to promote question-asking in typically developing children (Johnson, Gutkin & Plake, 1991; Lempers & Miletic, 1983; Schreiber, 1993), children with learning disabilities (Knapczyk, 1991), disadvantaged children who are at risk for language difficulties (Zimmerman & Pike, 1972), children with developmental disabilities (Warren et al., 1981), and minimally with children with autism (Beisler & Tsai, 1983; Hung 1977). More direct instructional strategies such as forward chaining (Twardosz & Baer, 1973) as described in Table 1, have also been effective in teaching children with developmental disabilities to ask questions. In this study, the participants were taught to ask, "What letter?" First the investigator instructed the participant to say, "What", then, "What leh?" the finally, "What letter?"

Additionally, as similar teaching approaches have become more widely used, researchers have incorporated such strategies as increasing the number of opportunities a child had to request (Olswang, Kriegsmann & Mastergeorge, 1982), using motivational procedures such as following the child's lead, and using naturally rewarding consequences for asking questions (Koegel et al., 1998; Koegel, 1995), and explicitly prompting question-asking (Koegel, 1995; Taylor & Harris, 1995) into instructional

programs for children with developmental disabilities. L.K. Koegel et al. (1998), L.K. Koegel (1995), and Taylor and Harris (1995) specifically addressed question-asking in children with autism. L.K. Koegel (1995) presented children with autism with highly desired items in a brown bag. The children then received the verbal model, "What's that?" Immediately after the child ask the question, the desired item was removed from the bag, labeled, and given to the child. The verbal model prompt was faded and novel items were included as the children's requests were emitted at higher and higher frequencies. "Where", "Whose" and "What happened" were then taught in a similar manner.

Taylor and Harris (1995) used a time delay procedure to teach three children with autism to ask, "What's that" in their educational setting. This study was very similar to the work done by L.K. Koegel (1995), except that the procedures explicitly stated the prompt delivery and fading procedure; i.e., progressive time delay. The results of this study supported previous work (Koegel, 1995) and clearly indicated that young children with autism could learn to ask, "What's that?" about novel stimuli, to learn new information (i.e., object labels via question-asking), and to generate their question-asking behaviors to other school environments.

Delayed Prompting Procedures

The success of recent research in the area of question-asking behavior in children with autism, particularly as demonstrated by L.K. Koegel (1995) and Taylor and Harris (1995) support the literature suggesting time delay as an appropriate and effective means of fading prompts for children with autism. Delayed prompting procedures are designed

to transfer stimulus control via the introduction of a time interval delay between the presentation of a stimulus and a prompt (Handen & Zane, 1987). Delayed response prompting, transfer of stimulus control, stimulus, and prompt are defined in Table 1. In 1987, Handen and Zane reviewed 26 studies including delayed prompting procedures. These researchers examined variations in delay length and ceiling, criterion for increasing the delay, mastery criterion, and error correction procedures in the body of reviewed literature. They reported that the results from the studies reviewed generally suggested that delayed prompting procedures were instructionally efficient, that is, the participants in the studies typically acquired the desired responses within a few training sessions or a limited number of trials.

Transfer of stimulus control in delayed prompting. Touchette (1971) first applied the procedure of delayed prompting in an experimentally rigorous manner. Touchette (1971) was interested in measuring the exact moment stimulus control was transferred. The transfer of stimulus control has been defined as a procedure systematically pairing "previously neutral stimuli with stimuli that already control the response" (Striefel & Owens, 1980, p. 308). The two ways that the transfer of stimulus control is used are "(a) to shift control of a response to a new stimulus when the response is already controlled by an existing stimulus via training, and b) to establish control of behavior by novel combinations of stimuli for which no training has occurred" (Streifel & Owens, 1980, p. 308). In Touchette's 1971 study, three adolescents with severe mental retardation were taught to make discriminations. The participants were first taught a color discrimination; that is, to press a red key rather than a white key. Next the adolescents were presented

with the letter "E", with the legs pointing either down or up. Initially the correct form was the letter with the legs pointing up and this form was superimposed on a red stimulus. The letter with the legs facing down was superimposed on a white stimulus. A correct response by the participants delayed the next onset of the red stimulus by .5 s so that in the second trial, both letters were presented on a white stimulus and only after the delay was red added to the correct letter key. The delay continued to be increased contingent on correct responses. In the second component of the study, more difficult stimuli were introduced. Here, Touchette was interested in whether delaying the red stimulus would again result in the transfer of stimulus control when a more difficult discrimination was required. He also wanted to see if intersubject variability would increase when the difficulty of the task increased. The data across both experiments demonstrated that transfer can occur very quickly, as was the case with two of the three participants, or not at all, as was the case for the remaining adolescent.

Over twenty years later, Oppenheimer, Saunders, and Spradlin (1993) replicated Touchette's study (1971) with 34 participants. They observed varied outcomes with many instances of unsuccessful transfer. Frequently participants continued to wait for the delayed cue. This result was later supported by Glat, Gould, Stoddard, and Sidman (1994) who stated that the participants failed to demonstrate transfer because of "competing and overriding control by the delayed cue" (p. 442).

The dynamics of the transfer of stimulus control, specifically involving the issue of competing schedules of reinforcement, have continued to be of interest to researchers. Before Oppenheimer et al. (1993) and Glat et al. (1994) addressed the failure of transfer,

Touchette and Howard (1984) identified the probability of reinforcement as the underlying operant mechanism in the transfer of stimulus control. Kennedy (1992) further deconstructed the transfer issue and said that transfer was based on an interaction of response-reinforcer delay and response effort in concurrent schedules of reinforcement. In delayed prompting strategies, the "delay is gradually increased for experimenter prompts, but response availability is immediate throughout training for unprompted verbalizations" (p.534). With regard to response effort, in delayed prompting procedures it seems that waiting for a cue and then responding requires less effort that engaging in an unprompted response. Initially, then when prompts are provided very quickly for a participant, the individual can choose to wait for the delayed cue and then respond (lower effort, lower delay) or respond correctly before the delayed cue (higher effort, lower delay). Typically individuals will wait for the cue to minimize their effort, but as the presentation of the controlling prompt (see Table 1) is delayed, prompted responses begin to lose their "weight," as a result of "experimenter prompts presenting the student with a lower effort response having a longer delay relative to the higher effort, but shorter delay accompanying the emission of unprompted verbalizations" (Kennedy, 1992, p. 534).

The moment of stimulus control transfer occurs at the point when the delay interval and response effort begin to compete in terms of response allocation for the concurrent operants. As the delay increases, unprompted responses are optimized and the individual begins to consistently respond before the prompt as the "discrepancy between the two response options is exaggerated and the student begins to emit the higher effort

response with minimal delays" (Kennedy, 1992, p. 534).

Prior to the introduction of temporally delayed prompting (Touchette, 1971), the transfer of stimulus control was addressed in the literature via fading techniques. Fading is defined in Table 1. In 1963, Terrace introduced the errorless fading technique as a means of quickly transferring stimulus control in the absence of the participant making persistent mistakes. Errorless learning (fading) procedures begin with extreme differences between the correct and incorrect stimuli. The differences in the stimuli are gradually reduced in a manner that reduces the probability of errors (Billingsley & Romer 1983; Terrace, 1963a, b). Billingsley and Romer (1983) asserted that "methods reducing the probability of error responding in the presence of the natural cue for the response should be more effective than methods that permit a higher probability of error responding" (pp. 7-8). A number of authors have concluded that frequent errors can be associated with challenging or disruptive behaviors (Billingsley, 1998; Carr & Durand, 1985; Weeks & Gaylord-Ross, 1981). Terrace (1963a) reported that errors in responding tend to persist once they are made. In addition, an individual's motivation to respond may be negatively affected in the face of persistent and excessive errors (Billingsley, 1998; Koegel & Egel, 1979).

Rationale for using delayed prompting procedures with children with autism. While errorless stimulus prompt fading has been proven to be an effective means of transferring stimulus control (Corey & Shamow, 1972; Schusterman, 1966; Sidman & Stoddard, 1967;Terrace, 1963a, b; Terrace, 1966; Touchette, 1968; Westbrook & Miles, 1970), delayed response prompting procedures were used in the study. Delayed response

prompting procedures can further minimize the possibility of attending to irrelevant stimuli (Touchette, 1971), an important consideration when designing interventions for children with autism. Response prompting was also chosen because stimulus fading can permit errors to reoccur during the final step of fading, that is, after the prompt has been removed. Stimulus fading also can require significant modification to training stimuli; such modifications are not typically necessary in delayed prompting procedures and may not be feasible in a busy preschool classroom such as the ones used in the study (Handen & Zane, 1987).

Error-free (or nearly so) transition from instructional support to independent responding can be critical when designing instructional programs for children with autism. These children's tendency to demonstrate stimulus overselectivity, the failure to acquire spontaneous speech, and behavioral issues such as aggression and self injury (American Psychiatric Association, 1994; Koegel 1995; Koegel et al., 1995; Rapin, 1997) seem to indicate that delayed prompting procedures would be effective instructional strategies (Ault, Wolery, Gast, Doyle, & Eizenstat, 1988; Berkowitz, 1990; Charlop et al., 1985; Charlop & Walsh, 1986; Ingenmey & Van Houten, 1991; Taylor & Harris, 1995; Touchette & Howard, 1984; Wolery, Gast, Kirk, & Schuster, 1988). The transfer of stimulus control from teacher prompts to naturally occurring discriminative stimuli can further prove to be especially difficult for children with autism who have a tendency to become dependent on extra stimulus prompts, those cues external to the stimulus such as the positioning of the materials or the volume of the verbal instruction (MacDuff, Krantz, & McClannahan, 1993). Halle, Baer, and Spradlin (1981) recommended using delayed

prompting as a means of achieving multiple stimulus control over individual's responses thereby allowing a greater range of environmental stimuli to control verbal behavior (Skinner, 1957). Additionally, Schwartz, Anderson, and Halle (1989) suggested that "responses to programmed nonverbal stimuli such as time delay are considered more spontaneous than responses to teacher directions or models; therefore the time delay procedure may be an effective instructional strategy for teaching students with severe disabilities to progress along this continuum toward more spontaneous and normalized communication" (p. 49). A close examination of delayed prompting should provide additional support for its use with individuals with autism.

Constant time delay. When using a constant time delay procedure, a target stimulus is presented followed by a prompt to ensure that the individual will perform the task correctly (Wolery, Ault & Doyle, 1992). The prompt is then systematically faded by inserting a fixed time interval between the presentation of the task and the delivery of the controlling prompt (Snell & Gast, 1981; Wolery et al., 1992). Please see Table 1. Zero-second delay trials are used during initial teaching opportunities and then constant delay trials are introduced. There are five types of student responses to the constant delay procedure. A student can respond correctly before the prompt (anticipation), respond correctly after the prompt (wait), respond incorrectly before the prompt (nonwait error), respond incorrectly after the prompt (wait error), or not respond at all (no response) (Wolery et al., 1992).

In constant time delay procedures, both prompted, (wait correct) and unprompted correct, (anticipation) responses are often reinforced. However, Wolery et al. (1992),

noted that the effectiveness and efficiency of the procedure is not compromised when more reinforcement value is assigned to anticipations than wait corrects or if anticipations are reinforced more often that wait correct responses. One of the first studies to differentially reinforce anticipations was conducted by Browder, Morris, and Snell (1981) in which praise and edible reinforcers were provided for anticipations but only praise was provided for wait corrects.

Oliver and Halle (1982) also reinforced anticipatory signing initiations made by a child with mental retardation. As soon as the child initiated, the delay was terminated and the signing request was praised and fulfilled. If the child made an incorrect initiation or did not sign at all, the object that was supposed to have been requested was delivered without comment at the conclusion of a 10 s constant time delay interval.

Touchette and Howard (1984) compared the efficiency of three conditions in a constant time delay procedure. In the first condition, both anticipations and wait corrects were reinforced on a continuous reinforcement schedule. In the second condition, every anticipation was reinforced while only every third wait correct was reinforced. The last condition reversed the reinforcement contingency of the previous condition so that every third anticipation was reinforced and every wait correct was reinforced. The condition in which anticipations were differentially reinforced was the most efficient.

McDonnell (1987) provided descriptive verbal praise for anticipations made by high school students with severe developmental disabilities who were learning to purchase snack items. When the students demonstrated a wait correct response, the response was simply confirmed. Similarly, McDonnell and Ferguson (1989) praised the

anticipatory banking behaviors (cashing checks and using an automatic teller) and only provided validating feedback like, "Okay" for wait correct responses.

Constant time delay has been successfully utilized to teach a variety of tasks to students of varying ages and a wide range of disabilities (Ault et al, 1988a; Ault et al., 1988b; Browder, et al., 1981; Doyle, Wolery, Gast, Ault & Wiley, 1990; Halle et al, 1981; Halle, Marshall & Spradlin, 1979; Johnson, 1977; Kleinert & Gast, 1982; McIlvane, Withstandley & Stoddard, 1984; Oliver & Halle, 1982; Schoen & Ogden, 1995; Schoen & Sivil, 1989; Stevens & Schuster, 1987). It should be noted that while the ages of the participants in the above studies ranged from preschoolers (Doyle et al., 1990; Schoen & Sivil, 1989) to adults (Kleinert & Gast, 1982), the majority of work done with the constant time delay procedure has been conducted with elementary (Gast et al., 1988, Halle et al., 1979; McIlvane et al., 1984b; Oliver & Halle, 1982) and secondary aged students (Browder et al., 1981; Halle et al., 1981; Schoen & Ogden, 1995; Schuster, Gast, Wolery, Guiltinan, 1988).

Discrete responses, those requiring a single response, as well as more complex chained responses have been taught with the constant time delay procedure. Definitions of discrete responses and constant time delay are included in Table 1. Discrete responses have included matching (McIlvane et al., 1984b) sight word reading (Doyle et al. 1990; Gast et al., 1988; Schoen & Ogden, 1995), manual signing (Browder et al. 1981; Kleinert & Gast, 1982; Oliver & Halle, 1982), spelling (Stevens & Schuster, 1987), identifying symbols (Johnson, 1977), number identification (Ault et al., 1988b), and verbal initiations (Halle, et al., 1981; Halle et al., 1979).

Complex chained responses (see Table 1) taught with the procedure include cooking (Schuster et al., 1988), purchasing (McDonnell, 1987), banking skills (McDonnell & Ferguson, 1989), laundry completion (Miller & Test, 1989), and self-help skills (Schoen & Sivil, 1989).

Constant time delay has been characterized as being parsimonious, and has been identified as being so relatively simple to implement that teachers have probably been using it for years without even realizing it (Wolery et al., 1992). Constant time delay was found to be more effective than most-to-least prompting in teaching laundry skills to students with moderate mental retardation (Miller & Test, 1989). The definition of most-to-least prompting can be found in Table 1. In addition, constant time delay has been found to be more efficient than the system of least prompts; defined as a "series of prompts that move from lesser to greater degrees of assistance" (Demchak, 1990, p. 604) in terms of number of sessions, errors, and minutes of direct instructional time to criterion in teaching sight word reading skills to children with moderate mental retardation (Gast et al; 1988), purchasing skills to adolescents with severe disabilities (McDonnell, 1987), number identification to elementary school students with autism (Ault, et al, 1988b), and self-help skills to preschoolers with autism (Schoen & Sivil, 1989).

Progressive time delay. In contrast to constant time delay, progressive time delay gradually increases either over trials or blocks of trials, the interval between the presentation of the task and the delivery of the controlling prompt (Wolery, et al., 1992). See Table 1 for definitions of progressive time delay and controlling prompt. The initial trials of the progressive time delay procedure are conducted using the same type of 0 s

delay as constant time delay procedures. Following the 0 s delay, the prompt delay interval is increased to a specific length. After a specified number of trials at this delay interval, the prompt delay interval is then systematically increased again, thus characterizing the progressive delay trials. As with constant time delay procedures, a student's responses can take the form of anticipations, waits, nonwait errors, wait errors, or no response (Wolery et al. 1992).

In progressive time delay procedures, several schedules of increasing the prompt delay have been used. In order to make the procedure easy to implement and rapidly move a participant through the increasing intervals, thereby decreasing the opportunity to make mistakes, some authors have chosen to increase the delay interval each session of instruction (Ault et al., 1988a; Bennett, Gast, Wolery, & Schuster, 1986; Browder, Hines, McCarthy, & Fees, 1984; Farmer, Gast, Wolery, & Winterling, 1991; Godby, Gast, & Wolery, 1987; Halle et al., 1979; Wolery et al., 1988)

Delay intervals have also been increased following a specific number of trials (Ingenmey & Van Houten, 1991; Snell, 1982; Touchette & Howard, 1980; Walls, Dowler, Haught, & Zawlocki, 1984). Increasing the delay in this manner also appears to be an attempt to make the procedure fairly easy to implement as the teachers would not have to rely on the kinds of responses the participants made to decide when to increase, maintain, or decrease the interval length.

The third way delay intervals have been increased is contingent on a "certain number of trials during which correct responses occurred" (Wolery et al., 1992, p.80). A number of investigators have chosen this method for increasing the interval length

(Berkowitz, 1990; Braam & Poling, 1983; Charlop et al., 1985; Charlop & Walsh, 1986; Johnson, 1977; McGee & McCoy, 1981; Matson et al., 1993; Smeets, Lancioni, Leonard, & Streifel, 1988; Smeets & Streifel, 1988; Streifel, Bryan, & Aikens, 1974; Walls, Haught, & Dowler 1982). In each of these studies, both anticipations and wait corrects were considered correct although only anticipations counted toward mastery criterion for the procedure. Typically, both anticipations and wait corrects have been reinforced because investigators felt it was important for the participants to learn that waiting was acceptable if the correct response was unknown, for the participants to learn to avoid nonwait errors, and so that the participants were exposed to a rich schedule of reinforcement early in instruction (Ault et al., 1988a).

Progressive time delay has been studied more extensively than its constant delay counterpart. Progressive time delay procedures have been used successfully with students of a wide variety of ages and disabilities (Aeschleman & Higgins, 1982; Barrera & Sulzer-Azaroff, 1983; Bennett et al., 1986; Berkowitz, 1990; Braam & Poling, 1983; Bradley-Johnson, Sunderman, & Johnson, 1983; Browder et al., 1984; Charlop et al., 1985; Farmer et al., 1991; Goetz, Gee, & Sailor, 1983; Ingenmey & Van Houten, 1991; Luciano, 1986; Matson et al., 1993; McDonagh, McIlvane & Stoddard 1984; Smeets & Streifel, 1980; Streifel et al., 1974; Touchette, 1971; Walls et al., 1984; Wolery et al., 1988; Zane, Handen, Mason & Geffin, 1984). Just as in the case of constant time delay, the majority of the studies examining progressive time delay have been conducted with elementary and secondary-aged students.

Discrete tasks such as identifying objects (Barrera & Sulzer-Azaroff, 1983;

Godby et al., 1987), identifying pictures (Barrera & Sulzer-Azaroff, 1983; Wolery et al., 1988), reading (Ault et al., 1988b; Browder et al., 1984; Farmer et al., 1991), signing (Bennett et al., 1986, McIlvane, Bass, O'Brien, Gerovac & Stoddard, 1984) symbol identification (Berkowitz, 1990; Touchette, 1971; Zane et al., 1984), direction following (Smeets & Streifel, 1980; Streifel et al., 1974), localizing toward a sound (Goetz et al., 1983), and making verbal initiations (Charlop et al., 1985; Charlop & Walsh, 1986; Ingenmey & Van Houten, 1991; Matson, et al., 1993;) have been taught using progressive time delay. In addition, such chained tasks as assembly (Walls et al., 1984; Walls et al., 1982) bed-making (Snell, 1982) and using vending machines (Browder, Snell & Wildonger, 1988) have been taught using this procedure.

Although it has been suggested that progressive time delay is not as parsimonious as constant time delay because the prompt delay interval must be gradually increased rather than remain at a fixed interval, progressive time delay has proven to be an effective and efficient procedure (Wolery et al., 1992). In terms of educational practice, effectiveness is defined as "children learn what they are taught" (Wolery et al., 1992, p.209). Therefore in this study, effectiveness meant the participants acquired the target skill under intervention conditions. Similarly, efficiency defines procedures that are "effective and require less energy or time than other procedures" (Wolery et al., 1992, p. 209). The participants' typical mean error rates during instruction with progressive time delay have usually been 10% or less (Wolery et al., 1992). Progressive time delay has been found to be more efficient than the system of least prompts in terms of sessions, errors, and minutes of instructional time in reaching criterion in teaching manual signs

(Bennett et al., 1986) and receptively identifying objects (Godby et al., 1987). Progressive time delay has also been found to be more efficient than standard stimulus fading procedures (Aeschleman & Higgins, 1982; Walls et al., 1984).

The adapted progressive time delay procedure used in the study. In this study, an adaptation was made to the standard progressive time delay procedure. While it is customary to count only anticipations toward the mastery criterion for an entire progressive time delay intervention, differentially reinforcing anticipations over wait correct responses and setting an "anticipations-only" criterion for increasing the progressive time delay interval have not been done previously. In requiring the participant to meet a mastery criterion for increasing the delay interval that was contingent on the demonstration of unprompted responses, it would seem that by definition, the transfer of stimulus control would be complete at the conclusion of the initial (post 0 s) progressive time delay interval. Any subsequent errors a participant might make that would affect the maintenance of the transfer could be corrected at the initial progressive interval. Several factors contributed to the use of an "anticipations-only" criterion for increasing the delay in the study. After the selection of the 4 s constant time delay interval, an initial progressive time delay interval of 1 s was chosen as a means of decreasing the probability that the participants would learn to embed errors in their question-asking behavior. Walls et al. (1982) found in a comparison of delay intervals increased by 1,3, or 5 s increments that the 1 s increment produced the fewest errors, required the least amount of instructional time, and resulted in the earliest acquisition. Since the controlling prompt would be consistently delivered almost

immediately after the presentation of the discriminative stimulus, the possibility of the participants embedding errors in their question-asking behavior should be minimized. The consistent and temporally close pairing of the discriminative stimulus and the controlling prompt should also serve as a clear cue for the boys to respond to the salient aspects of the stimulus, rather than to another possibly irrelevant component of the question-asking opportunity, e.g., the position or proximity of the circle leader. Such stimulus overselectivity, that is, the failure to "respond to complex environmental stimuli consisting of multiple cues or components" (Koegel, Koegel, Frea, & Smith, 1995, p.11) is a clear difference between the responding and initiating behaviors of children with autism and their typically developing peers (Koegel & Schreibman, 1977; Lovaas, Schreibman,, Koegel, & Rehm, 1971; Rincover & Koegel, 1975; Schreibman, Koegel, & Craig, 1977; Schreibman & Lovaas, 1973). Research on stimulus overselectivity has indicated that "children with autism often approach new learning situations by responding to an abnormally restricted number of relevant cues" (Koegel et al., 1995, p.12).

In addition, the very brief initial 1 s delay should promote a decreased latency between the presentation of the discriminative stimulus and the participant's response, thereby allowing the children with autism to access the reinforcer rapidly and consistently. A risk of conducting language intervention in an integrated classroom is that the socially and linguistically competent typically developing children in the setting will engage in the target response, in this case asking a question, before the participant with autism, therefore compromising the understanding of the important natural

contingency for asking a question by the child with autism. For these reasons it was hypothesized that the transfer of stimulus control from the controlling prompt to the naturally occurring discriminative stimuli would be hastened in the 1 s progressive time delay interval.

An expected outcome of differentially reinforcing anticipations and designating an "anticipations-only" criterion for increasing the delay was a decreased probability that the participants' would become prompt dependent on the presentation of the controlling prompt (Cook, Anderson, & Rincover, 1982). Prompt dependence has been noted in the repertoires of children with autism so that when prompts are not part of the relevant stimulus cue, but rather come after an incorrect response, which could include waiting for a controlling prompt, the individual with autism builds this cue into their behavioral chain (Woods, 1987). In this study, the potential for prompt dependence was addressed by embedding the opportunities for question-asking into a naturally occurring classroom activity and by making access to reinforcement contingent on independent responses.

Data collected in the participants' classrooms showed that when presented with the opportunity to ask What, Where, and Who questions during the circle time activity, typically developing children's responses ranged from 1 to 5 s, with the majority of the questions being asked around 3 s. In order to teach the children with autism to ask questions in a manner more similar to that of their typically developing peers, rather than shouting out the questions immediately, the progressive time delay interval was gradually increased by using a continuous schedule of reinforcement with a limited hold. Definitions for both continuous schedule of reinforcement and limited hold are found in

Table 1.

Limited holds are restrictions on how long a reward remains available (Domjan & Burkhard, 1986) and have historically been added to both variable interval (Boelens & Kop, 1983; Ferster & Skinner, 1957; Hughes, 1971; Newby, Memmott, & Kendall, 1978; Shamow, 1979 Weisberg & Kennedy, 1969) and fixed interval (Arnett & Ulrich, 1975, Buskist & Morgan, 1987, Cuvo, 1976; Ditty, 1982; Dunn, Foster, & Hurwitz, 1971; Newsom, McCoy, Garner, Kenny, Bassett, & Sewell, 1972; Poppen, 1982) schedules of reinforcement as a means of affecting response rate. When the length of the fixed interval portion of a schedule has been gradually increased, "the characteristic effect of a fixed interval/limited hold is steady responding" (Martin & Pear, 1988, p.90). Under a limited hold schedule, a participant must respond within a specific time limit following the interval if they are to access the reinforcer (Sulzer-Azaroff & Mayer, 1991).

As the goal was for the child to ask the target question anytime before the controlling prompt, in this study each progressive time delay interval could be viewed as an extended continuous schedule of reinforcement with a limited hold. By systematically extending the delivery of the controlling prompt, the child with autism was given the opportunity, as time progressed, to ask questions in a manner that was temporally similar to their typically developing peers. If the child asked the question before the delivery of the controlling prompt, access to the circle leader's object was provided. If the child waited for the controlling prompt, their response was validated, but did not earn them access to the object. If, for some reason, the initial transfer of stimulus control did not

maintain, the controlling prompt was still available through the systematic extension of the continuous schedule of reinforcement with a limited hold. The controlling prompt's continued availability, while seemingly unnecessary, did provide each participant with immediate access to a correction throughout the course of the adapted progressive time delay intervention. Corrections were provided to obtain the target response.

In the case of the current study, the investigator did not want the participants to learn that waiting was acceptable. Given the learning histories of the participants in the study, the threat of excessive nonwait errors was minimal as they had learned in a variety of other tasks to consistently follow verbal models. Since the wait corrects were met with a validation response such as, "That is asking a what question", it could be said that wait correct responses were minimally reinforced so the boys were not exposed to too thin a schedule of reinforcement. Since the goal was to teach the participants to ask the target questions before the delivery of the controlling prompt, differential reinforcement of anticipations seemed necessary.

Previous comparisons of constant and progressive time delay. Only one existing study (Ault, et al., 1988a) has compared constant and progressive time delay. These authors used a parallel treatments experimental design to evaluate the effectiveness of both delay procedures in teaching students with moderate disabilities to read words typically found on community signs. Both procedures were effective and no substantial differences were observed in terms of efficiency (trials to criterion, percent of errors to criterion, direct instructional time to criterion).

The following table summarizes the salient terms described thus far in the

Introduction and Review of Literature:

Table 1

Definitions

Term	Definition
Chained Tasks	"Tasks that involve several responses put together to form a more complex skill" (Wolery et al., 1992, p. 146).
Constant Time Delay	A delayed response prompting procedure in which a target stimulus is presented, followed by a controlling prompt. The controlling prompt is systematically faded by inserting a fixed time interval between task presentation and the delivery of the controlling prompt (Wolery et al., 1992).
Continuous Schedule of Reinforcement	"A schedule of reinforcement in which each occurrence of a response is reinforced" (Sulzer-Azaroff & Mayer, 1991, p. 586).
Controlling Prompt	A prompt used in delayed response prompting procedures that "ensures that the individual will perform the task correctly" (Wolery et al. 1992, p.48).

table continues

Delayed Response Prompting	A prompt fading procedure designed to transfer stimulus control via the introduction of a time interval between the presentation of a stimulus and a prompt (Handen & Zane, 1987).
Discrete Tasks	"Tasks involving a single response" (Wolery et al., 1992, p. 146).
Discriminative Stimulus	"A stimulus in the presence of which a particular response will be reinforced or punished" (Malott, Whaley, & Malott, 1993, p. 197).
Errorless Stimulus Fading	A transfer of stimulus control procedure that begins with extreme differences between the correct and incorrect stimuli. The differences are gradually reduced in a manner reducing the probability of errors (Billingsley & Romer, 1983; Terrace, 1963a).

table continues

Fading	"The gradual change, on successive trials, of a stimulus that controls a response, so that the response eventually occurs to a partially changed or completing new stimulus" (Martin & Pear, 1988, p. 132).
Fixed Interval Schedule of Reinforcement	"A schedule in which the duration is always the same" (Sulzer-Azaroff & Mayer, 1991, p.592).
Forward Chaining	"The establishment of the first link in a stimulus response chain, with the addition of successive links until the final link is acquired" (Malott et al., 1993, p.307).
Interval Schedule of Reinforcement	"A schedule in which reinforcement is made contingent on the passage of a particular duration of time before the response is reinforced" (Sulzer-Azaroff & Mayer, 1991, p. 592).

table continues

Limited Hold	"A restriction placed on an interval schedule requiring that the response occur within a particular time limit following the interval to be eligible for reinforcement, or the reinforcer is lost" (Sulzer-Azaroff & Mayer, 1991, p. 529).
Milieu Teaching Strategies	A group of natural language interventions that build upon arranging the environment to increase an individual's opportunities to use their language. Common features of these strategies include: (a) instruction follows the individual's lead or interest, (b) use multiple, naturally occurring examples to teach language, and (c) production of language is often explicitly prompted (Koegel et al., 1987).
Modeling	"A procedure whereby a sample of a given behavior is presented to an individual to induce that individual to engage in a similar behavior" (Martin & Pear, 1988, p. 237).

table continues

Most-to-Least Prompting	"An instructional strategy that progressively fades the teacher's assistance from the point of the most amount of help needed to ensure correct responses to the point of the student's independent performance of the target behavior" (Wolery et al., 1992; p.118).
Progressive Time Delay	A delayed response prompting procedure in which the interval between task presentation and the delivery of the controlling prompt gradually increases either over trials or blocks of trials (Wolery et al., 1992).
Prompt	"A supplemental stimulus that raises the probability of a correct response" (Malott et al., 1993, p. 207).
Queries	Requests for information that provide the necessary reciprocal interactions that further language development (Koegel, 1995).

table continues

Schedule of Reinforcement	"The response requirements that determine when reinforcement will be delivered" (Sulzer-Azaroff & Mayer, 1991, p. 597).
Stimulus	"An event that can affect an organism" (Martin & Pear, 1988, p. 118).
Stimulus Control	A situation in which "a response occurs more frequently in the presence of one stimulus than in the presence of another stimulus because of a discrimination training procedure" (Malott et al., 1993, p. 197).
Stimulus Overselectivity	A condition in which there is a lack of responding to multiple cues in the environment (Koegel, 1995).
System of Least Prompts	"Series of prompts that move from lesser to greater degrees of assistance" (Demchak, 1990, p.604). The order of the prompts is specified, then the teacher moves through the series (from less to more intrusive prompts) if the student does not respond during the specified latency.

table continues

Transfer of Stimulus Control	"A procedure that systematically pairs previously neutral stimuli with stimuli that already control the response" (Streifel & Owens, 1980, p. 308).
Variable Interval Schedule of Reinforcement	"A schedule in which the time interval varies about a given average duration" (Sulzer-Azaroff & Mayer, 1991, p. 592).

Purpose of the Investigation

The specific experimental question of this study was which time delay procedure, constant or an adapted progressive, was more effective and efficient in teaching preschoolers with autism to ask questions in their integrated classroom. To date, constant time delay has only been used to teach elementary school students with autism (Ault et al., 1988b) to identify numerals. While the standard progressive time delay intervention has been used several times with children with autism (Berkowitz, 1990; Charlop et al., 1985; Charlop & Walsh, 1986; Ingenmey & Van Houten, 1991; Koegel, 1995; Matson et al., 1993; Taylor & Harris, 1995; Wolery et al., 1988), it has rarely been used to teach question-asking (Koegel, 1995; Taylor & Harris, 1995), and never in the context of an integrated classroom, probably because management of the progressively increasing time intervals has been perceived as being too difficult to systematically manage in such settings.

In addition, this study extended the previous comparison of constant and a

standard progressive time delay made by Ault et al. (1988a) to preschoolers with autism, in this case employing an adaptation to the progressive time delay protocol. When considering the typical learning histories of this population, an expected outcome of such a comparison was the finding that the adapted progressive time delay was a more effective and efficient prompt fading strategy. Such a hypothesis was developed primarily because progressive time delay should minimize the children's opportunities for embedding errors in their question-asking behaviors. Controlling prompts were delivered earlier in the progressive time delay condition than in the constant time delay condition, possibly cueing the children with autism to the relevant discriminative stimuli for their behavior. When the children responded to the controlling prompts in the early progressive time delay intervals, they decreased the threat of their typically developing peers asking the questions first and therefore accessing the reinforcers.

The progressive time delay procedure was adapted in two ways. The first adaptation was to institute an "anticipations-only" criterion for increasing each successive time interval. Inclusive in this adaptation was the differential reinforcement of anticipations over wait correct responses. A continuous schedule of reinforcement with a limited hold was systematically extended as the progressive intervals increased as a means of increasing the likelihood that after the initial transfer of stimulus control was complete, the participants would not only maintain their question-asking behavior, but would have available the opportunity to ask questions in a manner that was more like that of their typically developing peers in terms of the latency of their responding.

CHAPTER 2

METHOD

Participants

Five young children independently diagnosed with autism participated in this study. All children were enrolled in preschool classrooms at a university-affiliated, integrated preschool program. In each participant's classroom there were a total of 15 children, 6 of whom were typically developing. The remaining nine children enrolled in the preschool classes were diagnosed with a variety of developmental and/or physical disabilities. The typical teacher-to-child ratio in each classroom was 1:3. The children were exposed to an activity-based intervention, the current trend in early childhood special education (Bricker & Cripe, 1992). Activity-based intervention emphasizes the importance of the environment for learning and the need for active involvement by the child for learning to occur. Learners are provided with countless opportunities to successfully interact with the classroom curriculum that should be meaningful and functional for the child. Opportunities are dramatically decreased when the child does not know how to gather information about the curriculum materials and the environment in general. Participants were selected on the basis of teacher report that they did not demonstrate question-asking behavior during the daily circle time activity. In addition to teacher report, the author of this study observed each participant during their circle time to confirm the teachers' observations.

Prerequisite skills necessary for participation in the study included: (a) visual and auditory skills within normal limits, as determined by auditory and visual screening tests

administered to all students in the participants' school, (b) demonstrated ability to sit and attend to the classroom teacher (or circle time leader) and circle time materials for a minimum of 15 minutes (the typical duration of circle time), (c) demonstrated ability to wait at least 4 s for a response prompt provided by an adult as noted by their classroom teacher, (d) demonstrated ability to verbally imitate spoken words within 4 s of an adult model as observed by their classroom teacher and speech language pathologist (Ault et al., 1988a), (e) demonstrated ability to answer simple What, Where, and Who questions as measured in a pre-intervention session with the experimenter.

Jack was a 4-year-old boy diagnosed with autism. He had participated in his current educational placement for approximately 8 months when the study began. Using the Stanford-Binet Intelligence Scale, his IQ score was 87. Jack's IQ was assessed approximately 3 months prior to the beginning of the study. He had a fairly extensive expressive repertoire including numerous object and action labels, as well as the ability to use at least one adjective, usually a concept such as color, shape, or size to describe nouns. As measured by a classroom communication sample conducted immediately prior to the study, his Mean Length of Utterance (MLU) was 4 words. He occasionally demonstrated stereotypic behavior in the form of self talk and frequently engaged in perseveration of topic. Throughout the course of the study, Jack's classroom teachers were collecting data on his tantrum behavior and implementing various behavior plans. He was a member of Classroom A – Morning Session.

Rory was a 3-year-old boy diagnosed with autism. He had participated in his current educational placement for 3 months at the onset of the study and was also a

member of Classroom A – Morning Session. Rory had been diagnosed with autism 6 months prior to the study and at that time achieved an IQ score of 97 on the Stanford-Binet Intelligence Scale. Rory demonstrated no visible stereotypies but often spoke in a barely audible voice. Although he was characterized as a quiet child, Rory did verbally express knowledge of numerous object and action labels. He frequently used adjectives dealing with size, shape, quantity, color, and touch, e.g., squishy, when describing objects. His MLU had been assessed at 4-5 words several weeks before the study began using a communication sample identical to that of Jack.

Seth, diagnosed with autism, turned 5-years-old a month into the study. He had participated in his current educational placement for 5 months when the study began. Approximately 1 month prior to the study, the Stanford-Binet Intelligence Scale was administered to Seth; he achieved a score of 75. While Seth was the oldest participant, his expressive verbal repertoire was the newest. Seth knew many action labels, such as running and climbing, but his object label repertoire was far less than either Jack or Rory. He infrequently used adjectives in his everyday language and his MLU had been assessed at 3 words in a classroom communication sample approximately 1 month prior to the study. Seth engaged in severe pronominal reversal. He engaged in no visible stereotypic behavior but did frequently engage in tantrum behavior when his routine was changed. He was a member of Classroom B - Afternoon Session.

Ari was a 4-year-old boy diagnosed with autism. He had participated in his current educational placement for well over 12 months. Ari engaged in self talk throughout the course of his day and was described by his teacher as "active" as he often

bounced from place to place in the classroom. By parental report, Ari exhibited significant sensory issues, particularly his inability to adjust to new environments. He was reported to demonstrate extreme tactile sensitivity and/or defensiveness and his parents had requested minimal if any use of physical prompting in his classroom. Other than a report from a sensory integration specialist, there were no assessment data available for Ari. It was noted in his school file that when formalized assessment had been attempted, he was not able to sustain attention to the varying test tasks presented to him. A classroom communication sample did show his MLU to be 3 words. He was a member of Classroom B – Morning Session. Ari was not originally a participant in the study but when Niall's family unexpectedly moved immediately prior to baseline, he was recruited for participation as he met all of the necessary prerequisites.

Niall turned 4-years-old during the course of the study. Like the other participants, Niall had a diagnosis of autism. Approximately 5 months prior to his participation in the study, Niall achieved a score of 101 on the Stanford-Binet Intelligence Scale. Using a classroom communication sample, the speech language pathologist in Niall's classroom assessed his MLU at 4 words. Niall knew a wide variety of object and action labels and readily used adjectives to describe objects. Niall displayed no visible stereotypic behavior. He was a member of Classroom A – Afternoon Session. Niall returned to school after Ari had begun the intervention phase of the study. Niall was recruited as the fifth participant in the study when it became apparent to the investigator that Ari would not consistently follow the data collector's verbal models.

Personnel and Training

Each participant's classroom staff were responsible for implementing the intervention. The author of this study trained all adults working in the classroom, including the head and assistant classroom teachers, classroom aides, the classroom speech language pathologist, and occupational therapist in the instruction of question-asking using the constant and progressive time delay procedures. The classroom staff were also trained as data collectors for this study.

The teacher in Classroom A had been teaching for 3 years. She had a masters degree in special education with a specialization in severe and profound disabilities. The teacher in Classroom B had also been teaching for 3 years. She had a master's degree in special education with a specialization in early childhood special education. Each of the four assistant teachers who participated in this study was a master's student in special education with a specialization in either severe and profound disabilities or early childhood special education.

Staff were given a copy of each participant's study protocol to read before the first training session. During the first training session, the investigator reviewed the protocol and answered any questions. The staff then viewed videotaped segments of circle time activities from each of the participant's classrooms. Prior to videotaping the training segments, each head teacher and/or circle leader received instruction in the form of modeling and role-playing in presenting novel stimuli materials during circle per the study protocol (to be described later). The teacher/circle leaders were instructed to alternate opportunities to ask each question form within each circle time activity. Once

weekly throughout the course of the study an independent observer recorded the order of opportunities on a baseline data sheet. The independent observer simply placed the number 1 in the column of the first question form opportunity, a 2 in the column for the second question form opportunity, etc. A review of these data sheets revealed that teachers never provided the same order of question form opportunities in consecutive weekly probes.

While viewing the videotaped circle, classroom staff were asked to identify opportunities in which a child could ask What, Where, and Who questions. When each member of each participant's classroom staff could identify all of the opportunities for question-asking, they were trained in data collection. Only two staff members required more than one training session. Please see Appendix A for the staff training data sheet.

Data collection training consisted of viewing role-played instructional scenarios. The adult participants in the scenarios demonstrated all 5 responses typically recorded in time delay procedures, anticipations, waits, nonwait errors, wait errors, and no response (Wolery et al., 1992). Scenarios included both the constant and progressive time delay intervals to be used in this study. When the members of each participant's classroom staff could identify each of the 5 responses across both time delay procedures with 100% accuracy as measured by the investigator's observations, intervention began. Again, only two staff members required more than one training session. Feedback was provided to the classroom staff regarding instruction and data collection throughout the course of the study.

Settings and Materials

All baseline and teaching sessions were conducted in the participants' classrooms during their daily 15-minute opening circle. Circle time typically included an opening greeting song, a calendar and weather activity, a short story or interactive activity correlating with the weekly theme and sometimes a show and share activity. Children sat in a semi-circle surrounding the circle leader; the assistant teachers and other classroom staff positioned themselves behind specific children who required support in order to attend to the circle leader and/or participate in the circle activities.

For the purposes of this study, instruction occurred throughout the entire circle activity. The teacher presented novel (that is, new to the classroom) stimuli during each circle time in a manner designed to elicit question-asking behavior from the children. The teacher prefaced the presentation of such stimuli throughout the course of the circle by saying, "It's time to play our special sharing game." The investigator provided each teacher with materials from which to choose so as not to add more responsibilities to their classroom preparation. Materials were chosen based on teacher report of participants' interests and included such items as Thomas the Tank Engine™ vehicles, Disney™ characters, squishy balls and toys, and small stuffed vegetables from the Veggie Tales™ television show. Stimuli to be presented for the sharing activity were always previewed by the investigator prior to each day's circle to ensure their appropriateness for the elicitation of What, Where, and Who questions.

At the conclusion of the study, follow-up was conducted during circle time to assess maintenance.

Response Definitions

This study examined the question-asking behavior of five preschoolers with autism. Both constant and adapted progressive time delay procedures were implemented during the participants' daily circle time activity so that for two of the three target question forms, What (is that, that) and Where (is it), five responses could be scored. No explicit instruction was provided for Who (is it) questions, although the same opportunities for asking this question form were provided for the participants. If the child asked any other questions, such as How, When, or Why, data collectors were instructed to record those responses as recorded as Other. No child asked a question other than What, When , or Who throughout the course of the study. Question types were chosen because they represented the first query forms to emerge in typically developing children and, based on each participant's chronological age, should have already been present in their expressive language repertoires (Miller, 1981; Schwabe et al., 1986).

Regardless of the delay procedure being used and the question being taught, the following responses could be scored: if the child asked the appropriate question before the delivery of the controlling prompt the response was scored as an anticipation. Appropriate questions asked within 3 s of the controlling prompt's delivery were recorded as correct waits. If the child asked an inappropriate question or made any other verbalization before the controlling prompt, the response was scored as a nonwait error. Inappropriate questions and/or other verbalizations made within 3 s of the delivery of the controlling prompt were scored as wait errors. If the child did not respond at all within 3 s of the controlling prompt, a no response was scored. Two correct responses were

required to meet mastery criterion. While wait corrects counted toward mastery criterion in the 0 s interval in both time delay procedures, only anticipations were considered correct and counted toward mastery criterion in all subsequent time delay intervals. Anticipations were consistently differentially reinforced; that is, were followed with behavior specific praise and access to the object about which the question was asked. All wait correct responses were validated, but did not access the objects about which a question could have been asked.

Dependent Measures

Several variables were analyzed in comparing the effectiveness and efficiency of constant and progressive time delay in teaching young children with autism to ask questions. To determine the effectiveness of each procedure, the frequency of anticipations were counted. The efficiency of each procedure was determined by examining the number of trials each participant required before the transfer of stimulus control was complete for each question type.

Generalization. Generalization of the participants' question-asking behavior was assessed weekly during their small group instructional time during baseline, intervention, and follow up sessions. No specific instruction of question-asking occurred during small group and the teachers were not required to make any modifications to the typical small group activity. During generalization assessments, the number of questions each participant asked were recorded in a manner identical to that of the study's baseline condition. Data collection was confined to those question forms explicitly taught to the participants during intervention. A generalization data sheet is found in Appendix B.

Social Validity. At the conclusion of intervention, each participant's classroom staff were asked to complete one of two questionnaires as a means of obtaining social validity information. The head teacher/circle leader's questionnaire addressed whether they thought the two prompt fading procedures were an effective and efficient means of teaching the participants to ask questions, if they would be willing to use the most effective and efficient intervention in the future, which of the two procedures they preferred and why, and how they would adapt the procedures, data sheets and training they received in future interventions. Please see Appendix C for the follow up questionnaire completed by the circle leaders.

The individuals who provided the verbal prompts and collected the data completed a questionnaire that addressed the prompt delivery conditions in both procedures, including counting the intervals with a stopwatch, and what adaptations they would make for future uses of the procedures. Please see Appendix D for the follow up questionnaire completed by the prompters/data collectors.

Data Collection, Interobserver Agreement, and Procedural Reliability

Data sheets for baseline and teaching sessions were similar. During baseline, the number of What, Where, Who, and Other questions asked during the circle sharing activity were recorded. Data collectors simply made a mark in the appropriate question's column. A baseline data sheet can be found in Appendix E. During teaching sessions, data collectors received a pre-made data sheet specifying which procedure(s) were being used, including the specific delay interval, and what question(s) were being targeted. After an opportunity was presented to ask a question the data collector circled an A

(anticipation) W+ (wait) N- (nonwait error) W- (wait error) or 0 (no response). Please see Appendix F for the data sheet used during the intervention phase of the study.

Interobserver agreement was collected for approximately half of all baseline and teaching sessions for each participant. During baseline, agreement across sessions was determined by comparing the number of each type of question asked by each participant as scored by two independent observers. In addition, during intervention, an overall reliability measure for (a) the response category A (anticipations), and (b) the remaining combined response categories was reported for each of the question forms demonstrated by each participant in the same manner as during baseline. For each of the three target question forms, agreement for the response categories was determined by comparing the agreements for anticipations as well as the remaining combined response categories per question type for each participant across all sessions for each phase as recorded by two independent observers. A point by point method was used to calculate interobserver agreement for baseline and intervention sessions and was calculated using the following formula:

$$\frac{\text{Occurrence Agreements + NonOccurrence Agreements}}{\text{Agreements + Disagreements}} \times 100$$

Table 2 displays the mean percentage of interobserver agreement recorded for each participant for each question form across baseline, intervention, and in the case of Jack, Rory, and Seth, follow up sessions. During baseline and follow up, agreement was consistently 100% for each question form for each boy. For both response categories, anticipations (A) and other responses (O), agreement ranged from 80 – 100% across all

question forms, with a mean of 96%.

Table 2

Percentage of Interobserver Agreement

	Baseline			Intervention						Follow Up		
	What	Where	Who	What		Where		Who		What	Where	Who
				A	O	A	O	A	O			
Jack	100	100	100	92	88	83	87	100	100	100	100	100
Rory	100	100	100	100	95	100	100	100	100	100	100	100
Seth	100	100	100	85	95	89	96	100	100	100	100	100
Ari	100	100	100	---	95	---	100	100	100	---	---	---
Niall	100	100	100	100	80	100	90	100	100	---	---	---

The integrity of the study's independent variables was assessed via procedural reliability checks (Billingsley, White, & Munson, 1980: Peterson, Homer, & Wonderlich, 1982; Salend, 1983; Salend, 1984) made periodically throughout the course of the study to "detect unplanned and/or unscheduled shifts in implementation" (Wolery, 1994, p.382). Procedural reliability was collected when an observer, who was not a member of the classroom staff, received a data sheet similar to the one used by the data collectors for each component of the study. The observer noted any deviations (a) from the manner in which questions were elicited by the teacher/circle leader, (b) the delivery of the fully modeled verbal prompt from the supporting instructor, particularly whether the prompt's delivery adhered to the corresponding delay interval, and (c) the delivery of praise by the teacher/circle leader. In addition, the order of the opportunity for questions to be asked was noted at the top of each procedural reliability sheet to ensure that the teacher did not provide opportunities for questions in a systematic pattern. Procedural reliability checks

were conducted one time weekly for each participant regardless of the study condition, baseline, intervention, or follow up. Procedural reliability was calculated using the following formula:

$$\frac{\text{Number of Times Administered as Planned}}{\text{Number of Times Should Be Administered}} \times 100$$

Table 3 shows the mean percentage of procedural reliability for each participant across the three question forms for all of the sessions for which reliability data were collected. For the What and Where question forms there were four responses scored for each question-asking opportunity. For the Who question form there were two responses scored for each question-asking opportunity. A total of thirty responses were scored per child per circle time activity. Please see Appendix G for the procedural reliability data sheet used in the study. Procedural reliability ranged from 95 – 100% for the study with a mean of 99%.

Table 3

Percentage of Procedural Reliability Across Sessions

Participant	What	Where	Who
Jack	96	100	100
Rory	97	99	100
Seth	95	95	100
Ari	100	100	100
Niall	97	100	100

Experimental Design and Procedure

A variation of the alternating treatments design (Barlow & Hayes, 1979), known as the adapted alternating treatments design (Griffen, Schuster, & Morse, 1988; Sindelar, Rosenberg & Wilson, 1985) was used to compare the effectiveness and efficiency of the

constant and adapted progressive time delay procedures employed in this study. In an alternating treatments design, there is a rapid alternation of two or more treatments which have been simultaneously applied to a behavior. A participant is exposed to each of the rapidly alternating treatments for an equal amount of time and the effects on their behavior are recorded. An advantage of the design is the manner in which threats to internal validity are handled. In regard to this subject, Barlow and Hayes (1979) said, "the testing of two treatments in the same subject within the same time period produces one of the most elegant controls to most threats to internal validity" (p. 203).

There are also several strategies that can be used with an alternating treatments design to reduce the threats to external validity. A major threat to external validity is multiple treatment interference. Multiple treatment interference arises when the same participant(s) receive two or more treatments (Kazdin, 1982). Ulman and Sulzer-Azaroff (1975) divided multiple treatment interference into sequential confounding and carryover effects. In an alternating treatments design, sequential confounding is controlled by counterbalancing, as the rapid alternation of treatments allows "more administrations of A and B in a shorter period of time than the standard A-B-A design" (Barlow & Hayes, 1979, p.204). More frequent administrations of an intervention allows the examination of more, and potentially all, of the sequences to which a participant could be exposed. In addition, more administrations of A and B provides an experimenter with more opportunities to replicate the various presentation sequences. Carryover effects, the influence of one treatment on another treatment regardless of delivery sequence can be divided into contrast and induction. Carryover effects will be discussed in further detail

in the following description of adapted alternating treatments designs. Alternating treatments designs have been used in two different ways: (a) to compare the effect of treatment versus no treatment and (b) to compare two different treatments. In either case, the design is desirable because it does not require the lengthy withdrawal of a treatment that could result in the loss of any gains made during intervention and it also allows for a quicker comparison of treatments than a standard withdrawal design.

An adapted alternating treatments design differs from the standard alternating treatments design in that each intervention or treatment is associated with a unique set of instructional items, in the case of this study the use of either a constant or an adapted progressive time delay to teach two different question forms. While it was pre-determined which time delay procedure would be applied to which question form for each child, the teachers leading the circle time activity alternated the opportunities to ask the specific question forms. Use of an adapted alternating treatments design requires a baseline in which the participants demonstrate equivalent performances across at least two sets of behaviors. The next experimental condition involves comparing acquisition in one method to the acquisition in the second method. Sindelar et al. (1985) stated that the comparison between the two methods is made by observing with which instructional method the participant makes the most rapid skill acquisition across subjects, settings, or behaviors. The application of different treatments to different behaviors which is characteristic of the adapted alternating treatments design is desirable because it permits a fairly rapid comparison of two treatments on behaviors that are considered equivalent and functionally independent.

The design can be more efficient than the A-B-A-B, multiple baseline, or multiple probe designs because the "relative effects of two interventions are readily and rapidly apparent" (Sindelar et el., 1985, p.69). Adapted alternating treatments designs avoid the problem of sequential confounding inherent in A-B-A-B designs in the same manner as alternating treatments designs. They are applicable to behaviors that are not typically expected to reverse or for complex behaviors that are difficult to break down into equivalent subsets of responses. As with the alternating treatments design, the adapted alternating treatments design can be plagued by carryover effects (Barlow & Hayes, 1979), particularly induction. Induction is defined by Sindelar et al. (1985) as the "positive transfer between two interventions" (p. 70). Sindelar et al. (1985) stated that " an assessment of induction across the instructional sets would require sampling of performance on a third equivalent set on which no instruction occurs" (p.74). The threats of both induction and contrast in this study were reduced since the same intervention package was not applied to the same behavior for each participant.

Induction was further addressed in this study via the inclusion of the third question type, "Who", for which no instruction was provided. Intervention for What and Where questions was introduced simultaneously for each participant; however, the introduction of intervention was lagged in a fashion indicative of a multiple baseline across participants experimental design so that the Rory did not begin intervention until Jack had completed the 0 s time delay condition for both question forms. Subsequent participants moved from baseline to intervention in an identical manner. Such a staggered introduction of the intervention further demonstrated that changes in the

participants' question-asking behavior could be attributed to the independent variables (Kazdin, 1982).

In addition, the study included a crossover component in order to control for the fact that the What and Where question forms may actually have not been of equivalent difficulty. An adapted progressive time delay procedure was used to teach the first participant to ask What questions and a constant time delay procedure was used to teach him to ask Where questions. For the second participant, a constant time delay procedure was used to teach the What question form and an adapted progressive time delay procedure was used to teach Where questions. These procedures were replicated for the third and fourth participants respectively. When the fourth participant failed to progress from the 0 s interval in either condition, a fifth participant was added to replicate the second participant's experimental conditions. Consistent effects needed to be observed across replications so that it could not be argued that one procedure was repeatedly assigned to an easier question form.

An adapted alternating treatments design was chosen for this study for a number of reasons. The question forms being taught to the participants in this study all emerge in typically developing children during the second year of life, and, therefore, may comprise equivalent instructional sets. The teacher managed rapid alternation of the instructional procedures, in that opportunities to ask the three question types were naturally alternated as appropriate to the classroom activity. In addition, given the complexity of question-asking behavior, and the fact that the acquired skill should not reverse when intervention is concluded, the adapted alternating treatments design and the behavior under

examination appeared to be a good match. Procedures to be employed for the participants were:

Baseline. The same procedures were used during each participant's baseline condition. The classroom teacher/circle leader presented novel and potentially motivating materials prior to the typical show and share activity. Materials were presented in the following manner: (a) for What (is it, that) questions, the teacher made a statement like, "We've been talking about green this week and I've brought one thing really cool that's green."; (b) for Where (is it) questions, the teacher said something to the effect of, "Today is our special purple day. I have a purple surprise hidden somewhere in the free choice area"; and (c) for Who (is it) questions, the teacher stated something similar to "I see someone is sitting next to a very neat surprise." The teacher provided 3 opportunities per question form per circle time and the number of appropriate questions each participant asked were recorded. The effects of observational learning and modeling as instructional strategies on the question-asking behavior of the participants were observed during baseline as the typically developing children appeared to be highly motivated to ask questions about or guess the identity of the novel stimuli. None of the participants imitated the questions frequently modeled by their typically developing peers during this condition.

Intervention. During intervention, the teacher alternated the opportunities to ask all three question types, therefore providing a natural alternation of the intervention. In both time delay conditions, the delay interval was measured using a stopwatch. After the initial baseline of three sessions per participant was complete, Jack entered the first

experimental condition. Intervention involved teaching What questions with an adapted progressive time delay procedure and Where questions with a constant time delay procedure. Instruction in the two question forms was simultaneous and the teacher presented stimuli identical to the manner it was presented in baseline. In the adapted progressive time delay procedure, Jack was exposed to two sessions with 0 s delay before moving to a 1 s, 2 s, 3 s and finally 4 s time delay interval. The move to the 1 s time delay was contingent on Jack imitating the verbal model at least 2 out of 3 times in consecutive sessions. The final 4 s delay interval was chosen to match the constant delay interval in the constant time delay procedure. In the constant time delay procedure, Jack was exposed to two sessions with a 0 s delay before moving to a 4 s constant delay interval. Four seconds was chosen because it is the most common constant time delay interval used in the literature (Ault et al., 1988; Browder et al., 1981; Doyle et al., 1990; Gast et al., 1988; Kleinert & Gast, 1982). The participant needed to demonstrate two consecutive sessions with two out of three of the target questions asked before the controlling prompt in each subsequent interval was increased. In the adapted progressive time delay procedure, Jack was required to achieve mastery criterion at the lower delay interval before an increased interval length was provided.

Upon the completion of the 0 s time delay interval for Jack's What and Where question forms, Rory moved from baseline to the experimental condition. For this child, constant time delay was used to teach What questions and the adapted progressive time delay was used to teach Where questions. The same procedures and contingencies previously described applied to the instruction that Rory received and when he completed

the 0 s time delay interval for the What and Where questions, Seth moved from baseline into experimental condition. Seth's time delay conditions replicated those of Jack.

When Seth completed the 0 s time delay condition for the What and Where question forms, Ari left the baseline condition. The instruction that Ari received in What and Where questions replicated the procedures used during the experimental conditions with Rory. Ari did not consistently follow the verbal models in the 0 s time delay interval for either question form. In order to replicate Rory's experimental conditions, Niall was added to the study. Niall, like Jack, only participated in three baseline sessions before entering the experimental condition.

Throughout the course of intervention opportunities to ask Who questions were provided in a manner consistent with that of the other two question forms. Although no intervention was provided for the Who question form, data were collected for each participant's question-asking behavior.

For each participant, the task stimulus was defined as the circle leader's statement (e.g., "I brought something special today" for the What question form). The controlling prompt for each child was the full verbal model of the appropriate question form delivered by the instructor/data collector. This adult was positioned directly behind the child in a manner that allowed them to quickly whisper the verbal model to the child. Support was typically provided from behind during circle, so the procedure did not appear to startle the participants. When the child emitted the correct question form before the controlling prompt (that is, demonstrated an anticipatory response), the teacher

delivered verbal, behavior-specific praise for asking the question and access to the novel stimuli presented (e.g., "That's great asking me a question. You can play with the special toy.") Although wait correct responses were reinforced during the 0 s interval for both time delay procedures, only anticipations were reinforced in all subsequent delay intervals. This reinforcement contingency, specifically linking reinforcers to the behavior under manipulation, was designed to provide for maintenance and generalization of the participants' question-asking skills in the absence of explicit prompting by an adult. Praise for anticipatory responses was delivered on an as continuous basis as was possible in the classroom. In the event that there were more than three opportunities per circle for a question form, data were collected for the first three presentations. With the exception of Ari, intervention was terminated when both the What and Where question forms were mastered.

CHAPTER 3

RESULTS

Figures 1 – 5 show the number of responses, that is questions asked, per circle time activity for the five boys across all conditions in which they participated. Anticipations and wait correct responses are graphed individually, while all other response types have been combined in the errors category. The only errors made by Seth and Niall were no responses. Jack, Rory, and Ari's errors were also in the no response category with the exception of three wait incorrect responses made by each boy across the intervention condition. During baseline, none of the boys asked What or Who questions and only Ari asked a Where question. A visual inspection of the Figures 1- 5 shows that, during the intervention conditions all of the boys except Ari produced What and Where questions during their daily circle time activity. None of the participants produced Who questions during circle.

Table 4 shows the number of intervention sessions needed for each participant to fully complete each time delay condition.

Table 4

Number of Intervention Sessions to Completion

Participant	What	Where	Who
Jack	22 (PTD)	14 (CTD)	-----
Rory	17 (CTD)	24 (PTD)	-----
Seth	21 (PTD)	20 (CTD)	-----
Ari	-----	-----	-----
Niall	4 (CTD)	13 (PTD)	-----

While Jack did not complete the 4 s adapted progressive time delay interval until the 22nd session, an examination of Figure 1 shows that he only required 15 sessions to complete the 1 s adapted progressive time delay interval. Completion of an interval (with the exception of the 0 s interval) in both time delay conditions was contingent on meeting the mastery criterion of two consecutive sessions with at least two anticipations when presented with three opportunities to ask questions. The data represented in Figures 1 – 5 indicate that only Jack's question-asking behavior fell below mastery level after the completion of the 1 s adapted progressive time delay interval. It, therefore, appeared that the transfer of stimulus control from the verbal prompt to the teacher's presentation of an opportunity to ask a question was complete at the end of the 1 s interval. The subsequent intervals were extensions of a continuous schedule of reinforcement with a limited hold schedule of reinforcement and, as previously noted, were presented to the participants as a means of potentially increasing the latency of their question-asking so that their behavior would be more like that of their typically developing classmates. In terms of the initial transfer of stimulus control, the true comparison then, of this study seemed to be between a 4 s constant time delay procedure and the completion of the 1 s interval of the adapted progressive time delay procedure with a continuous schedule of reinforcement with a limited hold. Table 5 displays the revised efficiency data comparing the completion of the 1 s adapted progressive time delay interval and the 4 s constant time delay intervals.

Table 5

Number of Intervention Sessions to Criteria

Participant	What	Where	Who
Jack	15 (PTD-1s)	14 (CTD-4s)	-----
Rory	17 (CTD-4s)	18 (PTD-1s)	-----
Seth	15 (PTD-1s)	20 (CTD-4s)	-----
Ari	-----	-----	-----
Niall	4 (CTD-4s)	7 (PTD-1s)	-----

While this comparison decreases the number of intervention sessions required for each participant to reach mastery criterion in the adapted 1 s progressive time delay condition, the 4 s constant time delay intervention still appeared to be slightly more efficient in terms of number of trials to criterion for Jack, Rory, and Niall. The adapted progressive time delay condition appeared to be more efficient for Seth.

A comparison of Table 5 and Figure 1 shows that 14 sessions were required for Jack to meet mastery criteria for the Where question form. Notice that data collection continued for this question form until the completion of the intervention for the What question form as Jack continued to require prompting to consistently ask Where questions for five sessions after meeting mastery criterion. An examination of Figures 2, 3 and 5 demonstrate that data collection was continued for the question forms Rory, Seth, and Niall learned in the constant time delay conditions in order to replicate the intervention conditions administered to Jack.

Ari did not complete the 0 s interval for either question form, as he did not consistently follow the controlling prompt. In fact, Figure 4 shows that for the What question form Ari only responded to the controlling prompt one time in the 5th

intervention session and two times in the 10th intervention session. For the Where question form, Ari only responded to the controlling prompt one time in the 13th intervention session. When the other four boys met mastery criteria for their intervention packages data collection was discontinued for Ari.

In terms of errors made by the participants throughout this study, there was no difference in the mean number of errors made by Jack, Rory, or Seth, and a minimal difference in the mean number of errors made by Niall across the time delay procedures applied to the What and Where question forms. These data are displayed in Table 6 which represents the mean number of participant responses per session. The data for anticipations and wait corrects are shown in isolation while the other 3 response types have been combined in the errors category.

Table 6

Mean Number of Participant Responses Per Session

	What			Where			Who	
Participant	A	W+	Errors	A	W+	Errors	Question Asked	Errors
Jack	1	2	0	1	2	0	0	3
Rory	1	1	1	1	1	1	0	3
Seth	1	1	1	0	1	1	0	3
Ari	0	0	3	0	0	3	0	3
Niall	2	.5	.5	1	1	1	0	3

None of the boys met mastery criteria for the Who question form with only Rory and Niall asking one Who question each at any time during intervention.

Follow up data, collected one time weekly after the conclusion of the intervention condition for Jack, Rory, and Seth showed that they continued to ask What and Where questions at least two times per circle time activity.

Generalization

Figure 6 represents the number of questions asked by the participants during generalization probes conducted once weekly during their daily small group activity. None of the boys asked any of the question forms during baseline. After intervention began for the What and Where question forms, each of the boys except Ari began to ask these questions during small group. Jack began asking What questions during generalization probes that corresponded to the fifth intervention session for the What question form and the second intervention session for Where questions. During generalization probes that corresponded with the sixth intervention session for What questions and the seventh intervention session for Where questions, Rory began asking these questions. Seth began asking What questions during the generalization probe that corresponded with the second intervention session for this question form. He began asking Where questions during the generalization probe that corresponded with the fifth intervention session for the Where question form. Niall began asking What questions during the generalization probe that corresponded with the second intervention session for this question form. Niall's first Where question during small group corresponded with the third intervention session for this question form. None of the boys asked Who questions during the probes. During follow up probes, Jack and Rory continued to ask at least two What and one Where questions per small group activity. All questions asked by the boys during small group were characterized as matching the opportunity; i.e., the boys did not ask a Where question when an opportunity for a What question was provided.

Social Validity

Both circle leaders felt that the progressive and constant time delay procedures were effective and efficient. The teacher in Classroom A did not prefer one procedure over the other, but the teacher in Classroom B preferred the progressive time delay procedure, stating, "using progressive time delay gives participants immediate success." The teachers unanimously stated that they would use both procedures as written for this study in their classroom again with the teacher of Classroom B elaborating, "It was extremely easy for any staff member to use." Neither teacher made any recommendations for modifications to either procedure or the data sheets used in the study. The teacher in Classroom A did not suggest any changes to the manner in which she was trained to elicit the boys' questions, while the teacher in Classroom B suggested having more assistance in providing opportunities for Where questions as "at the end it was easy, but at the beginning it was difficult."

All of the data collectors characterized the delivery of prompts in both procedures as being easy, either "easy everyday" or "usually easy". Only two of the seven data collectors discriminated their answers across the time delay procedures; that is, two data collectors did say that it was "easy everyday" to accurately prompt questions in the constant time delay procedure, but "usually easy" to accurately prompt questions in the progressive time delay procedure with one individual further elaborating that she "had to keep looking to see what it (the progressive time delay interval) was." None of the data collectors would have made any changes to the manner in which the intervals were counted or in the manner in which they were trained.

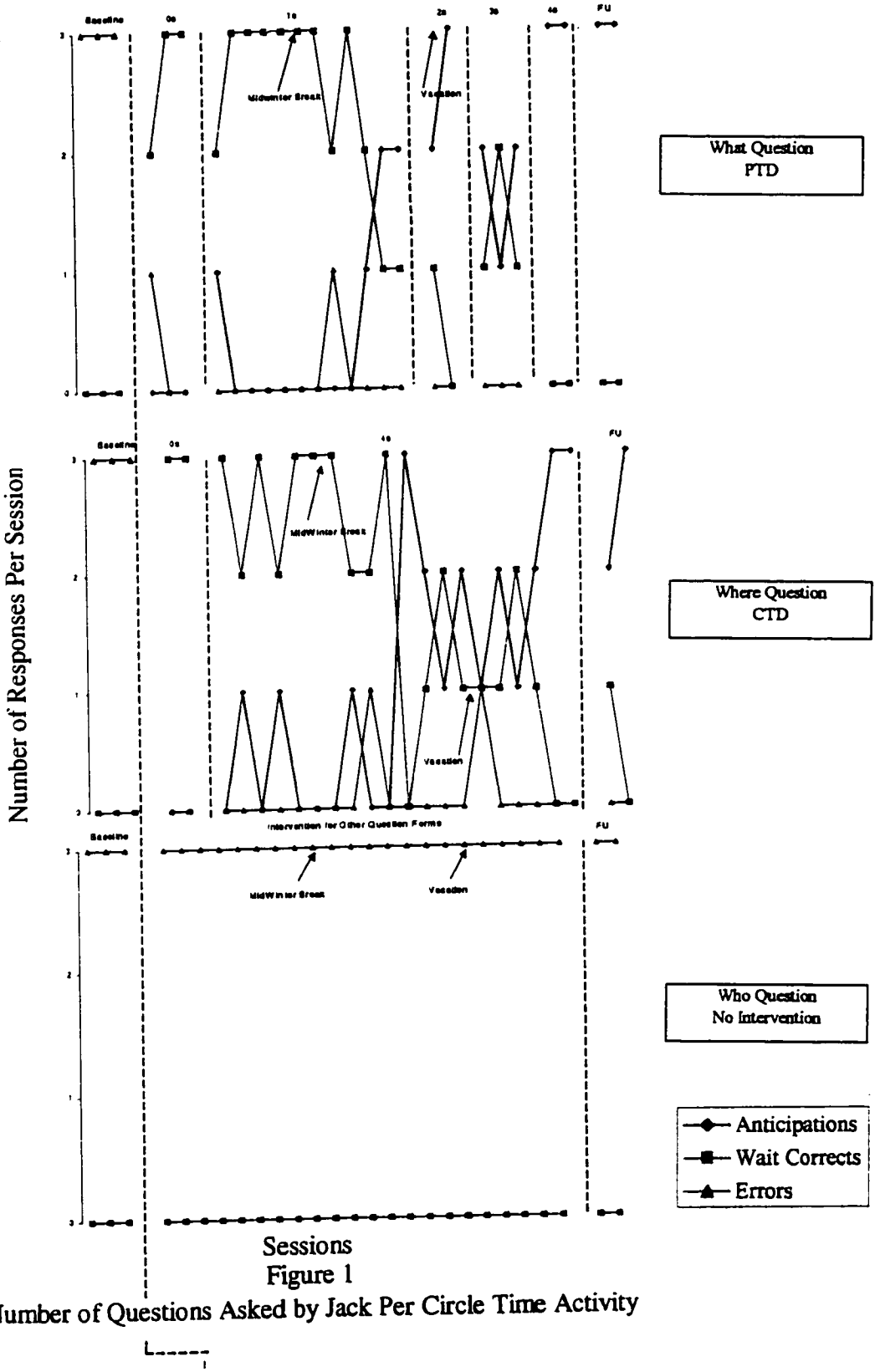

Figure 1

Number of Questions Asked by Jack Per Circle Time Activity

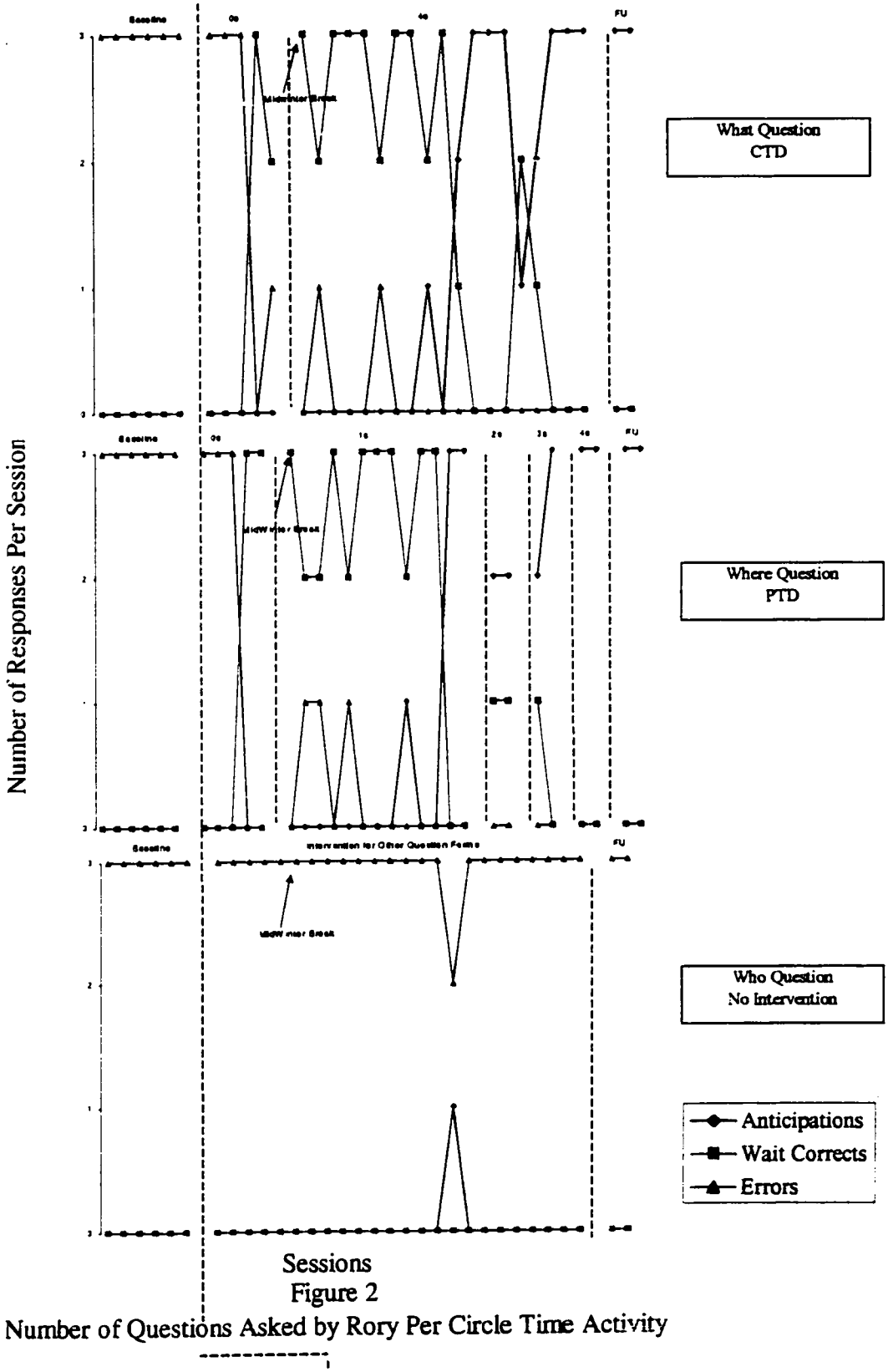

Figure 2

Number of Questions Asked by Rory Per Circle Time Activity

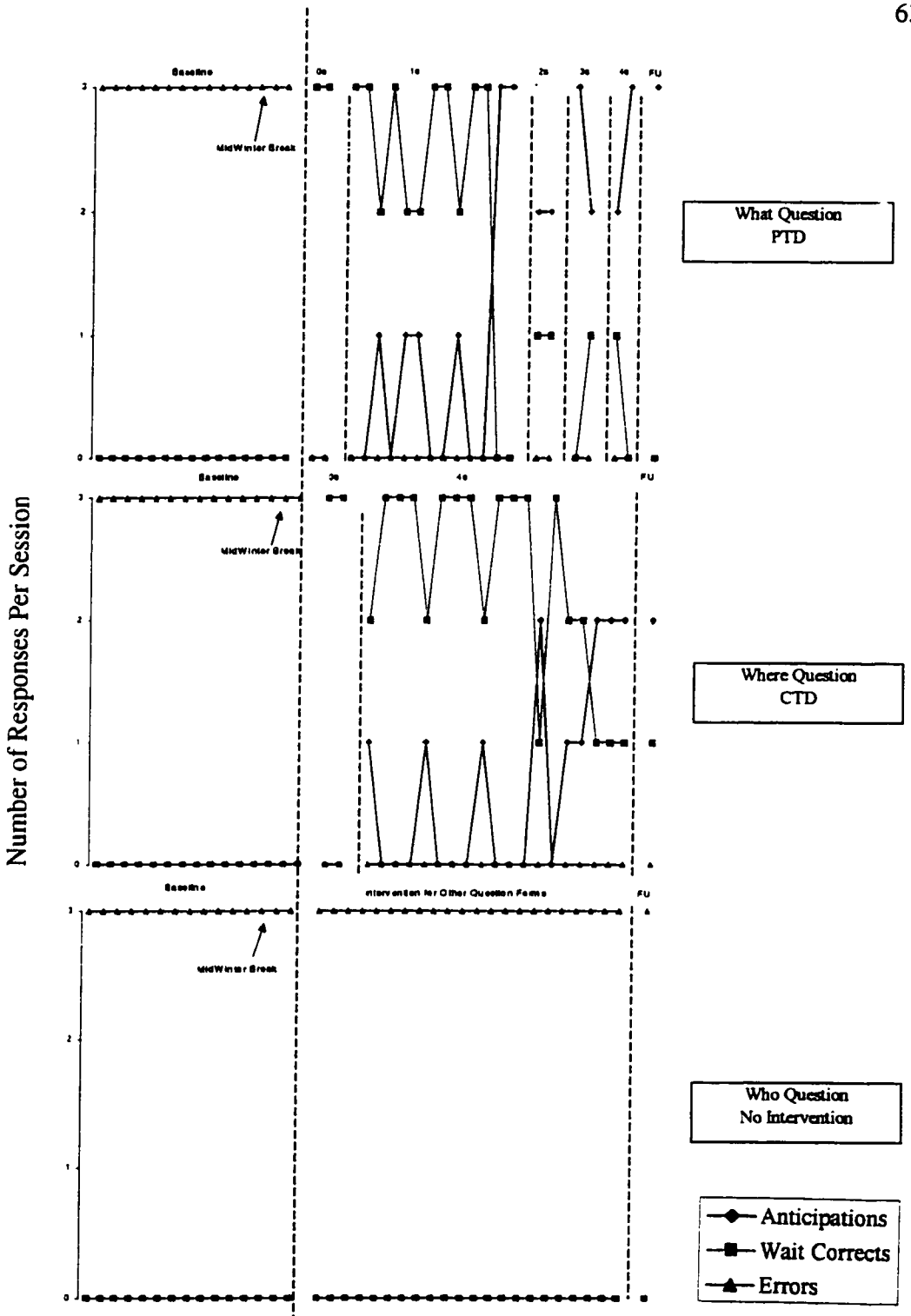

Figure 3

Number of Questions Asked by Seth Per Circle Time Activity

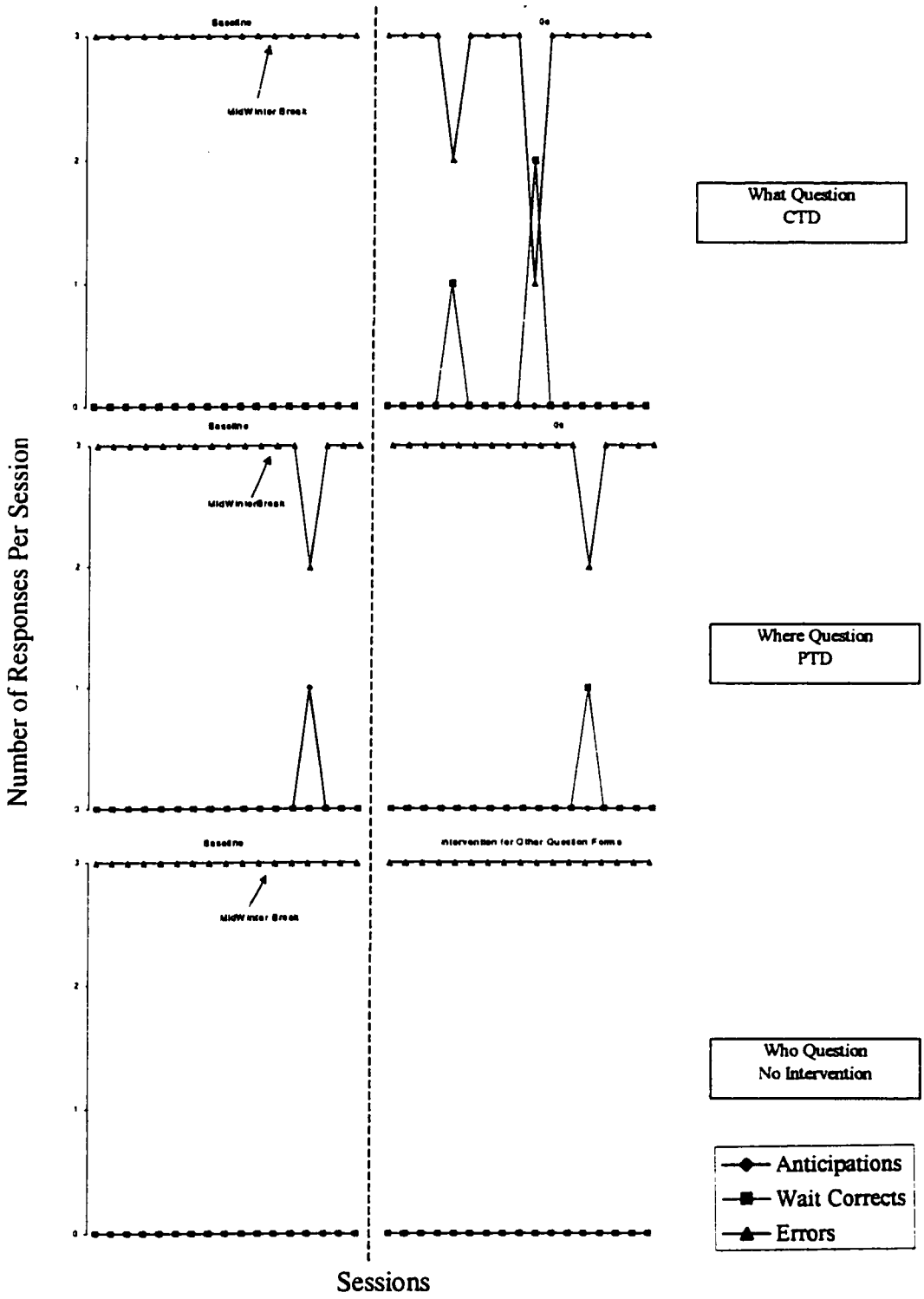

Figure 4
Number of Questions Asked by Ari Per Circle Time Activity

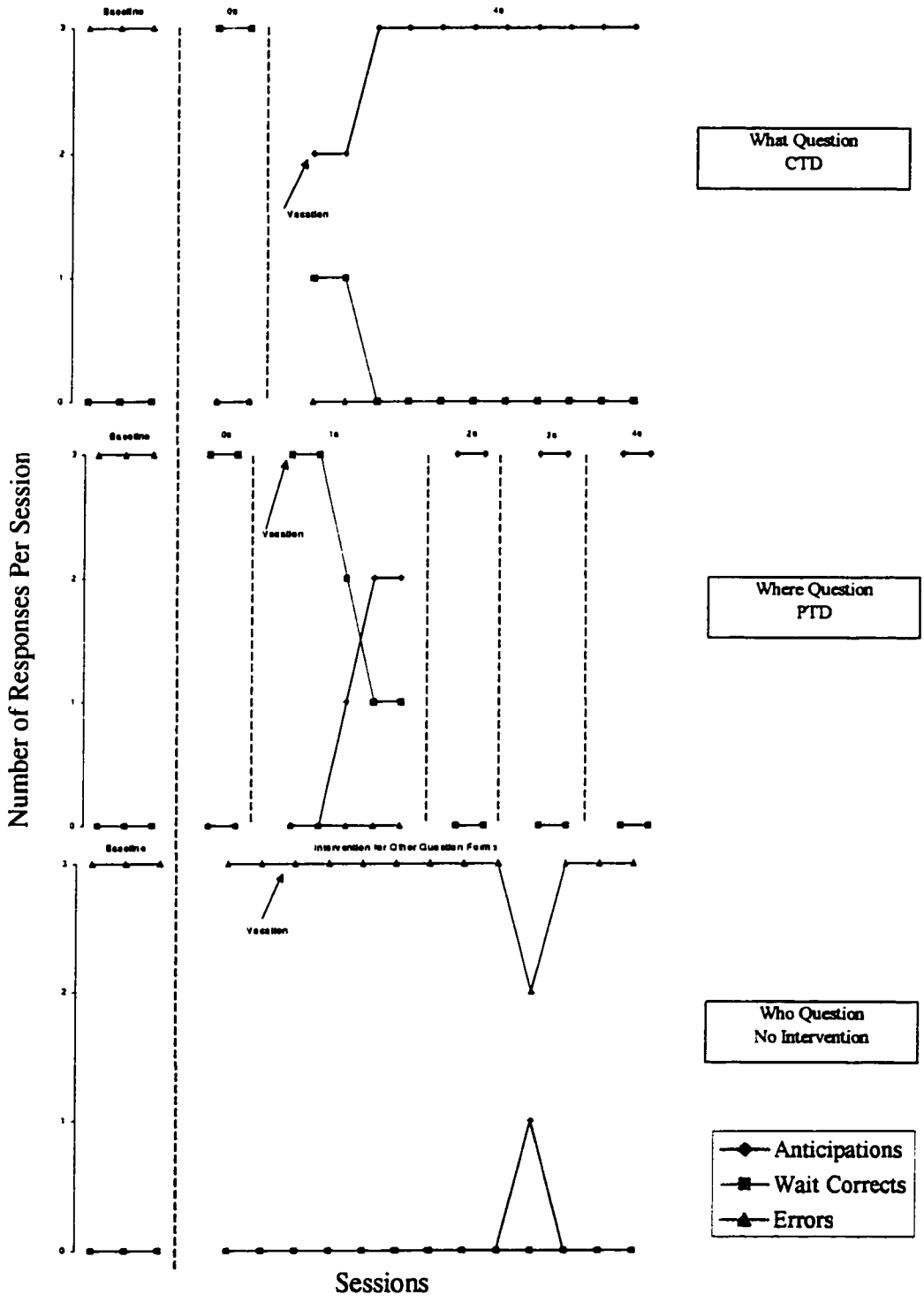

Figure 5
Number of Questions Asked by Niall Per Circle Time Activity

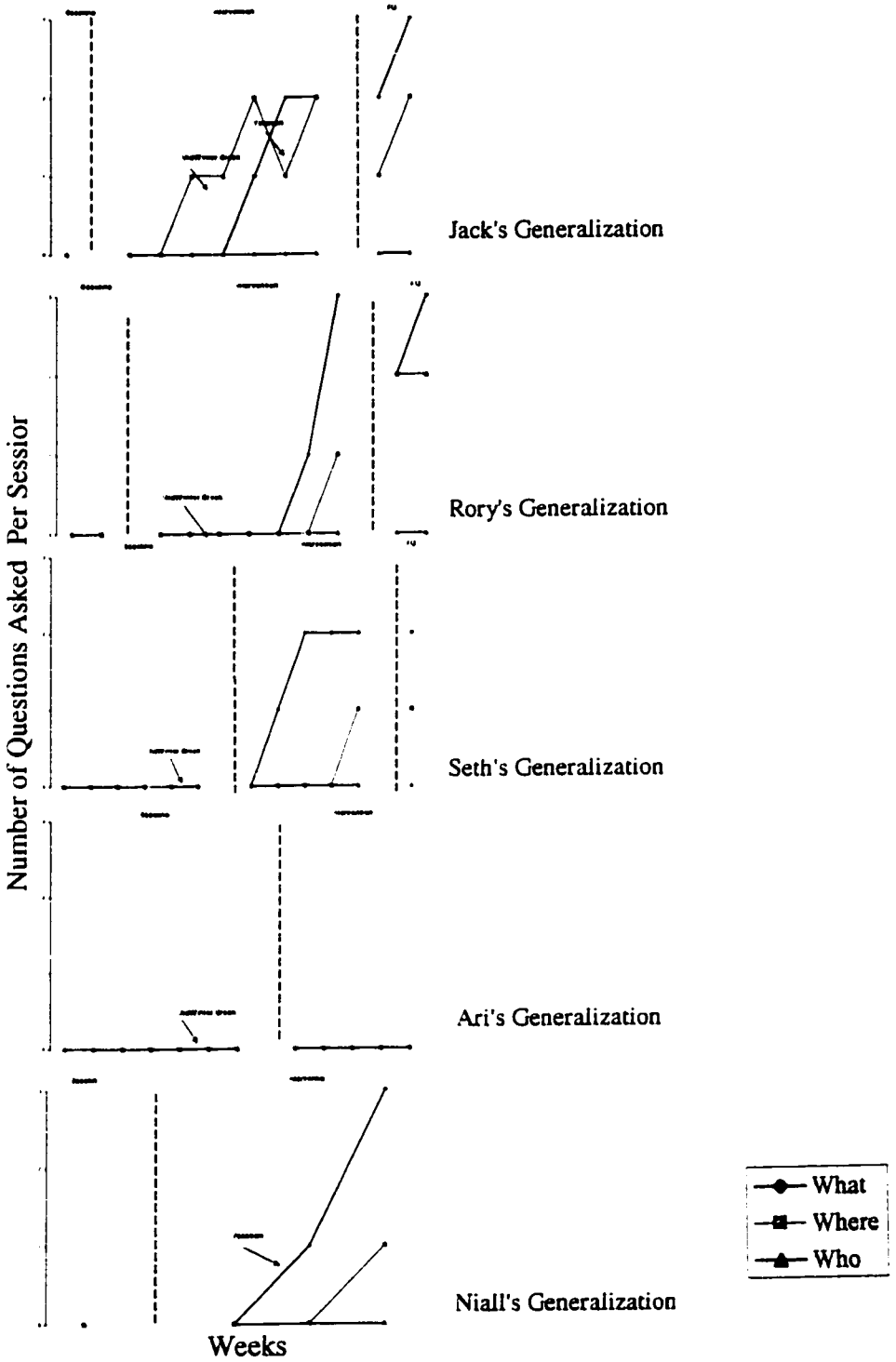

Figure 6
Number of Questions Asked In Generalization Probes
During Small Group Sessions

CHAPTER 4

DISCUSSION

The following section will be divided into several main areas. The discussion will begin with a summary of the participants' acquisition of the target question-asking behaviors. An analysis of the transfer of stimulus control will follow. The original hypothesis and rationale for the adaptation to the progressive time delay procedure will then be discussed. Finally, the limitations of the study will be highlighted as well as considerations for future research and implications for practice.

Summary of the Participants' Data

Baseline data collected for the five children in this study supported the anecdotal reports of the classroom teachers and observations of the author that, prior to intervention, none of the children in this study asked What, Where, and Who questions when presented with clear opportunities to do so. Interestingly, only Ari asked any questions during the baseline condition although, throughout the course of his intervention, he did not consistently respond to the controlling prompts in the 0 s time delay interval in either procedure. His failure to imitate the verbal models in the initial time delay conditions prevented his progression through the procedures like the other boys. Ari did meet the prerequisites for the study which included following verbal models when presented by an adult. However, throughout intervention, Ari refused to follow the modeled question; in fact, he often attempted to move away from the data collector after the model had been provided. Although by no means a requirement for participation in the study, it should be noted that Ari's parents had declined the invitation

for their son to receive additional intensive services provided to children with autism in his educational setting. It is possible that Ari's experience with demands being placed on him (i.e., consistently following verbal models from adults or even following an adult's instructions, and the consequences for not complying in either situation) was much different from the other four boys. It would be interesting to observe what difference, if any, would occur in his behavior if he were exposed to the same behavioral contingencies across his environments in a manner similar to that of the other four participants.

Based on the data obtained during this study (with the exception of Ari's), several interesting observations can be made. While the duration of entire constant time delay procedure was less for all of the boys in comparison to the duration of the entire adapted progressive time delay procedure, an examination of the data across participants shows that, in effect, none of the boys' question-asking behavior (with the exception of one 3 s session for Jack) fell below mastery level (that is two out of three questions asked independently) after completing the 1 s adapted progressive time delay interval (See Figures 1, 2, 3, and 5). It could then be said that these preschoolers had learned to ask whatever question form was presented to them at the conclusion of the 1 s adapted progressive time delay interval. Rather than compare the transfer of stimulus control between the entire adapted progressive and standard constant time delay procedures, it seemed more appropriate to compare the effectiveness and efficiency of the 1 s interval of the adapted progressive time delay and 4 s constant time delay conditions. While both time delay procedures appeared to be effective, that is the participants learned what they were taught (Wolery, 1992), the constant time delay procedure, when compared to the

mastery of the 1 s progressive time delay interval, appeared to be the most efficient for Jack, Rory, and Niall, meaning it was effective and required less time in terms of sessions to criterion than the progressive time delay (Wolery et al., 1992). For the purpose of comparison in this study, efficiency was represented in terms of number of sessions, and, therefore, total minutes of instruction, as well as number of errors made by the participants. The 4 s constant time delay was more efficient in terms of number of sessions for Jack and Rory by one session each and for Niall by three sessions. The 1 s adapted progressive time delay interval was more efficient for Seth by five sessions. Considering that a typical circle time lasted 15 minutes, the number of minutes in instruction with the 4 s constant time delay procedure was also less for Jack, Rory, and Niall while the number of minutes in instruction with the 1 s interval in the adapted progressive time delay condition was less for Seth. As previously noted in the Results section, there was minimal difference in the number of errors made across time delay procedures.

Original Expectation and Rationale

The original expectation of this study was that the adapted progressive time delay procedure would be more effective and efficient for preschoolers with autism because the controlling prompts would be delivered earlier in this procedure, therefore minimizing the opportunity for the children to embed errors in their question-asking behavior. The results of this study did not support this hypothesis as there appeared to be no difference between the two procedures in terms of effectiveness and the 4 s constant time delay procedure was slightly more efficient than the 1 s interval of the adapted progressive time

delay procedure for three of the four boys who completed the study.

Possible Rationale for Results

Given the prerequisites for the study, particularly the ability to answer What, Where, Who questions, these children may have had higher cognitive abilities than those in previous studies with less complex tasks like matching (McIlvane et al., 1984), sight word reading (Gast et al., 1988; Schoen & Ogden, 1995), manual signing (Bennett et al., 1986; Browder et al., 1981; Kleinert & Gast, 1982; Oliver & Halle, 1982), identifying symbols (Berkowitz, 1990; Johnson, 1977; Touchette, 1977; Zane et al., 1984), number identification (Ault et al., 1988b), object identification (Barrera & Sulzer-Azaroff, 1983; Godby et al., 1987), picture identification (Barrera & Sulzer-Azaroff, 1983; Wolery et al., 1988), reading (Ault et al., 1988a; Browder et al., 1984; Farmer et al., 1991), and localizing toward a sound (Goetz et al., 1983). This is to say that the potential for embedding errors in the boys' question-asking behavior in the 3 additional seconds between the 1 s adapted progressive time delay interval and the 4 s constant time delay interval may not have been substantial enough to increase the sessions required to meet criterion or increase the error rate in the constant time delay condition.

The above rationale might also help to account for the fact that, when comparing the completion of the 1 s adapted progressive time delay interval and the 4 s constant time delay interval, only Seth's data reflected the modified progressive time delay as more efficient that constant time delay. As previously mentioned, Seth's expressive verbal repertoire was the most recent to emerge and his IQ score was the lowest of the participants who completed the intervention. While he was the oldest participant and

demonstrated many pre-academic skills like number and sight word identification, his teachers and related service providers unanimously characterized his receptive and expressive language abilities as the least mature of the five participants. Seth's immature language repertoires were also apparent in the investigator's classroom observations and in his ability to answer What, Where, and Who questions prior to intervention. It appeared that Seth had, in fact, learned much of his expressive language in the gestalt manner described by Prizant (1983) and applied scripts, often erroneously, to the majority of the social-communicative situations with which he was faced. Given the possible fragility of his receptive and expressive language repertoires, it would therefore seem critical to prevent errors during instruction of novel language tasks such as question-asking. The results of this study also support Schuster and Griffen's (1990) suggestion that constant time delay is more appropriate for higher functioning participants "since waiting through small delay intervals (as would be used in progressive delay) might become frustrating" (p. 50). Frustration is thought to be a result of the students' restricted opportunities to respond independently before the delivery of the controlling prompt.

On the other hand, Niall's data indicated a rapid acquisition rate for both question forms receiving intervention. Niall was the youngest participant and by no means the most sophisticated linguistically, especially given his frustration over articulation issues. However, Niall's prosocial behavior, as measured by teacher report on a social rating scale, was rated the highest of the five participants in terms of attending to and maintaining interactions with his communicative partner. Niall's question-asking

behavior may have been the easiest to shape because, unlike the other boys who appeared to be more withdrawn, Niall seemed to demonstrate more competent linguistic intent and his pragmatic language deficits may not have been as severe as his fellow participants.

The Who question form. None of the boys learned to ask Who questions in the absence of intervention, thereby strengthening one's confidence that the changes in Jack, Rory, Seth, and Niall's question-asking behavior could be attributed to the intervention. The introduction of intervention in a multiple baseline across participants manner also supports this claim as none of the boys' question-asking increased throughout the course of their individual baselines. In fact, only Rory and Niall asked a Who question during intervention for the other two question forms and both questions came immediately after a Who question was modeled by a peer. Given that What and Where question-asking behavior had been reinforced, their attention to such verbal models may have increased since baseline.

Generalization. Not only did Jack, Rory, Seth, and Niall's question-asking behavior increase during circle time throughout the course of intervention , but the boys also began to ask questions during their small group activity as the study progressed (see Figure 6). With the exception of Jack, the boys consistently asked a higher number of What questions in their small group settings. One obvious explanation for this phenomenon is that the boys were provided with more opportunities to ask What questions during small group. A review of the raw data indicated that teachers provided the boys with an average of three opportunities per question form as they had been

instructed to do during intervention. Occasionally more opportunities for asking What questions were presented to the participants, although the raw data indicate that this was the case only for Jack and Rory. On two occasions, Jack and Rory's teacher provided them with four, rather than three, opportunities to ask a What question during small group. Given that Jack's What questions were not consistently higher than the other question forms, conclusive evidence is not available for the rationale that the only reason the boys asked more What questions is that more opportunities were provided to them.

Another possible explanation for the higher number of What questions for Rory, Seth, and Niall could be occurrence of sequence effects. It is possible that the teachers did not consistently alternate question-asking opportunities during small group. No data are available for the order of question-asking opportunities, this therefore remains an area for future research.

Novel Components of the Study

This study differed from most other investigations of progressive time delay in that each participant had to meet a mastery criterion for anticipations alone before progressing to the next interval. While several schedules of increasing the prompt delay have been used with progressive time delay, including increasing the delay interval each instructional session (Ault et al., 1988a; Bennett et al., 1986; Browder et al., 1984, Farmer et al., 1991; Godby et al., 1987; Halle et al., 1979; Wolery et al., 1988), increasing the delay interval following a specific number of trials (Ingenmey & Van Houten, 1991; Snell, 1982, Touchette & Howard, 1980; Walls et al., 1984), and increasing the interval following a certain number of trials during which correct

responses occurred (Berkowitz, 1990; Braam & Poling, 1983; Charlop et al., 1985; Charlop & Walsh, 1986; Johnson, 1977; McGee & McCoy, 1981; Matson et al., 1993; Smeets et al., 1988; Smeets & Streifel, 1988; Streifel et al., 1974; Walls et at., 1984), no other study to date has adapted the progressive time delay protocol to include an "anticipations-only" criterion for increasing the delay interval. While only anticipations counted toward criterion in the progressive time delay studies listed above, both anticipations and wait corrects were reinforced throughout intervention. Ault et al. (1988a) stated that it was important for the participants to learn that it was acceptable to wait if they did not know an answer. In this study, only anticipations were reinforced after the 0 s time delay interval in both time delay conditions.

The author acknowledges that waiting is acceptable when a student is unsure of the correct answer as noted by Ault et al. (1988a). However, the context of the participants' classrooms indicated that if these children were continually allowed to wait for the controlling prompt during acquisition, their typically developing peers would, in all probability, ask the target questions first. In differentially reinforcing anticipations and not counting wait corrects as correct in terms of increasing the progressive intervals, the latency between the opportunity to ask the target question and the question itself should have been diminished. As only questions asked before the controlling prompt resulted in access to the reinforcer, the differential reinforcement of anticipations should have decreased the probability of the boys becoming dependent on the prompter's verbal models. In order to avoid stimulus overselectivity and facilitate the acquisition of the participants' question-asking behavior, the investigator wanted to make it very clear to

the participants that only independently asked questions were acceptable.

An important and novel component of this study was the teacher's alternation of opportunities to ask specific question forms simultaneously. Previous work in the area of time delay and question-asking (Koegel, 1995; Taylor & Harris, 1995) has introduced instruction for specific question forms sequentially, not simultaneously per participant as was the case with this study. In addition, no specific stimuli were used on a daily basis; that is, the teacher provided access to individually-preferred stimuli for each participant every day, but did not necessarily use the same materials throughout the course of each child's intervention. These two components paired with the proven strength of delayed response prompting (Aeschleman & Higgins, 1982; Ault et al., 1988b; Bennett et al., 1986; Gast et al., 1988; Godby et al., 1987; McDonnell, 1987; Miller & Test, 1989; Schoen & Sivil, 1989; Touchette, 1971; Walls et al., 1984) make this intervention especially appropriate for children with autism given their tendency to engage in stimulus overselectivity. Halle et al. (1981) recommended delayed response prompting as a means of achieving multiple stimulus control over an individual's behavior, thereby allowing a wider range of environmental stimuli to control verbal behavior (Skinner, 1957).

Limitations of the Study

The study possesses some limitations, the first of which is the fact that, unlike most previous investigations of progressive time delay, movement through each progressive time delay interval was contingent on an "anticipations-only" mastery criterion. This study was designed to extend the previous comparison of constant and progressive time delay by Ault et al. (1988a) from elementary school children with

moderate disabilities to preschoolers with autism and the acquisition of a vital language milestone. Even though the progressive time delay procedure differed from the standard protocol, the results of this study, like those of Ault et al. (1988a), indicated no difference between the two procedures in terms of effectiveness. However, unlike the previous comparison, the investigator did find the 4 s constant time delay procedure to be more efficient than the initial 1 s adapted progressive time delay interval for all but one of the boys who completed the intervention. It should be noted that, while the standard progressive time delay procedure has been used more with students with autism (Berkowitz, 1990; Charlop et al., 1985, Charlop & Walsh, 1986; Ingenmey & Van Houten, 1991; Koegel, 1995; Matson et al., 1993; Taylor & Harris, 1995; Wolery et al., 1988) than constant time delay (Ault et al., 1988b), it has never been used to teach a complex pragmatic language skill like question-asking in an integrated educational setting. Given that the study was not a true comparison of the two standard time delay procedures, the fact remains that the standard progressive time delay procedure still has not been used to teach preschoolers with autism complex language skills in an integrated setting.

In addition, since data were not collected on the participants' latencies, there is no empirical evidence that Jack, Rory, Seth, and Niall extended their response latencies during the adapted progressive time delay procedure so that their question-asking behavior would appear to be more like that of their typically developing peers.

The next limitation hinges on the prerequisite skills required for participation in this study. The verbal abilities of the five children in this study were much more

advanced than the majority of the other students with autism in their school setting. These boys, with the exception perhaps of Ari, consistently and clearly imitated verbal models and remained attentive throughout the course of their daily 15 minute circle activity. Perhaps one reason that time delay procedures have not been employed more frequently to systematically teach complex language skills to this population is the issue of prerequisite skills, particularly in the areas of sustained attention to activities and various communicative partners, which are often significantly challenging for children with the diagnosis of autism.

Throughout the study it became apparent that the individuals responsible for prompting and data collection could not adequately attend to other children participating in the activity. Even as the data collectors became more familiar with the data sheets and the prompting procedures, each of them stated in their questionnaires that it was still a huge responsibility to recognize all of the opportunities to ask questions that were provided by the circle leader. While the constant time delay procedure, especially, was an efficient means of teaching this complex skill to the children, the staff-to-child ratio in other classrooms could discourage educators from replicating the conditions of this study in their classroom. All classroom aides who participated in this study were graduate students in special education and had histories of participating in research activities. The investigator also recognizes that the individuals responsible for prompting the boys and collecting data (typically the classroom aides) may have been more motivated to be accurate in their behavior than the educational assistants found in other public school settings. However, in non-research applications, dealing with the problems of ensuring

that two different treatment methods were implemented within any given instructional session would be alleviated, therefore making implementation considerably simpler.

A final limitation of the study is the number of question-asking opportunities each child was given per circle time activity. The boys may have acquired the target skill more rapidly had more learning opportunities been provided. The number of question-asking opportunities provided during intervention was requested by the teachers during baseline.

Implications for Future Practice and Research

In general this study speaks well for the effectiveness of both a 4 s constant time delay procedure and an adapted progressive time delay procedure and supports a 4 s constant time delay as the more efficient of the two procedures in the acquisition of a complex language skill such as asking questions for some students. When looking at the difference in the efficiency data between the two procedures, it should be noted that for two of the three boys for which the 4 s constant time delay procedure was more efficient, the difference was by only one session (the difference for the other participant was three sessions). For Seth, the only participant for whom the adapted progressive time delay procedure was more efficient, the difference between the two procedures was five sessions. Considering the minimal difference in these data, only systematic replication of these findings will support the use of one procedure over the other by classroom teachers or determine more circumstances that might suggest the use of one procedure rather than the other. Given that the study was conducted in a busy integrated preschool classroom, the results of this study are promising for individuals involved in the inclusive education

of young children with autism. Additional research is warranted to answer such important questions as the effects of learner profiles, particularly cognitive and social abilities as well as compliance on the efficiency of time delay procedures. The feasibility of implementing similar prompt fading procedures in classrooms with varying characteristics such as lower staff to child ratios, less trained and/or motivated staff, and less consistent classroom routines, should also be further examined.

Constant time delay has historically been characterized as the more parsimonious of the two procedures because the prompt delay interval remains fixed throughout the course of the intervention (Wolery et al., 1992). The data in this study suggested that a 4 s constant time delay as the more efficient procedure for three of the four participants who completed the study. The author of this study, therefore, recommends that educators, clinicians, and researchers who work with young children with autism further investigate the use of systematically applying this procedure to a wide variety of skills for this population. In the future, a comparison of constant and standard progressive time delay in which movement through successive progressive time delay intervals is not contingent solely on spontaneous behavior (anticipations) would also be appropriate.

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Appendix A

Question Asking Research
Staff Training Data Sheet

Date: _____
Name: _____
Please record the type of question elicited by the circle leader in the correct column in the order presented.

What	Where	Who

Appendix B

Question Asking Research
Generalization Data Sheet

Date: _____
Data Collector's Name: _____
Child's Name: _____
Please record the number of each correctly asked question by the child during small group. To be scored as a correctly asked question, the question must logically follow the small group leader's statement. Any question asked by the child that does not "match" the small group leader's statement should be noted at the bottom of this sheet.

What	Where	Who

Nonmatching Questions

What	Where	Who

Appendix C

Question Asking Research
Follow Up Questionnaire

Date: _____
Teacher's Name: _____

Please circle either yes or no for the questions below. Please feel free to use additional sheets for your elaborations.

1) Do you think the progressive time delay procedure was efficient and effective, that is did the child learn to ask the questions quickly?

Yes No

2) Do you think the constant time delay procedure was efficient and effective, that is did the child learn to ask the questions quickly?

Yes No

3) Would you choose to use the progressive time delay procedure as written for this study again in your classroom?

Yes No

4) Why or why not?

5) Would you make any changes to the progressive time delay procedure if you chose to use it again in your classroom?

Yes No

6) If you would make changes please elaborate on what they would be.

7) Would you choose to use the constant time delay procedure as written for this study again in your classroom?

Yes No

8) Why or why not?

9) Would you make any changes to the constant time delay procedure if you chose to use it again in your classroom?

Yes No

10) If you would make changes please elaborate on what they would be.

11) Did you prefer one procedure over the other?

Yes No

12) If you did prefer one procedure over the other please explain why.

13) Would you make any changes to any of the data sheets used in the study?

Yes No

14) If you would make changes to any of the data sheets used in the study please describe them.

15) Would you make any changes to the manner in which you were trained to participate in this study?

Yes No

16) If you would make any changes to the manner in which you were trained, please describe them.

17) Please let me know any other changes you would make to the study.

Appendix D

Question Asking Research
Follow Up Questionnaire

Date: _____
Teacher's Name: _____

Please circle the most appropriate answer for each question. Please feel free to use additional sheets for any elaborations.

1) Describe what it was like to use both prompt fading procedures simultaneously.

1	2	3	4	5
Easy Everyday	Usually Easy	Occasionally Easy	Usually Difficult	Nearly Impossible

2) Describe what it was like to deliver the prompts accurately in the progressive time delay condition.

1	2	3	4	5
Easy Everyday	Usually Easy	Occasionally Easy	Usually Difficult	Nearly Impossible

3) Describe what it was like to deliver the prompts accurately in the constant time delay condition.

1	2	3	4	5
Easy Everyday	Usually Easy	Occasionally Easy	Usually Difficult	Nearly Impossible

4) Describe what it was like to count each delayed prompt interval with a stopwatch?

1	2	3	4	5
Easy Everyday	Usually Easy	Occasionally Easy	Usually Difficult	Nearly Impossible

5) Would you make any changes to the method of counting/timing each delayed prompt interval

Yes No

7) If you would make changes please elaborate on what they would be.

Appendix E

Question Asking Research
Baseline Data Sheet

Date: _____
Data Collector's Name: _____
Child's Name: _____
Please record the number of each correctly asked question by the child during circle. To be scored as a correctly asked question, the question must logically follow the circle leader's statement. Any question asked by the child that does not "match" the circle leader's statement should be noted at the bottom of this sheet.

What	Where	Who

Nonmatching Questions

What	Where	Who

Appendix F

Question Asking Research
Teaching Data Sheet

Date: _____
Data Collector's Name: _____
Child's Name: _____

Please circle the correct response made by the child for each opportunity for each question form. Note that the "Who" question form will remain in Baseline, so you simply need to record only whether the child matched his response to the circle leader's for each opportunity.

Key to Response Types:
A= child asks appropriate question before the delivery of the controlling prompt
W+= child asks appropriate question within 3s after the delivery of the controlling prompt
N-= child asks nonmatching question or makes some other verbalization before the delivery of the controlling prompt
W-= child asks nonmatching question or makes some other verbalization within 3s after the delivery of the controlling prompt
O= child does not respond within 3s of the controlling prompt

What	Where	Who
PTD: ___ 0s: ___ 1s: ___ 2s: ___ 3s: ___ 4s: ___	**CTD:** ___ 0s: ___ 1s: ___ 2s: ___ 3s: ___ 4s: ___	**Baseline**
Question 1 A W+ N- W- O	Question 1 A W+ N- W- O	Question 1 Match Nonmatch No Question
Question 2 A W+ N- W- O	Question 2 A W+ N- W- O	Question 2 Match Nonmatch No Question
Question 3 A W+ N- W- O	Question 3 A W+ N- W- O	Question 3 Match Nonmatch No Question

Appendix G

Question Asking Research
Procedural Reliability Data Sheet

Date: _____
Data Collector's Name: _____ Child's Name: _____

Please mark the correct response made by the circle leader and/or prompter for each opportunity for each question form.

What	Where	Who
PTD: ___ 0s: ___ 1s: ___ 2s: ___ 3s: ___ 4s: ___	**PTD:** ___ 0s: ___ 1s: ___ 2s: ___ 3s: ___ 4s: ___	**Baseline**
Question 1 A) Teacher elicits question correctly ___ Yes ___ No B) Fully modeled prompt delivered ___ Yes ___ No C) Fully modeled prompt delivered at correct time delay interval ___ Yes ___ No D) Praise delivered by teacher ___ Yes ___ No	Question 1 A) Teacher elicits question correctly ___ Yes ___ No B) Fully modeled prompt delivered ___ Yes ___ No C) Fully modeled prompt delivered at correct time delay interval ___ Yes ___ No D) Praise delivered by teacher ___ Yes ___ No	Question 1 A) Teacher elicits question correctly ___ Yes ___ No B) Praise delivered by teacher ___ Yes ___ No
Question 2 A) Teacher elicits question correctly ___ Yes ___ No B) Fully modeled prompt delivered ___ Yes ___ No C) Fully modeled prompt delivered at correct time delay interval ___ Yes ___ No D) Praise delivered by teacher ___ Yes ___ No	Question 2 A) Teacher elicits question correctly ___ Yes ___ No B) Fully modeled prompt delivered ___ Yes ___ No C) Fully modeled prompt delivered at correct time delay interval ___ Yes ___ No D) Praise delivered by teacher ___ Yes ___ No	Question 2 A) Teacher elicits question correctly ___ Yes ___ No B) Praise delivered by teacher ___ Yes ___ No
Question 3 A) Teacher elicits question correctly ___ Yes ___ No B) Fully modeled prompt delivered ___ Yes ___ No C) Fully modeled prompt delivered at correct time delay interval ___ Yes ___ No D) Praise delivered by teacher ___ Yes ___ No	Question 3 A) Teacher elicits question correctly ___ Yes ___ No B) Fully modeled prompt delivered ___ Yes ___ No C) Fully modeled prompt delivered at correct time delay interval ___ Yes ___ No D) Praise delivered by teacher ___ Yes ___ No	Question 3 A) Teacher elicits question correctly ___ Yes ___ No B) Praise delivered by teacher ___ Yes ___ No

Curriculum Vita

Stacey Lynn Shook

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Education

1995 – Present
Doctoral Candidate
Department of Special Education
University of Washington
Seattle, Washington
Anticipated Date of Graduation: August 1999

1993 – 1995
M.Ed. Applied Behavior Analysis in Special Education
Department of Special Education
Temple University
Philadelphia, Pennsylvania

1988-1992
B.A. Psychology, Summa Cum Laude
Honors in Psychology
West Virginia University
Morgantown, West Virginia

Clinical Experience

1997-1999
Project DATA – Developmentally Appropriate Treatment for Autism
Experimental Education Unit
University of Washington
Seattle, WA
Curriculum and Training Coordinator

- Developed individualized educational and behavioral programs for project participants.
- Collaborated with participants' classroom, related service, and home service providers to integrate programming.
- Developed data collection protocol and collection tools.
- Trained staff for project intervention team.
- Supported kindergarten-age children in their classroom placements.
- Collaborated with kindergarten teachers to modify district-mandated curriculum for students with autism.

1996 Experimental Education Unit
University of Washington
Seattle, WA
Student Teaching Intern

- Worked with small and large groups of preschool children in an integrated setting.
- Planned classroom activities that incorporated children I.E.P. goals and objectives.
- Developed and trained classroom staff in the implementation of a free choice transition and engagement for preschoolers with autism.
- Conducted AEPS assessments of children with I.E.P.s in the small group for which I was responsible.
- Developed I.E.P. goals for child in the small group for which I was responsible.

1996 Seattle School District # 1
Office of Early Childhood Special Education
Seattle, WA
Special Education Therapist

- Coordinated home intervention program for preschooler with autism with school and district staff.
- Implemented specific home and community - based programs for preschooler with autism.
- Trained home therapists and family members in the implementation and data collection of the home educational program.

1996 Experimental Education Unit
University of Washington
Seattle, WA
Integrated Preschool Program
Research Intern

- Worked with small and large groups of preschool children in an integrated setting.
- Developed and implemented individualized language and social skills programs for preschool children with disabilities.
- Developed and implemented individualized motivational systems and photographic activity schedules for preschool children with autism.
- Collaborated with classroom staff in the development of individualized programs for children with developmental disabilities.
- Conducted functional assessment of appropriate affect in child with autism.
- Piloted teaching program for appropriate affect in child with autism.

1995 – 1997

Issaquah School District # 411
Office of Special Education
Issaquah, WA
Special Education Therapist

- Coordinated and implemented home behavior and educational program for kindergarten student with autism.
- Trained home and school staff in the implementation of individualized educational program and provided continued follow-up training as necessary.

1995

Bancroft
Haddonfield, NJ
Program for Children with Autism
Clinical Coordinator of Educational & Behavioral Programs for Children with Autism - Haddon Heights

- Coordinated clinical services to day and residential students in school program for children with autism.
- Supervised all staff in classroom management, clinical decision making, and program implementation.
- Trained staff in applied behavior analysis, behavior management, data collection, and program evaluation.
- Served as consultant to staff on behavior management and staff training issues.
- Served on agency Behavior Management Committee.
- Served on agency Quality Assessment Committee.

1994

Children's Seashore House
Philadelphia, PA
Pediatric Feeding Team
Feeding Extern

- Developed and coordinated a patient database.
- Collected, graphed, and presented daily feeding data for nuclear medicine research.
- Served as consultant to team on behavior management and research design issues the feeding unit and in clinic.

1994

Children's Seashore House
Philadelphia, PA
BioBehavioral Unit
Behavior Analysis Intern

- Collected and analyzed functional analysis data with children exhibiting SIB and aggression.
- Conducted experimental analysis sessions with unit patients.

1994 — Bancroft
Haddonfield, NJ
Program for Children with Autism
Behavior Analysis Intern

- Conducted social initiation training with children with autism.
- Trained residential staff in the development and implementation of basic compliance and self-care skills, as well as individualized motivational systems for children with autism.

1992 – 1993 — Princeton Child Development Institute
Princeton, NJ
Special Education Therapist

- Developed individualized instructional programs for preschool age children with autism.
- Provided direct instruction and treatment to the children served.
- Served as case manager for two children with autism - collected and analyzed their daily educational and behavioral data.
- Served as home programmer for two children with autism - provided intensive parent training and consultation services, developed and implemented family-based goals, programmed for the generalization of skills acquired at school to the home and community.

1991 — The May Institute, Inc.
Chatham, MA
Child Development Intern

- Reviewed and implemented individual treatment programs for children with autism and pervasive developmental disorder in both educational and residential settings.
- Taught socialization and problem solving skills to the children served.
- Conducted research on interventions for PICA behaviors in a young child with autism.
- Participated in a functional analysis of self stimulatory behaviors in a young child with autism.

1989 – 1990 — The Potomac Comprehensive and Diagnostic Center
Romney, WV
Residential Training Specialist/Training Specialist

- Implemented individualized treatment programs for children and adults with a variety of developmental disabilities.
- Taught self-preservation and prevocational/vocational skills to the individuals served.

Consulting

1997-1999 Bellevue School District, #405
Bellevue, WA

- Collaborated with general and special educators with regard to a young child with autism.
- Provided training to teachers and child's educational assistant in implementing child's individualized education plan.
- Developed specific inclusive strategies for child.

1997-1999 Newberg School District
Newberg, OR

- Developed and coordinated home program for elementary school child with autism
- Trained school staff in implementation of child's home program and generalization of school programs.
- Monitored child's home program and provided additional training and programming strategies.

1996 – 1997 Clackamas County Educational Service District
Marylhurst, OR

- Consulted with specific early intervention staff to develop appropriate IFSP goals for preschooler with autism.
- Developed and coordinated home program for preschooler with autism.
- Trained staff in implementation of child's home program.
- Monitored child's home program and provided additional training and programming strategies.

1996 – 1998 North Thurston School District #3
Lacey, WA

- Consulted with various early intervention staff throughout the district regarding programming strategies for preschoolers with autism and pervasive developmental disorder.
- Provided training to early intervention staff in the implementation of individualized motivational systems for preschoolers with autism and pervasive developmental disorder.
- Conducted one day inservice for district personnel regarding best practices in the inclusive education of children with autism and pervasive developmental disorder.

1996 Lake Stevens School District # 4
Everett, WA

- Conducted systematic classroom observations of third grade student with autism.
- Developed instructional strategies to address social deficits and behavioral concerns.
- Trained classroom staff in the implementation of social and behavioral plans.

1995-1999 Issaquah School District # 411
Issaquah, WA

- Consulted with and trained early intervention staff regarding home and school programs for preschoolers with autism.
- Collaborated with school staff in the development of IEP goals and objectives for kindergarten age child with autism.
- Provided follow-up programming strategies for student with autism.

1992 –1999 Home Programming
Bellevue, WA, Bridgewater, NJ; Gig Harbor, WA; Great Neck, NY; Hillsboro, OR; Issaquah, WA; Kent, WA; Kintnersville, PA; La Selva, CA; McMinnville, OR; Medina, WA, Mountlake Terrace, WA; Newcastle, WA; Newberg, OR; Pacifica, CA; Portland, OR; Redmond, WA; Seattle, WA; Tigard, OR; West Linn, OR; West Windsor, NJ; Wilsonville, OR; Woodinville, WA.

- Collaborated with families of children with autism to develop home-based educational program addressing academic, social, and behavioral needs.
- Wrote and implemented systematic, individualized programs for children with autism.
- Developed individualized motivational systems and photographic activity schedules for children with autism.
- Trained additional therapists in the implementation of children's programs.
- Monitored and evaluated children's individualized programs.

1993-1994 Community Child Development Center
Philadelphia, PA

- Conducted systematic classroom observations and standardized assessments of preschool age children referred for behavioral problems and/or educational/ developmental delays.
- Conducted parent and teacher interviews.
- Generated IEP goals and behavioral objectives for each child assessed.
- Developed and implemented classroom behavior management plans.
- Developed and implemented educational programs as appropriate.
- Trained classroom staff and parents in the implementation of above plans.

1991 – 1992 West Virginia University
Morgantown, WV
Quin Curtis Psychological Center - Special Education Project

- Developed and implemented a behavior management program for public school student with developmental disabilities.
- Trained classroom staff and guardians in the implementation of the plan and other useful behavior analytic techniques.

Academic Experiences

University of Washington – Course Instructor
Providing Effective Services for Young Children with Autism: Blending Approaches to Meet Individual Needs (1999)

- Course Content: provided an overview of the nature and diagnosis of autism as well as effective strategies for promoting learning and positive interactions with this diagnosis. Emphasized the strengths of early childhood education, early childhood special education, and applied behavior analysis.

University of Washington – Course Instructor
Exceptional Children (1999)

- Course Content: introduction to the characteristics and educational needs of children with disabilities. Topics included instructional methodologies and legislation as they affect children with disabilities.

University of Washington – Course Instructor
Providing Effective Services for Young Children with Autism: Blending Approaches to Meet Individual Needs (1999)

- Course Content: provided an overview of the nature and diagnosis of autism as well as effective strategies for promoting learning and positive interactions with this diagnosis. Emphasized the strengths of early childhood education, early childhood special education, and applied behavior analysis.

University of Washington – Course Instructor
Exceptional Children (1998)

- Course Content: introduction to the characteristics and educational needs of children with disabilities. Topics included instructional methodologies and legislation as they affect children with disabilities.

University of Washington – Teaching Assistant
Meeting the Needs of All Elementary Students (1998)

- Course Content: overview of classroom management techniques, inclusive practices, and federal educational mandates for children with disabilities. Also responsible for coordinating student's reflective papers.

University of Washington – Teaching Assistant
Specific Literacy Techniques for Elementary Students with Disabilities (1997)

- Course Content: overview of current research on specific literacy techniques, particularly direct instruction and peer modeling. Responsible for developing and grading all student assignments.

University of Washington – Course Instructor
Exceptional Children (1997)

- Course Content: introduction to the characteristics and educational needs of children with disabilities. Topics included instructional methodologies and legislation as they affect children with disabilities.

University of Washington - Teaching Assistant
Communication and Language in Young Exceptional Children (1997)

- Course Content: exploration of typical language development as well as communication delays and disorders. Appropriate design and implementation of communication interventions was a major emphasis Responsible for coordinating augmentative communications unit as well as course exams and assignments.

University of Washington – Teaching Assistant
Specific Literacy Techniques for Elementary Students with Disabilities (1996)

- Course Content: overview of current research on early literacy, particularly how it pertains to young children with disabilities in inclusive settings. Responsible for training students in the rationale and use of the Edmark reading program.

University of Washington – Teaching Assistant
Meeting the Needs of All Elementary Students (1996)

- Course Content: overview of classroom management techniques, inclusive practices, and federal educational mandates for children with disabilities. Also responsible for coordinating survey and observation project for students' field placements in area schools.

University of Washington – Teaching Assistant
Assessment of the Preschool Child with Special Needs (1996)

- Course Content: issues in the assessment of young children with special needs as well as the instruction and monitoring of the administration of the DIAL - R screening tool.

University of Washington – Teaching Assistant
Exceptional Children (1995)

- Course Content: characteristics and educational needs of children and youth with disabilities.

University of Washington – Teaching Assistant
Reflective Seminar (1995)

- Course Content: problems and experiences at practicum placements for students in the TEP/SPED (teacher education/special education) program.

Temple University – Teaching Assistant
Learning and Motivation (1994)

- Course Content: principles of the applied behavior analysis; research methodology.

West Virginia University – Teaching Assistant
Introduction to Human Development (1991)

- Course Content: developmental theories, normal development, abnormalities in development.

Research Interests and Experience

- Current Research Interests

  Systematic Instruction of Social Skills in Young Children with Autism, Development and Implementation of Data Collection Procedures, Programming for Generalization of Acquired Skills in Children with Autism, Developing Effective Individualized Motivational Systems for Children with Developmental Disabilities, Parent Training and Home-Based Interventions, The Use of Dynamic Assessment in the Development of Language Intervention Programs for Children with Autism, Systematic Delivery and Fading of Prompts in Teaching Children with Autism, The Role of Photographic Activity Schedules to Promote Independent Play Skills in Children with Autism, The Use of Video Modeling in Teaching Children with Autism Language, Social, Play, and Self-Help Skills.

- Doctoral Dissertation
  Teaching Children with Autism to Ask Questions in Integrated Preschool Settings: A Comparison of Constant and Progressive Time Delay
  Supervisory Committee Chairperson: Felix Billingsley

- Doctoral Research & Inquiry
  Using Activity Schedules and Progressive Time Delay to Promote Independent Engagement and Transitions During Free Choice for Children with Autism
  Committee Chairperson: Felix Billingsley

- Master's Thesis
  Training The Generalization Of Social Initiation Skills To Preschoolers with Autism Through Systematic Fading Procedures
  Chairperson: Saul Axelrod, Ph. D.

- Senior Honors Thesis
  The Von Restorff Effect and Children's Recall: Is Color an Effective Isolator?
  Chairperson: Hayne Reese, Ph. D.

Professional Organizations

- American Psychological Association (APA), Member
  - Division 25 Experimental Analysis of Behavior
  - Division 33 Mental Retardation & Developmental Disabilities
- Association for Behavior Analysis (ABA), Student Member
  - Autism Special Interest Group
- Autism Society of America (ASA), Member
- The Council for Exceptional Children
  - Division for Early Childhood
  - Division on Mental Retardation and Developmental Disabilities
- Families for Early Autism Treatment - Oregon & Washington
  - Board of Directors – FEAT of Washington 1997

Certificates

- Washington State Initial Teaching Certificate
  - K – 12 Special Education Endorsement
  - Expiration Date 8-31-01

Presentations and Posters

Shook, S.L., Billingsley, F.F., & Schwartz, I.S. (May, 1999) Teaching children with autism to ask questions in integrated preschool settings: A comparison of constant and progressive time delay. Poster presented at the 25th Annual Convention of the Association for Behavior Analysis, Chicago, IL.

Sweeney, E.C., Shook, S.L., & Schwartz, I. (May, 1999). Teaching preschoolers with autism to play a memory game. Poster presented at the 25th Annual Convention of the Association for Behavior Analysis, Chicago, IL.

Shook, S.L. (December, 1998). Providing effective services for young children with autism: Blending approaches to meet individual needs. Workshop for the Mineral County School District, Keyser, WV.

McBride, B., Schwartz, I., Shook, S., Boulware, G., & Sandall, S. (December, 1998). School-based preschool programs for children with autism: Blending approaches for individual needs. Conference Session at the 14th annual Division for Early Childhood International Early Childhood Conference on Children with Special Needs. Chicago, IL.

Schwartz, I.S., Shook, S.L., Boulware, G.L., & Garfinkle, A.N. (December, 1998). Providing effective services for young children with autism: Blending approaches to meet individual needs. Pre-Conference Seminar conducted at the 1998 TASH (The Association for Persons with Severe Handicaps) Conference, Seattle, WA.

Shook, S.L. (October, 1998). Everyday use of discrete trial methodology. Presentation for the ARC of Snohomish County. Everett, WA.

Shook, S.L. (August, 1998). Children with autism and public schools: Survival strategies. Presentation at the Washington Association of School Administrators' Focus on Special Education: From IEPs to EALRs to IEPs. Wenatchee, WA

Shook, S.L., Billingsley, F, Schwartz, I., Olswang, L, & Portin B. (May, 1998). Using activity schedules and progressive time delay to promote independent engagement and transitions during free choice for children with autism. In S. Shook (Chair), Children with autism in integrated settings: Programming across the early childhood continuum. Symposium conducted at the 24th Annual Convention of the Association for Behavior Analysis, Orlando, FL.

Schwartz, I.S., Boulware, G.L., McBride, B., & Shook, S. (May, 1998). School-based preschool programs for children with autism: Blending approaches to meet individual needs. Presentation conducted at the Infant and Early Childhood Conference, Bellevue, WA.

Dawson, G., DeMaso, D, Shook, S., & Zanolli, K. (May, 1998). Basics of Behavioral Intervention for Children with Autism. Panel discussion conducted at the Learning to Learn Autism Conference, Bellevue, WA.

Shook, S.L. (February, 1998). Strategies for school-age children with autism: Problem solving together. Workshop for Challenger Elementary School personnel, Issaquah, WA

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