TRAINING PARAPROFESSIONALS TO IMPLEMENT A DISCRETE TRIAL LANGUAGE INTERVENTION FOR CHILDREN WITH AUTISM

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Submitted to the Faculty of the
Graduate College of the
Oklahoma State University
in partial fulfillment of
the requirements for
the Degree of
DOCTOR OF PHILOSOPHY
May 2010

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INTERVENTION FOR CHILDREN WITH AUTISM

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ACKNOWLEDGMENTS

I entered graduate school knowing that obtaining my Ph.D. would not be an easy task. However, without the support and encouragement that I have received from so many wonderful people in my life, it would have been a goal that remained unattainable. First and foremost, I would like to thank God for the peace and reassurance He often provided at many times throughout my years of schooling. He has been there through the ups and downs, and I know that all of my successes have come from Him.

I'd also like to thank everyone in my family for their enduring support. Although you may not have known exactly what I was studying or just how long it would take; the moments you were able to say that you're proud of me will forever stand in my heart. I am so thankful for your enduring support in more ways than could ever be expressed. And to my Mama, I especially want to thank you for all that you have done to help me get to this point in my life. Of course I'm referring to the ultimate sacrifice that you made for us in 2004, but even earlier than that, thank you for always prioritizing education in my life. I realize my educational foundation was originally poured by the principles you and Daddy set for me; and I guess all the educational toys you bought for me have finally paid off.

To the faculty of the School Psychology program, I extend my deepest gratitude for the training you have provided to me to be a great influence in the lives of the children with whom I work. Dr. Yetter, the amount of patience you have shown me

throughout the course of this project is immeasurable, but I want you to know I truly appreciate your dedication in seeing me through. And Dr. Duhon, I don't know whether to thank you or place the blame at your feet! I still reflect upon the day so many years ago at the daycare center when you "recruited" me into the field of School Psychology. At the time, I wasn't at all sure what you meant when you said "You remind me a lot of myself", but now I realize that was a compliment paid to the potential you saw in me and my future as a School Psychologist.

There have been so many people who have entrusted the care of their children to me at some point in my life; even before the extensive training I received while in college. However, one particular family deserves special recognition, the Wieders. Mike and Lori, thank you so much for opening your home and your hearts to me. A special friendship has been formed through your generosity and I am eternally grateful for it. I hope Luke and Emily someday realize how special they are to me, and just how much of an impact they have had upon my life. Thank you for sharing your wonderful children with me.

And to my best friends, thank you girls so much for all the love and support you have shown me. I am truly thankful for our friendships and glad to know I have such strong, loving and supporting women in my corner!

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CHAPTER I

INTRODUCTION

Statement of the Problem

The puzzling complexity of Autism has come to the attention of many pediatricians, psychologists, educators, and parents. This disorder is growing in prevalence and is placing more children and adults affected by it into educational and vocational settings. In the early 1980's the prevalence of this disorder was thought to occur in 3 to 5 individuals out of 10,000. In 2007, prevalence rates for Autism suggested 1 out of 150 children experienced autistic spectrum disorders (Autism Society of America, 2008) and the most recent report sets Autism occurrences at 1 in every 110 children being affected with the disorder (Centers for Disease Control, 2009). The challenge comes in accommodating the various skills and abilities that are presented by individuals with a range of behaviors known as Autism Spectrum Disorders to provide the most optimal outcomes in their growth and development.

Autism is characterized by impairments in three main areas: communication, social interaction, and repetitive or stereotypic motor movements. Because of their limitations in communication skills, children with Autism often tantrum to get what they want or to express frustration. Limitations in their abilities to share joint attention with others may cause not to respond to their name being called by a person in close proximity, yet they may notice the faint sound of an airplane flying thousands of miles

overhead (Baron-Cohen & Bolton, 1993). If they are able to communicate verbally, children with Autism may have abnormalities in the rate, rhythm, and prosody of their voices, or exhibit a communicative behavior of mimicking or parroting phrases previously heard from movies, commercials or others' speaking. Children with Autism may take interest in toys, but the manner with which these toys are played is peculiar. In playing with objects, these children tend to focus on small details about the objects or on maintaining order, such as by persistently spinning the wheels on toy cars or arranging blocks into perfectly aligned patterns according to color. By expressing any one or a combination of these symptoms to some degree, children with Autism set themselves apart from their peers by relating differently to the world around them.

Although social impairments and repetitive behaviors are indeed hallmark symptoms of Autism, it is often impaired communication abilities that garner the most attention in children affected with Autism Spectrum Disorders. Early delay or regression in the development of language is often one of the first problems noticed by parents in their children with undiagnosed Autism (Noens & Berckelaer-Onnes, 2004) and is among the main reasons that parents seek diagnostic help (Howlin, 2006).

A variety of interventions have been advanced to enhance optimal development for children with Autism (Sigman & Capps, 1997). Comprehensive interventions hold the most promise for individuals with Autism. Empirically supported treatments include parent training and counseling, special and general education in highly structured environments, behavior modification, and speech-language therapy (Tsai, 2000).

Almost all children with Autism have no expressive language or are significantly delayed in their use of language, and discrete trial training (DTT) is the only approach

with data-based evidence of effectiveness for enabling such children to begin learning expressive language skills (Howlin, 1981). Communication takes many forms, including smiles, gestures, and postures. It is about conveying meaning and sharing experiences through a social dialogue. For speech to be communicative, it must be used for the purpose of conveying a message to a social partner such as through words being linked to specific referents (objects, actions, or ideas) that are generally understood by adults (Yoder & Stone, 2006). A substantial body of research demonstrates that most children with Autism can learn at least the rudiments of communicative speech (Harris, Wolchik, and Weitz, 1981; Smith & Camarata, 1999).

Discrete trial training is an applied behavior analysis (ABA) teaching strategy that utilizes a structured method for teaching children with Autism. In studies incorporating a scientifically sound design, discrete trial training is the only approach with documented effectiveness for teaching these children to add new speech sounds to their repertoires and combine those sounds into words, syllables, and phrases (Howlin, 1981; Lovaas, Berberich, Perloff & Schaeffer, 1966; Smith, 2001; Young, Krantz, McClannahan & Poulson, 1994). However, it should be noted that not only professional therapists, but also nonprofessional therapists, teachers, and family members, can implement DTT to the extent that both children and adults with Autism can benefit (Smith, 1993; as cited in Smith 2001). Studies have made clear that DTT is an effective method for teaching new skills to individuals with Autism at any age (Newsom, 1998).

Discrete trial training involves four components: (a) a discriminative stimulus, (b) a behavior, (c) an appropriate consequence, and (d) an inter-trial interval (Koegel, Russo & Rincover, 1977; Wilzcynski et al., 2003). A discrete trial is a small unit of instruction

(usually lasting only 5-20 seconds) implemented by a teacher who works one on one with a child in a distraction-free setting. Most commonly, DTT sessions involve the presentation of many discrete trials over a 10 to 15 minute period. Although DTT can be very effective in teaching expressive language skills to children with Autism, it has several drawbacks. In DTT sessions, children are responding to cues from the teacher; thus they may not learn to initiate behaviors in the absence of clear cues. Also, children do not spontaneously transfer skills acquired in DTT to other environments, such as classrooms or family settings, limiting the generalization of their skill use in natural settings.

Full inclusion of children with Autism in general education classrooms is a strategy used in many schools across the United States. Public Law 94-142, or the Education for All Handicapped Children Act guarantees children with disabilities a public education in the least restrictive environment possible for the child. This law and its successor, IDEA/IDEIA, have helped to expand the educational options for children with Autism (Sigman & Capps, 1997). Since children with Autism are increasingly mainstreamed into classrooms with their typically developing peers, beliefs regarding the value of integrating children with special needs influence not only the location of intervention, but also the objectives that are pursued and the range of disabilities involved.

Studies documenting the effectiveness of applied behavior analysis and discrete trial training for remediating the deficits associated with Autism (Lerman, Vorndran, Addison, & Kuhn, 2004), have also shown that DTT is used primarily by professional therapists in clinical settings. This is problematic as very few children have access to

these settings and the DTT services provided there. Previous investigations have shown that teachers and nonprofessional therapists, including family members, can be taught to implement DTT effectively (Smith, 2001), yet most teachers receive relatively little, if any, formal instruction in evidence-based practices for children with Autism (National Research Council, 2001). Typically, school districts provide little class-release time for teachers and continuing education is restricted to a handful of didactic workshops that cover a variety of topics throughout the academic year (Lerman, Vorndran, Addison, & Kuhn, 2004). Teachers have little time to participate in continuing education, and there are insufficient resources supporting qualified consultants to provide teachers with comprehensive instruction in Autism treatment.

Because of the strong evidence supporting the effectiveness of ABA for treating children with Autism, parents of children with Autism are increasingly asking schools to incorporate applied behavior analysis technologies into their children's classroom instruction (Jacobson, 2000). As the prevalence of children with Autism increases, and as more young children receive the majority of their education in regular public school settings, the demand for teachers who have expertise in applied behavior analysis is projected to grow (Lerman et al., 2004).

Most often, the communication needs of children with Autism in schools are addressed by speech-language pathologists (Silverman, 1995). In some cases, however, the speech-language pathologist is not the sole provider of speech and communication therapy, and special education teachers, occupational therapists, teachers (Silverman, 1995) or paraprofessionals also share this responsibility. School psychologists have a vital role to play in the diagnosis, assessment, and classroom consultation for children

with Autism Spectrum Disorders, and they play an integral role as consultants to teachers (Harris & Glasberg, 1996).

School paraprofessionals are individuals trained to assist teachers in providing special education and related services (Oklahoma State Department of Special Education Parent Handbook, 2006). However, paraprofessionals are often not trained to the same levels of education as regular and special education classroom teachers, and paraprofessionals are usually regarded as support personnel within the school district. However, paraprofessionals often are assigned to work more closely with students with special needs, particularly children with high levels of need, than classroom teachers. As a result of this it is most practical to incorporate the skills and abilities of paraprofessionals into the provision of special education services for children with special needs. Little is known about the responsiveness of paraprofessionals to training in ABA procedures. Also, no known research has investigated the acceptability perceptions of school staff regarding the use of discrete trial training procedures to teach children with Autism in the classroom.

Purpose of the Study

This study will investigate training outcomes when paraprofessionals are trained to implement a discrete trial language intervention in schools, supplemental to existing speech-language services the child may be receiving at school. The aim of this study is to address how many hours of training is necessary for paraprofessionals to achieve mastery criterion with discrete trial training procedures. Additionally, it will be determined whether paraprofessionals can implement DTT procedures with accuracy and integrity to produce positive growth outcomes in the functional communication skills of

nonverbal or low language ability children with Autism. A subsequent aim of this study will attempt to establish both classroom teachers' and paraprofessionals perceptions about utilizing DTT procedures in the classroom. For the purpose of this study, we will refer to *accuracy* as the faithfulness with which paraprofessionals carried out the recommended discrete trial training sessions as planned. We define *integrity* as the consistency of accurate implementation over time.

Research Questions

Question 1*:* How many hours of DTT instruction are needed for paraprofessionals to reach 85% procedural accuracy?

Question 2*:* After training to 85% accuracy, will paraprofessionals maintain integrity in implementing DTT procedures to teach functional communication skills in nonverbal or low language ability children with Autism?

Question 3*:* When DTT is carried out by paraprofessionals, are academic goals achieved, as measured by percentage of correct responses produced by the child?

CHAPTER II

REVIEW OF LITERATURE

Autism is one of a spectrum of pervasive developmental disabilities that affects millions of children. An estimated 1 in 110 children in the U.S. meet the criteria for Autism Spectrum Disorder (Centers for Disease Control, 2009). Children with Autism Spectrum Disorders clinically present with a variety of symptoms that include difficulties with social interaction, establishing relationships with others, and communicating. They also often manifest unusually rigid thinking and stereotyped behaviors (National Research Council, 2001).

Autism is characterized by impairments in three main areas: communication, social interaction, and repetitive or stereotypic motor movements. Because of their limitations in communication skills, children with Autism often tantrum to get what they want or to express frustration. Difficulties sharing joint attention with others may cause them to not respond when their name is called by a person in close proximity, yet they may notice the faint sound of an airplane flying thousands of miles overhead (Baron-Cohen & Bolton, 1993). If able to communicate verbally, children with Autism often have abnormalities in the rate, rhythm, and prosody of their voices, or they may exhibit a communicative behavior echolalia, mimicking or parroting phrases from movies, commercials or speech heard from others. Children with Autism often take interest in toys, however the manner with which these toys are played is peculiar. They may focus

on small details of an object or on maintaining order, such as by persistently spinning the wheels on toy cars or arranging blocks into perfectly aligned patterns according to color. By expressing any one or a combination of these symptoms to some degree, children with Autism set themselves apart from their peers by relating differently to the world around them.

Autism occurs more frequently in males, with a male-to-female gender ratio of approximately three or four to one (Dahle, 2003; Klinger, Dawson & Renner, 2003). However, when females are affected with Autism they are more likely than males to exhibit severe mental handicaps (Volkmar, Szatmari, & Sparrow, 1993). Although the causes of Autism are unknown, the results of both family and twin studies suggest that genetic factors play a role in the etiology of Autism and other pervasive developmental disorders (Rutter, 2000). There are many stakeholders devoted to developing information that facilitates understanding the biological and neurological underpinnings, as well as advancing educational implications to help children with Autism succeed in school and lead fulfilling lives.

History

The term "Autism" originates from the Greek word for "self" αυτος (autos) and was initially confused as schizophrenia in Eugene Bleuler's description of observations of patients with schizophrenia conducted in 1911. Bleuler used the term to describe the schizophrenic's "withdrawal from reality" and their seeming difficulty in connecting with other people (Klinger et al., 2003). Although it was first thought that Autism might be an early form of childhood schizophrenia, by 1979 this idea had been abandoned. Nearly 30 years after Bleuler, two researchers, Leo Kanner and Hans Asperger, independently

described children with disorders involving impaired social relationships, abnormal language, and restricted or repetitive interests, similar to those studied by Bleuler, but without the concomitant diagnosis of schizophrenia (Klinger et al., 2003). Kanner, in his initial report, presented case studies of 11 children whom he described as having an "extreme autistic aloneness"; having an inability to relate themselves in the ordinary way to people and situations from the beginning of life. In addition he wrote that the syndrome led to language deviation characterized by the delayed acquisition, echolalia, occasional mutism, pronoun reversals, and literalness (Klinger et al., 2003). Kanner also described these individuals as having an "obsessive desire for the maintenance of sameness, characterized by development of elaborate routines and rituals (Kanner, 1943, p 245). From the work Leo Kanner performed, the term early infantile Autism was coined and the symptoms that we now use to classify Autism were first identified (Szatmari, 2000).

Etiology. It was first believed that the parents of children with Autism were overly intellectual and emotionally distant, with limited interest in other people, including their spouses and children (Kanner, 1943). As recently as the 1960s, it was proposed that children with Autism withdrew from social interaction and became self sufficient as a response to their cold and rejecting parents (Bettleheim, 1967). Until the mid-1970s, it was commonplace for treatment regimens to focus on encouraging parents (usually mothers) to become less rejecting of their children. However, these initial hypotheses regarding the etiology of Autism were not supported by empirical research conducted during the 1970s and 1980s (Klinger et al., 2003). Bernard Rimland (1964) and Eric Schopler (1971) were among the first researchers to argue against the theory that parents

were responsible for their children's Autism. Rimland first proposed that the disorder is due to a neurological impairment and Scholpler suggested that rather than treating the parents, the aim of therapists should be to involve parents as part of the treatment team working with their children (Klinger et al., 2003).

Prevalence. In the early 1980's the prevalence of this disorder was thought to occur in 3 to 5 individuals out of 10,000. The estimated prevalence of Autism Spectrum Disorders in the U.S. has increased dramatically over the years, however. By 2007, prevalence rates for Autism were estimated to be 1 out of 166 children (Autism Society of America, 2008) and in 2009 Autism was estimated to affect 1 in every 110 children (Centers for Disease Control, 2009). Children are diagnosed earlier in life, and they are entering the special education and early intervention systems at a rate that challenges existing capacity (Boulware, Schwartz, Sandall & McBride, 2006). These facts present a challenge for educators working in the area of Autism.

Diagnostic Criteria and Other Prominent Symptoms

Autism is diagnosed along a spectrum of disabilities known as the Autistic Spectrum Disorders. Autism is characterized by significant impairments in three areas: social interaction, repetitive behaviors and stereotyped interests, and communication (American Psychiatric Association, 2000).

Children with Autism typically have social deficits in attachment, imitation, joint attention and face perception, including perception of emotion and expression (Klinger et al., 2003). These social abilities are often considered to be precursors to language development (Klinger et al., 2003). Additionally children with Autism show limited language and communication abilities as symptoms

The repetitive behaviors, primarily motor movements and stereotyped interests that characterize Autism may include fixations on abnormal or ritualistic behaviors, similar to established routines in obsessive-compulsive disorder. The repetitive behaviors can be classified into two categories: lower-level (simpler) behaviors and higher-level (more complex) behaviors. Lower-level repetitive behaviors, such as motor movements such as toe-walking, hand or finger flapping, rocking, and whirling, are common in individuals with ASD, while higher-level repetitive behaviors refer to stereotyped interests, fixations on specific topics (e.g., train schedules or weather patterns), an insistence on sameness, or repeated arranging and ordering of objects such as toys (Klinger et al., 2003). Communication impairments usually experienced in children with Autism include abnormal prosody of speech (atypical rhythm, stress, intonation and loudness), echolalia (verbatim repetition of previously heard words and phrases), and pronoun reversal (e.g., saying "you" when meaning "I"; Klinger et al., 2003).

Another characteristic of individuals with Autism is lower IQ scores. Mesibov, Adams, & Klinger (1997) reported that 77% of individuals with Autism have IQs below 70 and meet the criteria for mental retardation. Gilberg (1992) found that 50% of people with Autism have IQs between 50 and 70 and that 27% have IQs below 50. However, insofar as most intelligence tests require both receptive and expressive language, it seems likely that the lower IQs observed among individuals with Autism is, at least to some extent, an artifact of their communication skill deficits. Certain neuropsychiatric disorders such as AD/HD, mood disorders, obsessive-compulsive disorder, tic disorders,

anxiety disorder, seizure disorders, and sleep disorders also are more likely to co-occur in individuals with ASD (Tsai, 2000).

Communication Development Among Children with Autism

Communication takes many forms, including smiles, gestures, and postures. Communication may be an initiation, a response, or an imitation, and it may serve to express emotion, make a request, or protest (Olley, 1992). Scheuermann and Webber (2002) define communication as any set of interactions that transmits information. Communication is about conveying meaning and sharing experiences through social dialogue. For speech to be communicative, it must be used for the purpose of conveying a message to a social partner such as through words being linked to specific referents (objects, actions, or ideas) that are generally understood by adults (Yoder & Stone, 2006). Thus when teaching words and sentences, it is important to encourage children to use phrases in a genuinely communicative way (Baron-Cohen & Bolton, 1993).

Language differs from communication in that language is comprised of 5 parts: phonology, morphology, syntax, semantics, and pragmatics (Mercer, 1997). Phonology refers to the use of vocal sounds to create meaningful syllables and words. Morphology is how the smallest meaningful units of our language (morphemes) are combined to form words. Syntax is the linguistic rule system that governs the order and combination of words to form sentences, and the relationships among the elements within a sentence. Semantics involves the system that patterns the content of an utterance, intent, and meanings of words and sentences and pragmatics refers to the use of communication skills in social contexts (American Speech-Language-Hearing Association, 2000; Mercer, 1997).

Language both evolves out of and incorporates the prelinguistic forms of social communication -- joint attention and social referencing behaviors -- both of which prove most problematic for individuals with Autism. Relative to normally developing children, autistic children are slow in acquiring words. This is consequent to the social situations in which children first learn word meaning. Because children with Autism have significant deficits in joint attention behaviors and are far less likely than other children to interact or to share common interests with others, they lose many opportunities to learn language that are available to typically-developing children (Sigman & Capps, 1997).

Early delay or regression in the development of language is often one of the first problems noticed by parents in their children with undiagnosed Autism (Noens & Berckelaer-Onnes, 2004) and is among the main reasons that parents seek diagnostic help (Howlin, 2006). Speech and communication limitations have been reported as early as the first year through observations of absent or limited babbling, failure to use vocalizations for social engagement such as in vocal turn-taking or vocal imitation (although noncommunicative vocalization may be observed in isolate self-play), a limited repertoire of consonant sounds, and highly repetitive monotonic sound production when vocalization is observed (Prizant, 1996). Retrospectively, parents report having delayed in recognizing their children's Autism because they lacked knowledge about the normal development of young children or because they were reluctant to admit that their child seemed unusual or delayed (De Giacomo & Fombonne, 1998). The prognosis for individuals with Autism has improved. Whereas thirty years ago, 50% of individuals with Autism remained mute throughout their lives (Rutter, 1978), today, with earlier diagnosis and intervention available, around 25% of individuals with Autism remain without

functional speech (Lord & Bailey, 2002; as cited in Howlin, 2006). Still, it is estimated that one-third to one-half of individuals with Autism do not develop sufficient natural speech to meet their daily communication needs (Bryson, 1996; Lord & Paul, 1997; Noens & Berckelaer-Onnes, 2004). The risk of severe and persisting language impairment is particularly high among children with nonverbal IQs below 50. The development of language is an important prognostic indicator. Unless some useful language is established by the age of around 6 years, the likelihood of a child with Autism subsequently acquiring spoken language is very small (Howlin, 2006; Yoder & Stone, 2006).

Among children who remain mute, many also fail to learn to make the motor movements needed to use signs in sign language (Smith, 2001). For these individuals, functional communication training is often provided through the use of communication boards and other augmentative devices (Schuler, 1980 as cited in Donnellan, Mesaros, & Anderson, 1984).

Echolalia, the verbatim repetition of previously heard words or phrases, occurs in approximately 85% of children with Autism who eventually develop speech (Schuler & Prizant, 1985; Mesibov, Adams & Klinger, 1997). Although once considered an inappropriate self-stimulatory behavior, echolalia is now viewed as a way in which children with Autism attempt to communicate with others and is considered an important precursor to the development of more advanced language. Although their ability to remember the exact wording of previously heard-conversations may seem impressive, echolalic speech is inflexible and often inappropriate to the situation (Mesibov et al., 1997).

Joint Attention Impairments as Obstacles to Language Development

Impairments in using gaze and gesture as a means of sharing attention with others are among the first symptoms evident in Autism (Klinger et al., 2003). Teaching a child who rarely attends to others to look at an adult's face upon request is an important early goal for facilitating joint attention. Eye contact also facilitates learning to attend to instructional materials and instructional tasks (Newsom & Rincover, 1989). Eye contact is usually taught through discrete-trial procedures after the child has been taught the prerequisite behaviors of sitting quietly with hands down (Newsom, 1998).

"Joint attention" refers to the ability to "coordinate attention between interactive social partners with respect to objects of events in order to share an awareness of the objects or events (Mundy, Sigman, Ungerer, & Sherman, 1986; p 657). Orienting consists of two components: the ability to disengage from the current visual location, and the subsequent ability to shift attention to a new location (Posner, 1980). Of these two components, evidence suggests that it may be more difficult for young children with Autism to disengage than to shift their attention (Klinger et al., 2003; Landry & Bryson, 1999). Once eye contact begins to occur reliably in one-to-one sessions, it is generalized across persons and settings through "incidental teaching" (Hart & Risley, 1975; Newsom, 1998) to make it a functional social and educational skill. Likewise, in later teaching episodes the child is required to look at the teacher's mouth or hands during spoken or signed communication training (Newsom, 1998).

Treatment of Autism in Children

A variety of interventions have been advanced to enhance optimal development for children with Autism (Sigman & Capps, 1997). Comprehensive interventions hold the

most promise for individuals with Autism. Empirically supported treatments include parent training and counseling, special and general education in highly structured environments, behavior modification, and speech-language therapy (Tsai, 2000).

Parent counseling and training. Parent counseling programs and parent training programs typically have different goals and objectives. Whereas parent counseling programs aim to support family as a whole, parent training programs are more focused on helping parents meet the individual needs of their child with Autism. Counseling efforts commonly address pragmatic problems that families face, such as a lack of community resources for their child with Autism, difficulty in locating appropriate services, finding educational and health care services optimal for their child, help with financial concerns pertaining to their child's treatment, and barriers to finding free time away from the daily demands of parenting a special-needs child (Newsom & Rincover, 1989). Emotional problems such as guilt, blame and worry, as well as interpersonal problems are all likely topics for discussion in parent counseling sessions (Newsom & Rincover, 1989).

By contrast, parent training programs typically focus on teaching parents the essential basic principles and specific techniques for helping their child with Autism. Historically, behavioral approaches with families of children with Autism were motivated by the families' request for help in dealing with disruptive and dangerous behaviors occurring in the home (Risley, 1968). However, it later became apparent that language and other behaviors established so laboriously in clinics and classrooms would not generalize to the home unless parents were taught to use the same behavioral techniques (Lovaas, Koegel, Simmons, & Long, 1973; Newsom & Rincover, 1989). Parent training programs usually involve a combination of instructional methods, such as lectures,

readings, practice with feedback given, tests for mastery of didactic materials and home visits for demonstrations and consultations (Newsom & Rincover, 1989). Ample research has clearly demonstrated that these training methods have beneficial and worthwhile effects on both parents and their children, and that they are generally well-liked by parents (Newsom & Rincover, 1989).

Education in a highly structured environment. It has been documented that highly-structured environments that include predictable routines and that are adapted to meet students' current level of functioning best serve the educational needs of children with Autism. (Howlin, 1997). Classrooms that are structured by the teacher to guide the children's activities, or that ensure that the learning environment is well-organized, promote more adaptive behaviors among children with Autism, compared with unstructured settings (Bartak, 1978).

Biological interventions. Currently, no psychotropic agents are FDA-approved for the treatment of Autism, and no medications have been proven to be efficacious in the treatment of the core social or communication impairments seen in this disorder (Lewis & Lazoritz, 2005). Nevertheless, psychopharmacologic drugs are often included as an integral part of a treatment plan for individuals with Autism. Psychotropic drugs have been used to a minor extent in the management of Autism, and experts recommend that these drugs should be used sparingly and only when other strategies to reduce maladaptive behaviors have been unsuccessful (Bryson, Rogers & Fombonne, 2003).

Typical antipsychotic medications were among the first to be studied systematically in autistic children. The success of the typical antipsychotic medications in the treatment of schizophrenia led to several early investigations of the effects of these

agents in children with autistic disorder. This class of medication proved to be helpful and continues to be used for treating severe aggression and self-injury in ASDs today (Posey & McDougle, 2000). Among the antipsychotic agents used, several were efficacious for behavioral symptoms of Autism, including hyperactivity, excitability, and stereotypies. These medications are sometimes used to manage a range of disruptive or aggressive disorders and self-injurious behavior in school settings (Sweeney, Forness, & Levitt, 1998).

Children with Autism have shown mixed responses to stimulant drugs (Bryson et al., 2003). Stimulant medications are used to treat attention problems and hyperactivity in children with Autism. Possible benefits from the use of stimulant medications include increased attention span, decreased distractibility and motor restlessness, and decreased impulsivity. Additionally, Clonidine, an antihypertensive, has been found to have a general positive effect the reduction of aggressive behaviors, a symptom associated with Autism. It is sometimes used to reduce aggressive behavior (Sweeney et al., 1998). However, there are no established FDA recommendations for its use in child and adolescent psychiatry.

Non-behavioral treatments. Pivotal Response Training is a technique often used to help children with Autism generalize skills to the natural environment. In pivotal response training, the therapist observes the child in the natural environment and looks for any attempts the child makes to respond to others. The therapist provides direct reinforcers in response to the child's attempts to respond. The therapist intersperses maintenance tasks throughout interactions with the child, and the therapist and child engage in frequent turn taking. Because of the more "natural" interactions that are

inherent in pivotal response training and the associated positive affect in the children, this is a preferred method for teaching children with Autism, as it most closely approximates the natural interactions between nonhandicapped children and adults in the environment (Schreibman, Kaneko, & Koegel, 1991).

Milieu language teaching is a family of procedures that are designed to capitalize on children's desires and interests in their natural environments to embed teaching opportunities (Goldstein, 2002). Milieu language teaching is usually used to teach requesting, because high motivation is inherent when individuals are requesting desired items that presumably function as reinforcers (Goldstein, 2002). In addition to communication skills, milieu teaching procedures are also used to train a variety of communicative functions: preverbal communication (eye contact, joint attention, and motor imitation (Hwang & Hughes, 2000; Goldstein, 2002). At this point, there is no compelling evidence that milieu teaching procedures are clearly more effective than the procedures that have developed out of discrete-trial training; however one could argue that milieu language teaching procedures can be more easily incorporated into everyday activities and reduce the need to program for generalization (Goldstein, 2002). Research on milieu language teaching procedures has been extensive and seems to be applicable to teaching early language skills to a broad population of children (Goldstein, 2002).

Incidental teaching is a training method that concentrates on facilitating language use, or overall communication. It involves teaching language within the everyday context of conversational exchange (Carr, 1985). In incidental teaching the child initiates training episodes and, if necessary, reinforcers are administered prior to the production of

"ideal" responses. Incidental teaching and mand-model training employ specific trainer cues in natural but arranged training environments (Ogletree & Oren, 1998).

Naturalistic teaching is another form of language intervention approaches to facilitate language and communication growth in children with Autism. In recent years the term naturalistic instruction has emerged as a global concept to describe several intervention approaches that embed instruction in natural or normalized settings for young children (McBride & Schwartz, 2003; Rule, Losardo, Dinnebeil, Kaiser, & Rowland, 1998). Naturalistic teaching strategies begin with the learner's intention to communicate and the trainer's ability to systematically provide models of appropriate communication forms and meaningful consequences for communication attempts (Hancock & Kaiser, 2002). These types of approaches have 3 primary characteristics: they embed instruction into children's everyday lives, they capitalize on children's interests, children's initiations, and natural consequences, and they typically target functional skills (McBride & Schwartz, 2003).

Applied behavior analysis. Applied behavior analysis (ABA) is a technology in which behavioral procedures are systematically applied to improve socially significant behavior and to demonstrate experimentally that the procedures employed were responsible for the improvement (Heward, 1987). General behavioral techniques form the core of most Autism interventions (Sigman & Capps, 1997). The use of applied behavior analysis to treat Autism and other pervasive developmental disorders has had a dramatic impact on treatment outcomes for many children. Intensive behavioral intervention at an early age is well documented for improving the developmental trajectory of many of

these children, and this treatment is therefore essential beginning in children's preschool years (Harris & Glasberg, 1996).

Effective ABA-based Autism interventions programs hold several features in common. These programs are intense (i.e., the child is actively engaged with individuals and/or relevant stimuli for a significant number of hours per week) and they are comprehensive, in that they address all domains that are developmentally appropriate and/or related to the impairments associated with the disorder (Green, 1996 as cited in Wilzcynski et al., 2003). Applied behavior analysis-based programs involve small measurable units of instruction and include at least some portion of instruction under very structured and controlled conditions in which adults direct the teaching interaction (Green, 1996; as cited in Wilzcynski et al., 2003). Many ABA-based programs also involve a portion of instruction under semi-structured naturalistic conditions in which child-directed activity occurs also (Wilcynzski et al., 2003). Ultimately, the goal of ABA is to help children succeed and become independent socially and academically.

Discrete-Trial Training

Discrete Trial Training (DTT) is a brief teaching interaction that involves four components: (a) a discriminative stimulus, (SD); (b) a behavior; (c) an appropriate consequence; and (d) an inter-trial interval (Koegel, Russo & Rincover, 1977; Wilczynski et al., 2003). A discrete trial is a small unit of instruction (usually lasting only 5-20 seconds) implemented by a teacher who works one on one with a child in a distraction free setting. Each trial has five parts: Cue, Prompt, Response, Consequence, and Intertrial interval (Smith, 2001). With DTT, trainers attempt to control all aspects of intervention and use imitation, prompting, shaping, and reinforcement procedures. Over time, these

prompts and cues are faded to promote independence (Donnellan et al.,1984; Ogletree, 1998; Ogletree & Oren, 2001). Reinforcement components are also integrated into discrete trials, and these schedules are leaned over time as children learn to delay reinforcement (Wilcynzki et al., 2003). Although DTT is artificial, in the sense that it is almost entirely adult initiated, it provides a structured learning environment that is particularly important in the early stages of teaching children with Autism (Smith, Donahoe, & Davis, 2001). Discrete-Trial Training is the only approach with data-based evidence of effectiveness for enabling children with Autism to begin learning expressive language skills (Howlin, 1981). Koegel et al. (1977) first systematically applied the format to the training of teachers of students with Autism and it has been strongly recommended by other behaviorally oriented researchers and practitioners (Donnellan et al., 1984).

Every discrete trial has a definite starting and stopping point, (Smith, 2001); thus, DTT breaks down the continuous flow of ordinary adult-child interactions into highly distinctive (discrete) events that are more easily discriminated by the child (Newsom, 1998; Smith, 2001). In this way, DTT maximizes children's success and minimizes their failures (Smith, 2001). DTT is highly labor intensive in the sense that a teacher works individually with a child and continually provides cues (Smith, 2001). Generally, the outcomes that can be expected from operant speech training with autistic children appear to depend primarily on each child's initial language level (Newsom, 1998).

Marianda-Linne and Melin (1992) compared discrete-trial procedures and incidental teaching to instruct two children with Autism in the expressive use of color adjectives. These two teaching procedures were carried out in a classroom setting.

Results showed that discrete-trial teaching was more efficient, in that it produced fast acquisition and initially greater generalization than the incidental teaching method. Discrete-trial teaching is the major method used for facilitating the acquisition of language forms, whereas incidental teaching concentrates on facilitating language use (Carr, 1985).

However, although DTT has been very effective in teaching expressive language skills to children with Autism, it has several drawbacks. During DTT, a child responds exclusively to explicit cues provided by the teacher; consequently, the child may not learn to initiate behaviors in the absence of clear cues. Children with Autism do not spontaneously transfer the skills they acquire in DTT to natural environments, such as classrooms or family settings. For this reason, DTT is often combined with incidental teaching, pivotal response training, and other techniques to promote generalization of skills to the child's natural settings.

Speech-language therapies. Two prominent therapies commonly used by speech-language pathologists include augmentative communication and picture-exchange communication systems. The Picture Exchange Communication System (PECS) is one of the methods that is commonly used under an ABA approach. Picture Exchange Systems teach students to exchange a picture of a desired item for the actual item. PECS uses pictures and other symbols to develop a functional communication system. Studies indicate that PECS may be effective in teaching communications that involve single words or short phrases, but studies have not assessed generalization of skills to everyday settings (http://www.asatonline.org).

Augmentative communication is defined as procedures for encoding and transmitting messages without their being written or directly encoded into phonemes by the vocal tract that can augment a person's ability to speak (Silverman, 1995). Such procedures are not intended to substitute for the residual abilities to speak and write, but rather to augment or increase the abilities or such persons to meet their communication needs. Any approach to encoding and transmitting spoken messages that does not require a person to produce speech sounds directly is classified as augmentative communication. Some examples of augmentative communication strategies include American Sign Language and other strategies that use muscle action potentials and other electrical signals generated by the body to control typewriters and computers (i.e. communication boards and facilitated communication devices; Silverman, 1995).

Language as Verbal Behavior

Language refers to the practices of a linguistic community rather than the behavior of any one member (Skinner, 1957).Language can be divided into two subcomponents: mands and tacts. Mands are typically the first type of verbal behavior that humans acquire (Skinner, 1957) and are very important to early language learners (Sundberg & Michael, 2001). Skinner defined a mand as a verbal operant in which the response is reinforced by a characteristic consequence and is therefore under the functional control of relevant conditions of deprivation or aversive stimulation (an establishing operation) (Skinner, 1957; Sundberg & Michael, 2001). A mand is characterized by the unique relationship between the form of the operant and the reinforcement typically received. A mand assumes a given form because of contingencies of reinforcement maintained by the listener or by the verbal community as

a whole. A mand in which the listener is independently motivated to reinforce the speaker is commonly called a request (Skinner, 1957). Typical children learn to use mands quite quickly, and often do so without much instruction. Much of a typical infant's early language consists of mands for unconditioned reinforcers or for strong conditioned reinforcers (Sundberg & Michael, 2001). However, some children do not learn how to use words to ask for what they want (Sundberg, & Partington, 1998).

A tact is a verbal operant in which a response of given form is evoked (or at least strengthened) by a particular object or event or property of an object or event (Skinner, 1957). The ability to verbally label common items and actions is a major cornerstone of language development. Tacting is different from receptively identifying items and actions, in that it involves the child talking. Labeling items is a more difficult skill than receptive identification, such as pointing, because it requires a child to produce the correct word and to have the vocal control to pronounce the word independently. It would be quite reasonable for mand training to be the major focus of early language training. It is the mand that gives the child some control over the social and, indirectly, the nonsocial environment. This control should increase the value (to the child) of language training in general, which in turn, should make the task of the language trainer an easier one (Sundberg & Michael, 2001). Not only do mands allow a child to control the delivery of conditioned and unconditioned reinforcers, but they begin to establish the speaker and listener roles that are essential to further verbal development. Mands also are the most likely type of verbal behavior to be emitted spontaneously, and generalization may occur quickly because of the unique effects of the establishing operation (Sundberg & Michael, 2001).

School-Based Education of Children with Autism

Full inclusion of children with Autism in general education classrooms is a practice used in many schools across the United States. Beginning with Public Law 94-142 in the 1980s, educational policy changed to one of inclusion, so that today, most children with Autism are integrated either full-or part-time into regular classes in schools within their communities (Bryson et al., 2003). Public Law 105-17 guarantees a free appropriate public education for eligible children and youth with disabilities. This law is one of several amendments to PL 94-142, passed in 1975, which required that an Individualized Education Program (IEP) be developed by a team for each child with a disability who was eligible for special education and related services. The IEP was intended to set forth the services that would be provided to the child. The expansion of this law into the Individuals with Disabilities Education Act (IDEA) has helped to expand the educational options for children with Autism by including them in settings where they are able to interact with typically-developing peers to promote their social and communication development (NICHD, 1999; Sigman & Capps, 1997).

The National Academy of Science recommends a minimum of 25 hours of educational services per week throughout the year, as outlined by the Individuals with Disabilities Education Act (IDEA). A delay in receiving services could mean the difference between an individual with a functional language system and a student entering first grade without a useful means of communicating (Dahle, 2003). Since children with Autism are increasingly mainstreamed into classrooms with their typically developing peers, beliefs regarding the value of integrating children with special needs influence not only the location of intervention, but also the objectives that are pursued

and the participants involved. Interventions implemented in mainstreamed classrooms, for example, may focus more extensively on social adaptation (Sigman & Capps, 1997).

While inclusion is important, empirical findings clearly indicate that certain types of intensive early intervention also are important for lessening the debilitating effects of Autism. There is increasing evidence that for children younger than four years, early intensive intervention can result in increased developmental rates and more pronounced language, social and cognitive gains (De Giacomo & Fombonne, 1998).

Yet despite the studies showing the effectiveness of applied behavior analysis for remediating the deficits associated with Autism (Lerman, Vorndran, Addison, & Kuhn, 2004), very few children have access to such intensive programs. This leaves schools and treatment facilities open to finding ways to provide effective early intervention in the most economical way possible so that the largest possible number of children can benefit (Rogers, 1996).

A number of features characterize some of the most effective early intervention programs. One feature is individualized, comprehensive programming, such as using behavioral technologies to study each child and identify specific strengths and deficits of that child. Highly effective programs also emphasize identifying children as early as possible, and working with them in a very favorable teacher to child ratio; often one-on-one in the early stages. Most programs also have a highly systematic approach to helping children with autistic disorders and related conditions learn to interact with peers and function in the natural environments of childhood (Harris & Handleman, 1994).

Parents of children with Autism are increasingly asking their schools to incorporate these behavioral technologies into classroom instruction (Jacobson, 2000).

As the prevalence of children with Autism increases, the demand for teachers who have expertise in applied behavior analysis will continue to grow as more young children receive the majority of their education in regular public schools (Lerman et al., 2004). Appropriately structured educational programs and management in the early years can play a significant role in enhancing functioning later in life (Howlin, 1997; Dahle, 2003). Early identification and diagnosis of Autism can provide access to the services and result in a better prognosis for the student (Dahle, 2003).

Individualized educational plans (IEPs), implemented in schools to address the special needs of children with Autism, often focus on both behavioral treatments and educational interventions. One area that occasionally is overlooked, or does not receive as much attention as is warranted in the IEP, is addressing verbal communication and its teaching. It is possible to make a major shift in the developmental trajectory of some of these children, especially when one intervenes in the preschool years using an intensive, behaviorally based treatment program (Harris & Handleman, 1994; Lovaas, 1987). Smith, Eikeseth, Kelvstrand, and Lovaas (1997) found that intense behavioral treatment with preschoolers with Autism was successful in achieving higher IQ scores, more expressive speech, and a reduction in behavior problems.

In school settings, it is usually the role of the speech-language pathologist to address the communication needs of the child. The speech-language pathologist is responsible for diagnosing and treating (non-medically) all communication disorders except those arising from hearing loss. The speech-language pathologist assesses the communicative status of his or her clients and then develops intervention strategies that will, it is hoped, improve their ability to communicate (Silverman, 1995). In some cases,

however, the speech-language pathologist is not the sole provider of speech and communication therapy, as special education teachers, occupational therapists, teachers (Silverman, 1995) or paraprofessionals are likely to assume this responsibility. The school psychologist has a vital role to play in the diagnosis, assessment, and classroom consultation for children with pervasive developmental disorders such as Autism, and plays an integral role as a consultant to the teaching staff (Harris & Glasberg, 1996).

Other empirically-supported treatments, however, are not yet commonly available in schools. For example, although ample research has shown the effectiveness of discrete trial training for teaching expressive language skills to children with Autism, DTT is typically used primarily by professional therapists in clinical settings. However, Smith (2001) noted that teachers and nonprofessional therapists, including family members, can be taught to implement DTT effectively. For example, Crockett, Fleming, Doepke, and Stevens (2007) examined the acquisition and generalization of discrete trial teaching skills by parents of children with Autism in a research lab setting. In this study, parents were instructed on the procedures of discrete trial training through lectures, video demonstrations, role-playing exercises, verbal feedback and in-vivo modeling sessions. Once the parents had demonstrated initial acquisition of the procedure by correctly using the procedure for four consecutive trials in training, they were asked to apply the procedure directly with their children. The trainer provided instructional feedback until the parents demonstrated four consecutive correct trials; and after meeting this criterion the parents were videotaped teaching four skills to their child, without feedback. Results indicated that both of the parents involved in the study were able to acquire a well-defined set of behaviors for teaching their children with Autism. Although child

outcomes were slight, in this study parents were able to produce outcomes in their children in a fraction of the time that the literature has suggested is needed to implement DTT to produce significant child gains (Crockett et al., 2007).

Koegel, Russo, and Rincover (1977) trained teachers to use behavior modification strategies with autistic children within less than 25 hours. Their training package involved providing teachers with a training manual that described examples of correct and incorrect use of five categories of behavior modification principles, showing videotapes of correct and incorrect use of each procedure and brief verbal feedback. Their results showed that during baseline sessions, teachers evidenced low percentages of correctly implementing behavior modification procedures. After training and implementation in a special education classroom setting, all teachers showed performance rates between 90% and 100% correct use of behavior modification procedures in 25 of 26 sessions and the teachers behavior generalized to new tasks. Additionally, the experimenters collected data on the students' performance. They found either no improvement or a decrease in correct responses to tasks during the baseline sessions, but after teacher training, the children showed marked improvement in their level of correct responding during the remaining 26 sessions of the study. Although Koegel et al. (1977) did not collect acceptability data, they noted that none of the teachers reported training to be excessively demanding.

Similarly, Ducharme and Feldman (1992) trained direct-care staff in residential group home for adolescents and adults with varying degrees of developmental disabilities (moderate to profound mental retardation). Furthermore, initial training sessions were performed similarly in that both researchers used modeling, rehearsal, and feedback as

methods for providing instruction. All training sessions were three hours in length, although they did not specify the total numbers of sessions that were conducted. Ducharme and Feldman also established a performance criterion of 85% as they had determined from a previous work that staff members were likely to be ineffective below this level. They found that after receiving written instructions that were read in the presence of the experimenters with the opportunity to ask questions, participants generally performed lower on the percentage of teaching skills the staff correctly delivered. However, once additional training was conducted, the participants' performance indicated a substantial jump, although most consistently performed below criterion levels. Ducharme and Feldman (1992) did not collect data on the students' responses to the tasks they were instructed on, or the staff's acceptability perceptions with regard to the training procedures.

Leblanc et al. (2005) did not offer any modeling, role play, or practice of skills, as they relied upon an abbreviated performance feedback (8-10 minutes in total length) procedure in improving the discrete trial instruction delivered by paraprofessional staff at a private school for children with autistic disorders. Leblanc et al.'s established criterion was for paraprofessionals to demonstrate the discrete trial instructional skills correctly 90% of the time or greater during two consecutive sessions, although they did not collect data on the students' performance. At the conclusion of the study, it was found that the staff members rapidly acquired the discrete trial instructional skills and maintained these skills after an 11 week follow-up. Subsequently, the discrete trial procedures were judged favorably by the staff members at follow-up.

Moore et al. (2002) examined teachers' acquisition of functional analysis methodology with three classroom teachers and three students, one diagnosed with specific learning disabilities while the other two students were considered developmentally normal. The researchers provided teachers one day to read protocols and understand the verbal instructions they were provided on delivering a behavioral intervention. The experimenter asked specific questions to ensure all teachers entered into the study with equivalent levels of knowledge and each teacher answered the questions with 100% accuracy. In Phase 2 of their study, Moore et al. (2002) provided rehearsal, modeling and performance feedback in training the teachers to conduct functional analyses. They found that the teachers did not perform well after the initial training, although each teacher's accuracy increased in the second phase of the study, with average accuracy rates for all 3 teachers exceeding 90%. Moore et al. (2002) conducted all training procedures in the classroom where the experimental probes were also given. However, no information was provided as to the total amounts of time that were spent in providing training during the second phase of their study.

Lafasakis and Sturmey (2007) trained parents at a special education preschool to implement discrete trial teaching, while examining whether generalization of parent teaching skills from trained to untrained programs occurred. They further examined whether changes in parent teaching led to increases in their children's correct responding. Each session was videotaped and scored later. During training sessions, Lafasakis and Sturmey gave scripts of the 10 components of discrete trial teaching and described each component to the parents. The experimenters also provided the parents with verbal feedback and a graph displaying her performance during baseline sessions. They utilized

modeling with the child in the study as the experimenter performed three discrete trials and then asked parents to perform three discrete trials. This modeling rotation between experimenter and parent took place until 10 minutes had elapsed, although the total amount of time spent in training the parents in this study was not provided. They chose to require a criterion of 90% or more correct implementation across two consecutive training sessions with the parent participants. Lafasakis and Sturmey (2007) found, in their study, behavioral skills training to be an effective and efficient method of training parents to implement discrete trial teaching, as evidenced by the parents generalizing their skills to novel, untrained programs and increased responding by the children.

Parsons, Reid, and Green (1996) spent a maximum of six hours training staff in basic teaching skills. Direct service staff members were responsible for individuals with severe disabilities. The special education classroom based training package consisted of an explanation of the class purpose, a written prequiz, review of a commercially prepared videotape, role-playing with feedback given from the instructor and other trainees, out of class assignments, a written post-quiz and questions answered by the researcher. The trainee was then observed at his or her work site and verbal feedback was provided until the trainee correctly implemented at least 80% of the teaching procedures correctly. The researchers indicate that each student being instructed by the trained staff member made progress on his or her skill acquisition, although this progress was not evaluated experimentally. Staff participants in Parsons, Reid and Green's (1996) study improved their teaching skills, although they direct feedback was required for them to obtain the desired criterion. Additionally, staff members reported the training to be acceptable.

The public school system is of particular interest in these studies, because it is the context in which children and adolescents with Autism are generally educated and spend a great deal of their time (Bryson et al., 2003). A substantial base of literature exists in psychology and psychiatry that support the effectiveness of paraprofessional treatments. This literature suggests a cost effective expansion of mental health service delivery while promoting role changes for professional therapists from direct service providers to program developers, directors, trainers, and supervisors (Christensen & Jacobson, 1994).

Barriers to implementing intensive individual intervention in schools. Most teachers receive relatively little, if any, formal instruction in evidence-based practices for children with Autism (National Research Council, 2001). The limited time that is available for teachers to participate in continuing education and for qualified consultants to provide comprehensive instruction is one key barrier to disseminating research findings. Typically, school districts provide little class-release time for teachers and continuing education is restricted to a handful of didactic workshops that cover a variety of topics throughout the academic year (Lerman et al., 2004).

Currently, the way most schools are structured is not conducive to the child attaining optimal growth in a skill area. The design of educational program models most frequently used in schools call for each adult trainer (e.g. speech pathologist, art therapist, and classroom teacher) to tutor the child in a separate setting, and for completing different tasks. This approach is likely to limit generalization of children's skills across settings and individuals at school (Carr, 1985). An additional concern that limits the amounts and types of services that are provided in schools to children with Autism is a problem of insufficient opportunities for technical assistance, such as ongoing

consultation and hands-on experience to practice skills while in training. Administratively, more explicit strategies could be implemented to keep skilled personnel within the field and more specifically within the school district (National Research Council, 2001).

Utilizing School Paraprofessionals to Carry Out Therapeutic Interventions

A paraprofessional is an individual trained to assist teachers providing special education and related services to students (Oklahoma State Department of Special Education Parent Handbook, 2006). Paraprofessionals are not trained to the same levels as professional educators, and they usually are regarded as support personnel within the school district.

Paraprofessionals are employed for the purpose of supporting the efforts of teachers. Because the paraprofessional-to-student ratio is much lower than the teacher-to-student ratio, paraprofessionals usually have the opportunity to work more intensively with their assigned special-needs students, particularly those with severe disabilities such as Autism. Paraprofessionals often engage in one to one teaching, small group instruction, and shadowing and supporting the child with Autism in the general education classroom (asatonline.org). For this reason, it is especially practical to consider training paraprofessionals to enhance the skills of children with special needs. Given the role that they serve and the amount of direct contact that they have with their students, it is imperative that paraprofessionals receive the training, mentorship, and supervision necessary to maximize their skills and competencies (asatonline.org). There is extensive evidence to indicate that lay persons can be trained to function at minimally facilitative

levels of conditions related to constructive client change over relatively short periods of time (Carkhuff, 1968).

The importance of collaboration among school paraprofessionals, classroom teachers and other educators is highlighted in the transdisciplinary service delivery model of education (Dahle, 2003; Gariulo, 2003). The transdisciplinary model emphasizes role sharing among team members, with each specialist helping other members to acquire skills related to their particular area of expertise in service to the child and family. This approach requires both 'role release' (accepting what others can do and what the specialist was trained specifically to do) and 'role acceptance' (accepting that one's job can include more than what one was specifically trained to do so). Within this framework, it would be optimal for the speech-language pathologist to train the other school professionals working with the child with Autism, so that speech and language services are delivered across the school throughout the school day (Dahle, 2003).

A substantial base of literature in psychology and psychiatry support the effectiveness of paraprofessionals in delivering clinical treatments. This literature suggests that by training paraprofessionals to deliver mental health services, schools and other institutions that serve the needs of special-needs individuals could expand the range of clinical services they provide, while delivering them in a more cost-effective manner (Christensen & Jacobson, 1994).

In 1979, Durlak reviewed 42 studies that compared professional and paraprofessional therapists. Experienced psychologists, psychiatrists, and social workers constituted the professional therapists in these studies and adults without postbaccalaureate, clinical training in professional mental health programs constituted the

paraprofessional therapists. Most of these studies found no differences in effectiveness between professional and paraprofessional therapists. Only one study demonstrated the superiority of professionals over paraprofessionals; and a second study was inconclusive. However, in 12 studies, paraprofessionals actually outperformed professionals (Christensen & Jacobson, 1994; Durlak, 1979).

A meta-analysis comparing therapists with different levels of training compared inexperienced with experienced therapists and also compared professional with paraprofessional therapists. Across 24 studies, this study reported no evidence that experienced therapists created better outcomes than inexperienced therapists (Stein & Lambert, 1984, as cited in Christensen & Jacobson, 1994). Additionally, another meta-analysis of 108 well-designed psychotherapy studies with children and adolescents (Weisz, Weiss, Alicke, & Klotz, 1987) found no overall difference in effectiveness between professional therapists, graduate-student therapists, and paraprofessional therapists. Berman and Norton (1985) found that whereas professionals were slightly better when working with briefer treatments and older patients, paraprofessionals were slightly more effective when working in longer treatments and with younger patients (Berman & Norton, 1985).

The overarching results of these meta-analytic studies conclude that there are either no differences between professionals and paraprofessionals, or differences that favor paraprofessionals. These findings seem contradictory to commonly-held beliefs and expectations that years of training should dramatically improve a person's ability to carry out clinical work (Christensen and Jacobson, 1994).

Yet despite the empirical evidence supporting the effectiveness of paraprofessionals in delivering clinical services, the potential benefits of training school paraprofessionals remains chronically untapped. Most paraprofessional support personnel in education and residential settings begin employment with minimal or no preparation in how to teach. Although the agencies in which they work are responsible for training them to ensure that they acquire adequate teaching skills, typically, paraprofessionals receive only limited training (Parsons, Reid, & Green, 1996).

Training paraprofessionals to implement behavior modification. A variety of training methods have been utilized to train teachers, parents and paraprofessionals to implement behavior modification strategies. The research shows that superior training outcomes are obtained by combining training procedures, rather than by using a single training procedure (Quilitch, 1975). The most common training modalities have been written instructions of procedures, such as training manuals (Ducharme & Feldman, 1992; Ivancic, Reid, Iwata, Faw, & Page, 1981; Koegel, Russo, & Rincover, 1977; Moore et al., 2002; Page, Iwata, & Reid, 1982), in-vivo or videotaped demonstrations (Ducharme & Feldman, 1992; Koegel, Russo, & Rincover, 1977) and verbal performance feedback (Ducharme & Feldman, 1992; Koegel, Russo, & Rincover, 1977; Pierre-Leblanc, Ricciardi, & Luiselli, 2005). Additionally, techniques of rehearsal, role-playing, in service meetings and public posting as performance feedback have been implemented to aid paraprofessionals and teachers in the acquisition of behavioral programming skills (Ivancic et al., 1981; Quilitch, 1975). The most frequently cited staff training technique has been that of performance feedback, either through oral explanations or public posting of documents, charts and scores (Ducharme & Feldman, 1992; Koegel et al.,1977;

Parsons & Reid, 1995; Pierre-Leblanc et al., 2005), along with hands-on experiences for the trainees, such as through role-playing or in-vivo demonstrations (Ducharme & Feldman, 1992; Lavie & Sturmey, 2002). It is yet to be determined through component analysis procedures which training methods account most for the behavioral changes that are seen in staff members who are trained in behavior modification strategies (Koegel et al., 1977).

The amount of time spent in training laypersons to teach functional skills to individuals with disabilities has ranged from 30 minutes (Lavie & Sturmey, 2002) to 6 hours of training per day (Parsons, Reid & Green, 1996). Koegel et al., (1977) devoted twenty-five hours to training teachers to an established criterion in using behavior modification procedures with children with Autism. Depending on the technique, instructors can spend anywhere from 1-12 minutes providing performance feedback on a skill (Ivancic, Reid, Iwata, Faw, & Page, 1981; Page, Iwata, & Reid, 1982) while up to 45 minutes has been spent in role-playing or modeling demonstrations (Parsons, Reid & Green, 1996). The number of training sessions that are provided also has varied a great deal.

In general, the established criterion for mastery in studies where laypersons are trained to implement behavior modification strategies has fluctuated with some researchers preferring trainees to demonstrate eighty (80%) percent proficiency (Crockett et al., 2007; Page et al., 1982; Parsons & Reid, 1995), while others have provided training to eighty-five (85%) percent criterion (Ducharme & Feldman, 1992). For example, Parsons, Reid, and Green (1996) conducted training in a one-day program to instruct basic teaching skills to community and institutional support staff. In this study, training

procedures were combined so that trainees viewed videotapes, received oral explanations, practiced the skills that had been demonstrated through role-playing, and also completed a written quiz over the information. The one-day program was outlined into a classroom component that encompassed a maximum of six hours. After the training procedures were delivered, the instructor then observed the staff member in teaching sessions with the client. Feedback was also provided until the trainees correctly implemented at least 80% of the procedures on two different client skills (Parsons et al., 1996). Even still, Koegel et al., (1977) set performance criterion levels at ninety (90%) percent correct skill use for teachers in training while Lafasakis & Sturmey (2007) used this same ninety (90%) percent criterion when training parents to implement a discrete-trial procedure.

Single Case Designs

Multiple Baseline Designs

The multiple baseline technique has become the most widely used method for experimental design in applied behavior analysis. This design enables a researcher to analyze the effects of an independent variable across multiple behaviors, settings, and/or subjects without the necessity of withdrawing the treatment variable in order to reverse improvements in behavior (Heward, 1987). In multiple baseline designs, the effect of an intervention is demonstrated by showing a pattern of change as the intervention is introduced. The more baselines across which the effect of the intervention is demonstrated, the more convincing is the demonstration of a causal relationship. Usually, two or three baselines are enough if the baseline data are stable and the intervention produces marked effects (Kazdin, 1982).

Nonconcurrent Multiple Baseline Designs

Nonconcurrent multiple baseline designs are a derivation of the standard or concurrent multiple baseline design. However, in a nonconcurrent design, data are not collected simultaneously as they are in a concurrent baseline design where each baseline is established contemporaneously (Harvey, May & Kennedy, 2004). In this research design, the researcher initially determines the length of each of several baseline phases. When a subject becomes available, he is then assigned to one of the predetermined baseline lengths and then baseline observations are able to be carried out. Observations are continued throughout the treatment phase, as would be in an AB design. Identical procedures are carried out for each subject until all of the predetermined baseline lengths are utilized. Since the baseline lengths are randomly determined for any one subject, the treatment is implemented at a randomly determined point in time (Watson & Workman, 1981). The primary advantage of the non-concurrent multiple baseline across subjects design is that it allows for flexibility in applied research settings, while establishing functional relationships between treatment variables and behavior changes.

Definition of Terms

For the purpose of this study, we will refer to *accuracy* as the faithfulness with which paraprofessionals carried out the recommended discrete trial training sessions as planned. We define *integrity* as the consistency of accurate implementation over time.

Research Questions

Question 1*:* How many hours of DTT instruction are needed for paraprofessionals to reach 85% procedural accuracy?

Question 2*:* After training to 85% accuracy, will paraprofessionals maintain integrity in implementing DTT procedures to teach functional communication skills in nonverbal or low language ability children with Autism?

Question 3*:* When DTT is carried out by paraprofessionals, are academic goals achieved, as measured by percentage of correct responses produced by the child?

Hypotheses

Hypothesis 1*:* School paraprofessionals will need an average of 8 of hours of discrete trial training instruction to be trained to competency levels of 85% accuracy with the technique.

Hypothesis 2*:* After training, paraprofessionals will continue to implement DTT procedures at or above the 85% criterion level over a period of seven weeks.

Hypothesis 3: The children with Autism will produce growth of more than 50% accurate responses produced above baseline levels when DTT procedures are delivered with accuracy and integrity by paraprofessionals over a period of seven weeks.

CHAPTER III

METHODOLOGY

Participants

Five paraprofessional educators and five students with Autism participated in this study. Two of the paraprofessionals (Karla and Donny) served students in a self-contained classroom for students with Autism. The other three paraprofessionals (Jane, Mary and Nancy) were Inclusion Assistants, who provided support to the students with Autism in a general education setting. Tables 1 and 2 provide demographic data for the paraprofessional and student participants. To protect the identity of the participants, names have been changed in this study. Paraprofessionals and students were paired to create dyads that reflected names with the same first letter, with the paraprofessional listed first (for example, Jane and Jake; Karla and Kevin, Mary and Marc; Nancy and Noah; Donny and Daniel).

All five student participants were enrolled in the self-contained classroom, known as the Teaching to Academic Potential (TAP) classroom in a middle school in Fort Worth, Texas. The paraprofessionals and students who participated in this study were identified by the special education teachers of the self-contained TAP classroom. The TAP classroom was initially identified as a potential source of participants by the co-coordinator of self-contained programs for the Fort Worth Independent School District.

Students were admitted into this study after the researcher confirmed that each student participant possessed the necessary oral motor mechanisms to produce speech by examining the students' speech-language records. Additionally, information from hearing and vision screenings was collected to ensure that student participants had appropriate visual and auditory abilities before participating in this study.

Record reviews were conducted for each student participant to confirm their Autism diagnoses. Jake received a diagnosis of Speech-Language Impairment during preschool years from a community based early intervention service agency. At the age of seven, he received a formal diagnosis of Autism, from a pediatrician at a local children's hospital. Kevin received a formal diagnosis of Autism at the age of three through a multidisciplinary evaluation at a children's medical consortium in Tempe, AZ. Kevin also received Speech-Language therapy as an outcome of his initial formal evaluation. Records indicated Marc was initially diagnosed as a child with Autism at the age of seven years old. Marc's diagnosis was given by a developmental pediatrician at a local children's hospital. Marc's Speech-Language Impairment diagnosis was given by a speech-language assessment conducted at his elementary school. Noah was originally diagnosed with Autism at the age of four. Noah also received a diagnosis of Attention Deficit Disorder-Inattentive at the age of nine. At school he was served educationally under the categories of Autism, Other Health Impairment and Speech-Language Impairment. Noah's speech-language impairment diagnosis was the outcome of a multidisciplinary evaluation conducted when he entered the public school system at age 6. Noah also received medication to address the behavioral symptoms of ADD. Both of Noah's medical diagnoses were given by his pediatrician in Fort Worth. Records

indicated Danny received a diagnosis of Autism prior to age three, although a specific chronological timeframe could not be determined. Danny had a comorbid diagnosis of Hydrocephaly with Epilepsy. Danny was diagnosed with Autism and co-morbid conditions by a pediatric neuropsychologist in Guam. Danny received daily medication to address this comorbid condition. Danny also received a speech-language diagnosis of developmental motor apraxia given by a developmental pediatrician, prior to entering the public school setting.

Table 1

Demographics of Paraprofessional Participants

Paraprofessional	Gender	Age	Ethnicity	Education	Yrs of Exp in Sp Education
Jane	Female	30	Black	Some college	less than 3 years
Karla	Female	36	Caucasian	High School Diploma/GED	10+ years
Mary	Female	25	Hispanic	2yr+/Assoc. Degree	less than 3 years
Nancy	Female	35	Hispanic	2 yr+/Assoc. Degree	less than 3 years
Donny	Male	57	Black	Some college	4-9 years

Table 2

Demographics of Student Participants

Student	Gender	Age	Ethnicity	Diagnosis	Grade
Jake	Male	13	Hispanic	Autism/Speech Impairment	7
Kevin	Male	12	Black	Autism/OHI/Speech Impairment	6
Marc	Male	13	Hispanic	Autism/Speech Impairment	7
Noah	Male	13	Black	Autism/Speech Impairment	7
Daniel	Male	14	Hispanic	Autism/OHI/Speech Impairment	8

Setting

Fort Worth, located in north Texas, is an urban school district in the Dallas/Fort Worth metroplex. Fort Worth has a population of approximately 650, 000 residents and the Fort Worth Independent School District has an average enrollment of 80,000 students in grades K-12.

A general conference room adjacent to the principal's office was used to train the paraprofessionals. The room was furnished with technological equipment including a computer and projector, which were used in the didactic presentation of the discrete trial procedures. Due to schedule conflicts, the discrete trial language interventions were carried out in two locations within the middle school campus. The initial room where DTT sessions were conducted was the speech/language therapy classroom. In this classroom, the participants sat at a crescent (kidney) shaped table. An alternate location for the language intervention sessions was a small conference room. During the discrete

trial language sessions that were conducted in this setting, participants sat at a rectangular folding table, where the student was placed either perpendicularly or diagonally across from the paraprofessional.

Materials

Paraprofessional training materials. A discrete trial training curriculum entitled *How to Do Discrete Trial Training* (de Boer, 2007) was used to train the paraprofessionals in the use of discrete-trial training. This 75-page book was purchased from the publisher and was written to address a target audience of professionals seeking practical solutions and strategies for successfully working with students with Autism Spectrum Disorders.

Student materials and reinforcers. Target behaviors for the language skills that were addressed in the discrete trial intervention were based upon each student's individual speech-language goals as written in his most current IEP. Small manipulative items such as blocks, magnets, puzzle pieces or other toys were used as stimulus items. Materials used as stimulus items during the language intervention were either provided by the author, or by the special education teachers in the TAP classroom. Tangible items such as sensory toys and edible reinforcers were also present during the language intervention sessions. Each student had his own supply box stocked with language training and reinforcing items that were unique to their language targets and desired interests.

Scoring of student responses. Red, white and blue poker chips were used as a method for paraprofessionals to collect data of the students' responses during the discrete trial language intervention. Red and blue poker chips were placed into a plastic,

compartmentalized token box to indicate correct responses given by the student. White poker chips were also placed into compartments indicating the student provided a response that was incorrect for the language stimulus item. The compartments of each token box were numerically ordered with numbers 1-24, corresponding to the trial initiated by the paraprofessional. At the end of each day, the author recorded the total numbers of correct and incorrect tokens across the DTT sessions.

Target Behaviors for Students.

The target skills for each student's verbal responses were selected from the student's most current speech-language goals as written in their Individualized Education Plan. The TAP classroom teachers and the researcher worked collaboratively to identify the most appropriate skills to be addressed in this study for each student. The specific skills targeted in the DTT sessions ranged from receptive understanding, responding to "wh" questions, turn-taking in conversation, expressive labeling, pragmatics and using appropriate vocabulary. Table 3 summarizes the goals for each student.

Table 3

Student Target Behaviors

Student	Speech-Language Goal/Target Behavior
Jake	1. Respond appropriately to a variety of questions of varying complexity, with cues
	2. Engage in socially appropriate verbal exchanges with cues (greetings, farewells, apologies, manners, etc)
Kevin	1. Provide yes/no answers, supplying true/false judgments
	2. Descriptions, events, actions, processes, etc
	3. Match 3 new sight words to pictures per week
	4. Verbally count one to twenty objects
Marc	1. "Wh" answers, supplying solicited information.
	2. Descriptions: properties, traits, conditions
	3. Explanations to express reason, causes, and predictions
Noah	1. Verbally label common objects/pictures, with cues
	2. Appropriately request an object, person or activity with 1-3 words, with cues
Daniel	1. Indicate receptive understanding of verbal labels
	2. Upon seeing and wanting a particular item, and with a picture of that item within reach, D. will pick up the picture, reach to person holding the item, and release the picture into that person's hand.
	3. Use the signs for "more", "eat", "finished" to indicate wants

Measures

The Behavior Intervention Rating Scale (BIRS*;* Elliott & Treuting, 1991; Von Brock & Elliott, 1987) is a 24 item instrument that measures three concepts: acceptability, effectiveness and time to effectiveness of a treatment. The BIRS items are scaled on a 6-point Likert format, ranging from 1 = *Strongly disagree* to 6 = *Strongly*

agree, where higher ratings indicate more favorable perceptions. The alpha coefficients derived for each scale are .97, .92, and .87 respectively (Von Brock & Elliott, 1987). A variation of the BIRS was given to the paraprofessional participants and special education TAP teachers at the completion of the study to gather ratings regarding their perceptions of the effectiveness overall acceptability of the discrete trial language intervention. Several BIRS items were modified for this study to reflect the perspectives of the paraprofessionals and TAP teachers regarding the effectiveness, acceptability, and feasibility of the discrete trial procedures. The modified BIRS that was utilized in this study is reproduced in Appendix A.

Procedures

Research approval was granted by the Office of Research Accountability and Data Management department within the Fort Worth Independent School District and from the Institutional Review Board at Oklahoma State University. Once this approval was obtained, the author proceeded with the study.

Research design. This study utilized a non-concurrent multiple-baseline design conducted over a 7-week period. It consisted of several activities and phases: baseline measurement, paraprofessional training in DTT, Phase I of treatment (post-training), verbal feedback, Phase II of treatment (post-verbal feedback), video and verbal feedback, and Phase III of treatment (post video and verbal feedback). Table 4 outlines these activities in greater detail. It was determined a priori that paraprofessionals who failed to reach the pre-established criterion of 85% accuracy with the steps of the discrete trial procedure in Phase I would receive post-verbal feedback. Similarly, it was established prior to data collection that paraprofessionals who failed to attain the predetermined level

of 85% accuracy with the DTT steps in Phase II would receive post-video-and-verbal feedback.

Baseline data collection. The author collected baseline data for all paraprofessional-student dyads over the course of one week prior to the paraprofessionals being trained on the discrete trial procedure. Three of the paraprofessional-student pairs were observed on three separate occasions, while two dyads were observed on four occasions. Baseline data observations were five minutes in length for each session.

Baseline data were gathered to measure two outcomes, the paraprofessionals' use of DTT procedures and also the students' performance on their targeted academic tasks. Student baseline data were collected during observations conducted simultaneously with the paraprofessional's baseline observations. The researcher utilized a score sheet of tally marks to record baseline data. A copy of this data score sheet is included in Appendix B.

During baseline, paraprofessionals and students were observed in the self-contained TAP classroom while working on a variety of academic tasks, primarily involving English-Language Arts and math vocabulary. Target behaviors for the students' responses were drawn from the speech-language goals listed on their Individualized Educational Plans. Discrete trial training had not been previously explained to the paraprofessionals and they were instructed to "sit down and do this activity". The activity they were given to do with the student generally consisted of a task with which the student was previously familiar, such as a file folder game or an activity from the student's individual work.

Table 4

Study Phases

Phase	Activity	Measured by
Baseline	In class observation of paraprofessional conducting language activity with student	Direct observation of task
Training	2 hour didactic instruction: modeling, role-play, Q & A	Direct observation in training
Phase I *Post-training*	Paraprofessional implements intervention to 85% accuracy criterion	Review of video data. Scored on data coding form
Verbal feedback	Researcher individually discusses with each paraprofessional participant specific details related to their implementation of DTT	Bulleted list of suggestions
Phase II *Post-Verbal Feedback*	If 85% accuracy criterion is not reached, researcher provides corrective verbal feedback; implementation continues	Review of video data. Scored on data coding form
Verbal and video feedback	Researcher individually discusses with each paraprofessional participant specific details related to their implementation of DTT and also shows supporting video from actual DTT sessions of the dyad	Bulleted list of suggestions Review of video data
Phase III *Post Verbal and Video Feedback*	If 85% accuracy criterion is again not reached, research provides corrective feedback through verbal and video modalities; implementation continues through conclusion of study	Review of video data. Scored on data coding form

Training paraprofessionals. The five paraprofessionals were trained on January 5, 2009 during a teacher in-service day in one 2-hour group session. The training session involved didactic instruction, modeling, role play and question and answer sessions with the researcher.

Each participating paraprofessional was given a copy of *How to Do Discrete Trial Training* (de Boer, 2007) for personal reference. Throughout the didactic instruction the author conversed with the paraprofessionals in a question-and-answer format regarding any questions they had about the procedure. At the conclusion of the presentation, each participant to role-played a scenario in which a discrete trial language session was performed. The author critiqued each paraprofessional participant on his or her role-play performance until all participating paraprofessionals verbally reported they felt comfortable with the procedures. Role-play scenarios were approximated to simulate a variety of student responses, and it was explained to each paraprofessional that their sessions would be unique to the individual language targets and responses of his or her student.

Target behaviors for paraprofessionals. The target behaviors for the paraprofessional participants consisted of the steps of the discrete trial procedure. These steps include 1) ensuring all materials are ready to begin session, 2) ensure student is attending and willing to participate, 3) delivers initial stimulus, 4) allows adequate time for student to respond, 5) delivers reinforcement or correction procedure, and 5) collection of data. Please refer to the 25 trial data coding form included in the appendix of this document for a representation of the DTT steps taught and evaluated.

Recording and reliability. All intervention sessions were video recorded using a Sony Cybershot digital camera with tripod. The video data were then reviewed by the author, on a daily basis, and the paraprofessional's accuracy with each component of the discrete trial process was coded based on the video. Paraprofessionals received a check-mark (√) for a correctly performed step, or a hash-mark (-) for a step performed incorrectly or omitted. If a particular step of the discrete trial process was not required within a specific trial, the author coded the step as (X) for Not Able to be Observed. Accuracy of paraprofessionals' performance was calculated by dividing the number of correctly performed steps by the total number of steps within each session and multiplying by 100 to obtain a percentage. Likewise, data were collected on the students' verbal responses to each trial, where students received a check-mark (√) for a correct verbal response or a hash-mark (-) for an incorrect verbal response. The students' percentage of correct responding was calculated by dividing the number of correct responses by the total number of opportunities to respond within each session and multiplying by 100. The coding sheet can be found in Appendix C.

Reinforcer assessments. For the duration of the study, prior to the first intervention session conducted each day, the paraprofessionals were instructed to perform a reinforcer preference assessment to determine the tangible items each student participant was willing to work for in that session. Possible reinforcers for each student were identified by parents prior to the start of the study by asking them to select preferred items from menus of potentially reinforcing items.

For each trial of the reinforcer assessment, the paraprofessional placed three items in front of the student and/or asked the student which item they would choose to work for

that day. The paraprofessional conducted between three and five reinforcer assessment trials each day, using the item most frequently chosen by the student as the reinforcer for that session. Generally, only one reinforcer was used within each session, unless the paraprofessional determined the student was satiated with the item. At such time the paraprofessional was instructed to conduct another preference assessment to determine what other items the student desired as reinforcers. Reinforcers used in the study included sensory toys, handheld video games, and earned computer time outside of the DTT session. Students were also allowed to choose edible reinforcers such as juice boxes, cookies, crackers, candy and fruit snacks.

Overview of the multiple baseline design. All baseline observations began on January 13th. It became necessary to extend baseline conditions into the following week due to a scheduled school closing. Phase 1 (Post-Training) began for each participant on or after January 26, 2009. Phase 1 was initiated by Mary and Marc on January 26th; followed by Donny and Daniel on January 29th. The next participants to enter Phase 1 were Karla and Kevin on February 4th. Due to time constraints, the last two dyads of paraprofessionals and students, Nancy and Noah along with Jane and Jake entered Phase 1 on February 9th and February 11th respectively. Each paraprofessional implemented the discrete trial procedure based upon his or her knowledge from the training that was provided earlier in January. All five paraprofessional participants were allowed to implement the intervention for a minimum of two sessions with the student with Autism before the author provided Phase 2 of the research. The number of sessions completed by each paraprofessional during Phase 2 ranged from four to eleven. The researcher verified the accuracy with which the paraprofessionals implemented the discrete trial procedure

during Phase 2. Any paraprofessional whose level of procedural accuracy was below 85% was provided with verbal feedback prior to commencing Phase 3. All five paraprofessionals progressed to receive verbal feedback after the post-training since not one participant was implementing the discrete trial procedure to the criterion of 85% accuracy.

Prior to the beginning of phase 2 (Post Verbal Feedback), the author individually conferenced with each paraprofessional regarding his or her accuracy with the steps of the discrete trial procedure. Paraprofessionals were given specific suggestions relative to their performance, as evidenced through the video recorded data. Additionally, the student's performance regarding their correct verbal responses to each trial was discussed in this verbal feedback session. The author also provided each paraprofessional with a bulleted list handout of reminders to increase his or her accuracy with the discrete trial procedures. A sample copy of the feedback handout that was given to the paraprofessionals can be found in Appendix A3. The paraprofessionals were instructed to continue implementing the intervention with the same frequency and duration of sessions. The total number of DTT language intervention sessions implemented during Phase 3 ranged between five and 20 sessions. One paraprofessional reached and maintained the criterion of 85% accuracy with the procedure, and therefore did not progress to the next phase; while the remaining 4 participants received an additional round of feedback from the author.

Phase 3 (Video and Verbal Feedback) occurred after the paraprofessionals had implemented the intervention utilizing the strategies provided by the author in the sessions following verbal feedback. For this phase of the research study, the author again

conferenced individually with each paraprofessional; providing verbal feedback to specific situations each para encountered with their student with Autism. Also in this fourth phase, the author reviewed portions of the video recorded sessions with the paraprofessional participants. This was done in addition to the verbal suggestions that were provided, although no bulleted list was given to the participants at this time. The paraprofessionals were then instructed to continue implementing the intervention twice daily for at least ten minutes each session. Each of the remaining four paraprofessional participants implemented the intervention for 4-5 more sessions before the conclusion of the study.

Analysis. The first research question, how many hours of DTT instruction are needed for paraprofessionals to reach 85% procedural integrity, was assessed through the author's direct observation and a tally of the number of minutes spent in training and individual conferencing needed for each paraprofessional to reach 85% procedural integrity. The second and third research questions, assessing the degree to which the paraprofessional therapists maintained integrity of the discrete trial training procedures and measuring the accuracy with which each paraprofessional carried out the DTT components, were measured utilizing a multiple baseline across subjects design analyzing the videotapes of the DTT sessions with the children over the 7-week period. The fourth research question, evaluating the teachers' and paraprofessionals' perceptions of the effectiveness, feasibility, and ease of implementation of the DTT intervention in the classroom, was addressed by administering the modified BIRS (Elliott & Treuting, 1991; Von Brock & Elliott, 1987) at the conclusion of the intervention period.

CHAPTER IV

RESULTS

Results from this study indicate the effectiveness of training paraprofessionals to implement discrete trial language interventions in this study is varied among paraprofessional participants and the students with whom they worked. Several explanations can be given regarding individual performance and will be discussed in the next chapter. Data collection began on January 26th, 2009 and concluded on March 13th, 2009 with the expectation that the language intervention would be conducted at least once each day. Dyads are discussed below with paraprofessional's name listed first.

Jane and Jake

Jane and Jake completed a total of 14 discrete trial language intervention sessions, over a period of 11 days. Data collection began on January 29th, 2009 and the last day of data collection occurred on March 12th, 2009. On several days, the language intervention was not implemented due to absences of the paraprofessional or student. Jake participated in a weekly classroom assignment where students transitioned to a workshop environment off campus to engage in living skills training, thus eliminating data collection for one day each week.

Baseline. As Figure 1 shows, baseline data were collected a total of three days. During the baseline phase of the intervention, Jane's performance was recorded at levels of 37%, 20%, and 26% respectively on the three occurrences of baseline observation

Jake's percentages of correct responses were 80%, 80% and 84% during the baseline observation.

Post-Training. In the Post-Training phase, Jane implemented the intervention four times, across five days. Four language intervention sessions were conducted before the first phase of verbal feedback was given. Session 1 of implementation resulted in Jane obtaining an accuracy score of 22% with the steps of the discrete trial process while Jake responded correctly to 100% of the items presented. Session 2 provided accuracy data where Jane obtained a percentage of 70% and Jake received a score of 78% correct responding. In the third session, Jane implemented the intervention with 31% accuracy while Jake responded correctly to 98% of the language items. The fourth session showed Jane implementing the intervention with a low percentage of only seven percent accuracy. However, Jake's correct responses on this date was 78% percent; his lowest accuracy rate percentage throughout the intervention. After these four sessions implementing the language intervention with less than the desired criterion of 85% accuracy with the DTT procedure, the author conferenced individually with Jane and provided her with verbal feedback regarding her and Jake's performance.

Post Verbal Feedback. Subsequent to receiving verbal feedback, Jane and Jake implemented the language intervention session again for six sessions. Jane's accuracy percentage showed an increasing trend while Jake's percentage of correct responses remained at or near the criterion of 85% within each session. The first session after receiving verbal feedback, session 5, recorded Jane as 31% accurate while Jake's responses were 93% correct for the presented task. In the sixth implementation, Jane was 82% accurate with the procedure while Jake correctly responded to 95% of the language

items on which he was being instructed The seventh session of the intervention resulted in a task change for Jake since he met the criterion of at least 85% correct responses to the language tasks in three consecutive intervention sessions. On this day of data collection Jane was recorded to be implementing the discrete trial language intervention with 71% accuracy while Jake was 80% correct in responding. The eighth session that the intervention was implemented, Jane recorded a score of 73% accuracy with the steps of the discrete trial process while Jake produced 83% of his language responses correctly. The ninth and tenth sessions the language intervention was implemented, Jane obtained scores of 88% and 77% accuracy while Jake recorded a score of 100% correct responding with the language tasks on both days of the intervention.

Post Video and Verbal Feedback. After the tenth session, the author again provided Jane with verbal feedback in addition while also presenting video samples from selected intervention sessions. The videos shown were selected based upon the accuracy percentages obtained by Jane in that session. The author showed video from a session with low accuracy and a session where Jane performed at her highest percentage up to that point. In the conference, the author discussed Jane's accuracy with implementing the discrete trial procedures and Jake's accuracy of responding. Jane was then instructed to continue implementing the intervention again until the conclusion of the study.

After the final phase of verbal and video feedback, Jane achieved and maintained the criterion level of 85% accuracy with the steps of the discrete trial process for the language intervention. In session 11, the first session immediately following video and verbal feedback, Jane obtained 81% accuracy while Jake correctly responded to 98% of the tasks. Session 12 resulted in Jane implementing the intervention with 95% accuracy

while Jake was 86% correct in his responses. Jake's language task was changed in session 13, since he again met the 85% criterion for three consecutive days of the intervention. On this day, Jane's accuracy score was 91% while Jake correctly responded to 78% of the language items. Jane obtained a score of 96% accuracy and Jake was 98% correct in responding to the language tasks in the 14th session. In the final session, session 15, both Jane and Jake were 100% accurate and correct with their performance. Thus, at the conclusion of the study, Jane had reached and maintained the criterion of 85% accuracy with implementation of the discrete trial procedures in a language intervention for Jake.

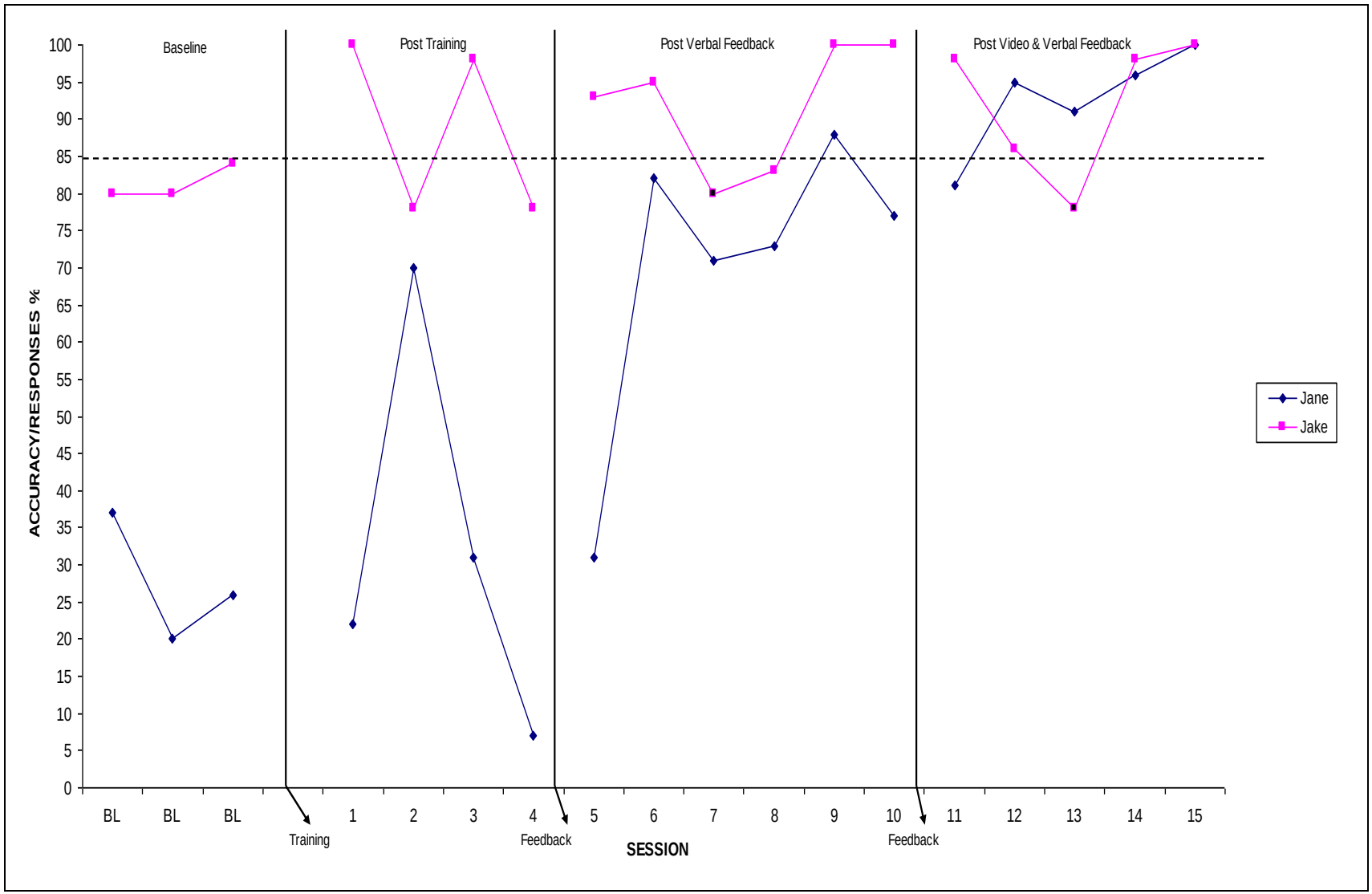

Figure 1. Summary of intervention performance percentages for Jane and Jake.

Karla and Kevin

Karla and Kevin completed a total of 21 discrete trial language intervention sessions, over a period of 16 days. Data collection began on January 26th and concluded on March 13th. Occasionally, the language intervention was not implemented due to medical absences of the paraprofessional or classroom activities that conflicted with the scheduled times for the student's intervention. Kevin is a full-time student in the self-contained TAP classroom and receives inclusive education with non-disabled peers for special/elective classes. Karla received all four phases of intervention in the course of the study (Baseline, Post-Training, Post Verbal Feedback, and Post Video and Verbal Feedback).

Baseline. As Figure 2 shows, baseline data were collected for a total of four observations. During the baseline phase of the intervention, Karla's accuracy prior to receiving any DTT training was recorded at levels of 34%, 21%, 13%, and 27% respectively. Kevin's percentages of correct responses produced were 44%, 53%, 64%, and 51% during the baseline observations

Post-Training. In the Post-Training phase, Karla implemented the intervention six times, across four days. Six DTT intervention sessions were conducted before the first phase of verbal feedback was given. Session one of the intervention implementation resulted in Karla obtaining an accuracy score of 47% with the steps of the discrete trial process while Kevin obtained a correct percentage of 68%. Session two resulted in Karla's accuracy percentage was 67% as Kevin responded correctly to 85% of his language tasks. In session three, Karla's accuracy of implementation was at 51%. Kevin obtained a response score of 83%. In sessions four and five, Karla's accuracy in

implementing the intervention was 53% and 42% respectively. Kevin's correct responses in sessions four and five were 74% and 85% respectively. In the sixth session of the intervention, Karla implemented the discrete trial procedures with 56% accuracy while Kevin responded correctly to 69% of the language tasks. Verbal performance feedback was given after completion of the sixth intervention session.

Post Verbal Feedback. Subsequent to receiving verbal feedback, Karla and Kevin implemented the language intervention again for 10 sessions across 19 days. Karla's accuracy percentage continued to show a varying trend without establishing stability in performance. Session 7 resulted in Karla obtaining an accuracy percentage of 68%. Conversely, in this session, Kevin was 87% correct in his responses. In session 8, Karla delivered the discrete trial intervention with 73% accuracy while Kevin responded to the language intervention 72% correctly. In session 9, Karla was 69% accurate while Kevin's correct responses fell to a level of 54%. Session 10 resulted in Karla obtaining an accuracy percentage of 70% while Kevin correctly responded to 58% of the language items that were presented to him. In sessions 11 and 12, Karla was 72% and 77% accurate respectively, and Kevin responded with 58% and 63% correctness, respectively. In session 13, Karla's accuracy dropped to 58%, although Kevin's correct responses increased to 66%. Session 14 resulted in Karla being 79% accurate with delivering the intervention in a discrete trial format. Likewise, in session 14, Kevin responded correctly to 83% of the intervention. Karla was 75% accurate in session 15; while Kevin correctly responded to 80% of the language tasks in this same session. Karla was 72% accurate in implementing the discrete trial intervention in the 16th session. Kevin was 79% correct

with his responses to the language tasks in this intervention. After session 16, Karla received the next phase of verbal and video performance feedback.

Post Video and Verbal Feedback. After the 16th session, the author again provided Karla with verbal feedback while also presenting video samples from selected intervention sessions. The videos shown were selected based upon the accuracy percentage obtained by Karla in those sessions. The author strategically selected video from a session with low accuracy and a session where she performed at her highest percentage thus far into the intervention. During this conference, the author discussed Karla's accuracy with implementing the discrete trial procedures and Kevin's precentage of correct responding. Karla was then instructed to resume implementing the intervention for the remainder of the study.

After the final phase of verbal and video feedback, Karla gradually approached and finally achieved the criterion level of 85% accuracy with the steps of the discrete trial process for the language intervention. In session 17, the session immediately following video and verbal feedback, Karla obtained 83% accuracy while Kevin responded with 80% correctness. Session 18 resulted in Karla implementing the intervention with 84% accuracy while Kevin was 74% correct in his responses. Karla obtained 94% accuracy while Kevin correctly responded to 78% of the items in the 19th session. Karla obtained a score of 79% accuracy and Kevin was 77% correct in session 20. In the final session, session 21, Karla implemented the intervention with 88% accuracy while Kevin correctly responded with 86% to the language task. At the conclusion of the study, Karla had reached, with variable consistency, the criterion of 85% accuracy in implementation of the discrete trial procedures in providing a language intervention for Kevin.

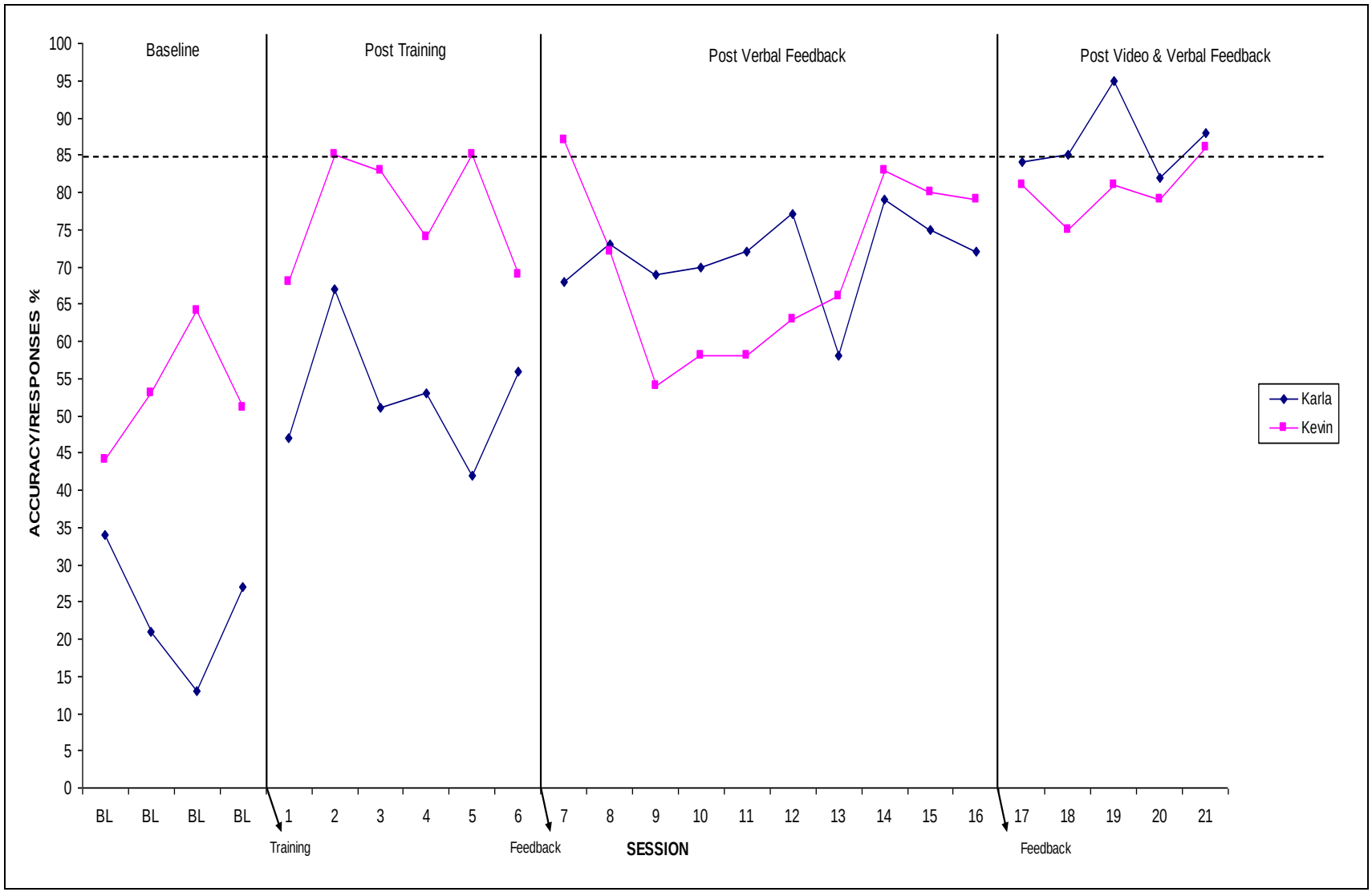

Figure 2. Summary of intervention performance percentages for Karla and Kevin.

Mary and Marc

Mary and Marc completed a total of 28 discrete trial language intervention sessions, over a period of 20 days. Data collection began on January 26th and concluded on March 13th. Occasionally, the language intervention was not implemented due to absences of the paraprofessional or student, scheduled activities, or school closings. Marc is a sixth grade student receiving sixty percent of his instruction in the self-contained TAP classroom and the remaining forty percent of instruction inclusively in the general education setting. Marc also participated in a weekly classroom assignment where students transitioned to a workshop environment off campus to engage in living skills training, thus eliminating data collection for one day each week. Mary received all four phases of intervention in the course of the study (Baseline, Post-Training, Post Verbal Feedback, and Post Video and Verbal Feedback).

Baseline. As Figure 3 shows, baseline data were collected for a total of four observations. During the baseline phase of the intervention, Mary's accuracy prior to receiving any DTT training was recorded at levels of 11%, 14%, 26%, and 28% respectively. Marc's percentages of correct responding at baseline were 76%, 41%, 66%, and 74% during the observations.

Post-Training. After receiving initial discrete trial training, Mary implemented the intervention 10 times, across six days. 10 language intervention sessions were conducted before the first phase of verbal feedback was given. In the first session of implementation Mary received an accuracy score of 49% with the steps of the discrete trial procedure while Marc responded correctly to 91% of the language items presented to him. Session two resulted in Mary obtaining a percentage of 45% accuracy and Marc

received a score of 96%. The third session resulted in Mary implementing the intervention with 53% accuracy while Marc responded with 91% correctness. The fourth session of the intervention showed Mary obtaining an accuracy score of 52% and Marc responded correctly to 98% of the stimulus items. In sessions 5, 6, and 7, Mary delivered the intervention with 50%, 62%, and 51% accuracy respectively. Marc provided correct responses of 100% in sessions 5, 6, and 7. Mary delivered the intervention with 53% accuracy in the 8th session; while Marc responded correctly to 98% of the tasks. Session 9 resulted in Mary implementing the discrete trial intervention 83% accurately. Marc was again 100% correct in his responses. In the tenth session, Mary was 78% accurate with the intervention, yet Marc still responded correctly to 100% of the items. After these 10 sessions of implementing the language intervention with less than the desired criterion of 85% accuracy, the author conferenced individually with Mary, and provided her with verbal feedback regarding her and Marc's performance.

Post Verbal Feedback. Following the verbal feedback that was provided, Mary and Marc continued to implement the language intervention for another 11 sessions. These 11 sessions were carried out over the course of eight days. Mary's accuracy percentage showed a variable trend of decreasing accuracy beginning with the 11th session. In this session, Mary obtained an accuracy percentage of only 42%. Marc provided correct responses to 89% of the language items presented during that session. Mary continued to maintain low rates of implementation accuracy in the 12th, 13th and 14th sessions of the language intervention. Her accuracy scores for these sessions were 49%, 57% and 64% respectively. In these sessions, Marc correctly responded to 94%, 90% and 100% accuracy in the respective sessions also. Due to the high rates of response

accuracy, Marc's task was again changed as he consistently met the established criterion of 85% correct responding in the language intervention sessions. Session 15 resulted in Mary delivering the discrete trial language intervention with 52% accuracy, while Marc was again 100% correct in his language responses. In the 16th session, Mary was 69% accurate with the procedures of the discrete trial language intervention while Marc was 94% correct in his responses. Sessions 17, 18 and 19 resulted in Mary delivering the intervention with accuracy percentages of 57%, 55% and 60%. In the 17th, 18th and 19th sessions Marc provided responses that were increasing with 96%, 98% and 100% correctness. At session 17 and again in the 20th session, Marc's tasks were changed. Mary implemented the intervention with 61% accuracy in the 20th session; while Marc was 95% correct in his responses. The intervention was implemented again two more times, session 21 and 22, with Mary delivering the discrete trial procedures with 37% and 32% accuracy. Marc provided correct responses to 99% and 92% of the language tasks. After the 22nd session of the language intervention being implemented, the author again provided Mary with feedback regarding her accuracy and Marc's correct response percentages.

Post Video and Verbal Feedback. Upon receiving verbal and video performance feedback, Mary and Marc carried out the language intervention six more times over the course of five days in the study. In session 23, both Mary and Marc obtained 98% with implementation of and correct responses to the discrete trial intervention. Session 24 resulted in a task change for Marc since he consistently exceeded the established criterion of 85% correct responding. Mary again obtained an accuracy percentage of 98%, while Marc was 96% correct in responding to the new language tasks. In sessions 25, 26, and

27 Mary delivered the intervention at rates of 94%, 95% and 97% accuracy. Marc correctly responded to the language intervention at 99%, 94% and 96% accuracy. In session 28, the final session, Mary obtained an accuracy percentage of 94% and student Marc provided 97% correct responses to the language tasks that were presented to him. Thus at the conclusion of the intervention, Mary had reached and exceeded the established criterion of 85% correct implementation of the discrete trial procedures.

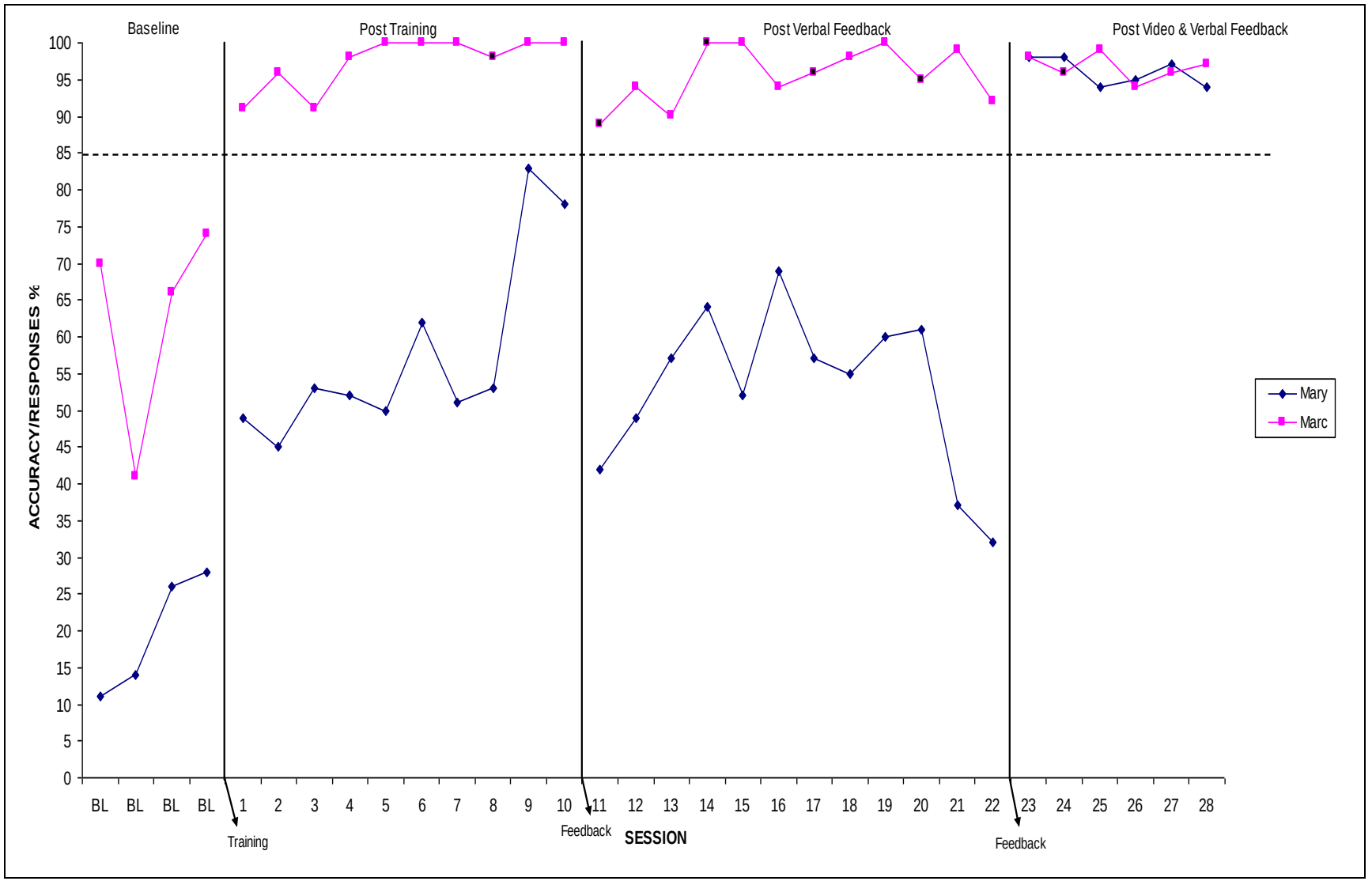

Figure 3. Summary of intervention performance percentages for Mary and Marc

Nancy and Noah

Nancy and Noah completed 18 sessions over a period of 14 days in this study. Data collection for these participants began on January 29th, 2009 and concluded on March 13, 2009. Nonconsecutive days of data collection occasionally occurred due to absences of the paraprofessional or student, school activities, school closings or technology difficulties. Similar to other students, Noah also participated in a weekly sheltered workshop opportunity where student's learned independent and daily living skills, thereby eliminating data collection for one day each week. Noah is a full-time student in the self-contained TAP classroom and receives inclusive education with non-disabled peers for special/elective classes. Nancy received all four phases of intervention throughout the study.

Baseline. Figure 4 provides a graphical representation of Nancy and Noah's progress during the course of the intervention. During the baseline phase of the intervention, Nancy correctly implemented discrete trial procedures in 19%, 11% and 26% of the observations that were conducted. Noah responded correctly to the tasks and obtained scores of 62%, 62% and 68% during the baseline observations.

Post-Training. Nancy delivered the discrete trial intervention to Noah three times during the Post-Training phase. Session 1 of implementation resulted in Nancy obtaining an accuracy percentage of 44% with the discrete trial procedures while Noah correctly responded to 75% of the items that were presented during this session. Session 2 provided accuracy data where Nancy was 30% accurate with the discrete trial procedures and Noah was 74% correct with his language responses. In the third session, Nancy implemented the intervention with 56% accuracy. Noah provided correct

responses to 52% of the language items in this third session. After these three sessions of implementing the intervention with less than the desired criterion of 85% accuracy with the discrete trial procedures, combined with the delayed start date and nonconsecutive days of data collection, the author met with Nancy to discuss her individual performance and the correctness of Noah's responses.

Post Verbal Feedback. After receiving verbal feedback, Nancy was instructed to continue implementing the language intervention with Noah utilizing the suggestions provided in the feedback session. The intervention was then implemented 10 more sessions across 21 calendar schooldays. In the fourth session, Nancy implemented the intervention with 51% accuracy. Noah responded correctly to 81% of the language tasks that were presented to him during this session. In sessions 5, 6 and 7 Nancy implemented the intervention with variable accuracy, obtaining scores of 66%, 46% and 48% accuracy with the discrete trial procedures in these respective sessions. Noah also had a variable pattern of responding in these sessions as he recorded accuracy percentages of 81%, 68% and 81% correct responses in the 5th, 6th and 7th intervention sessions. In session 8, Nancy was 39% accurate while Noah responded with 82% accuracy. Nancy obtained an accuracy score of 45% in the 9th session. Noah was 68% correct in responding to the language intervention in the ninth session. In sessions 10, 11, 12, and 13, Nancy continued to demonstrate varying ability in implementing the discrete trial procedures with accuracy percentages of 58%, 55%, 65% and 63%. Noah fluctuated in the percentage of correct responses he provided during these intervention sessions also. He obtained scores of 68%, 69%, 79% and 73% correct responding. Since Nancy had not reached the desired criterion of implementing the intervention with 85% accuracy, the

author again conferenced with her individually and this time provided feedback through verbal instruction and video modeling modalities.

Post Video and Verbal Feedback. Session 14 was the session immediately following the last phase of feedback given in this study. In this session, Nancy was 74% accurate delivering the intervention according to discrete trial procedures. Noah was 61% correct in his responses during this session. In session 15, Nancy obtained an accuracy score of 71% while Noah's percentage of correct responding rose to 68%. At session 16, Nancy reached the desired criterion of 85% accuracy and continued to improve her performance in the 17th and 18th sessions with accuracy scores of 91% and 94% respectively. In session 16, Noah correctly responded to 58% of the presented language items, while in sessions 17 and 18, his percentages increased to 67% and 81% correct responses. Thus by the end of the intervention, Nancy met and maintained the established criterion of 85% accuracy with the discrete trial procedures. Noah approached the 85% criterion of correct responses, but at the conclusion of the study, he still had not obtained that goal.

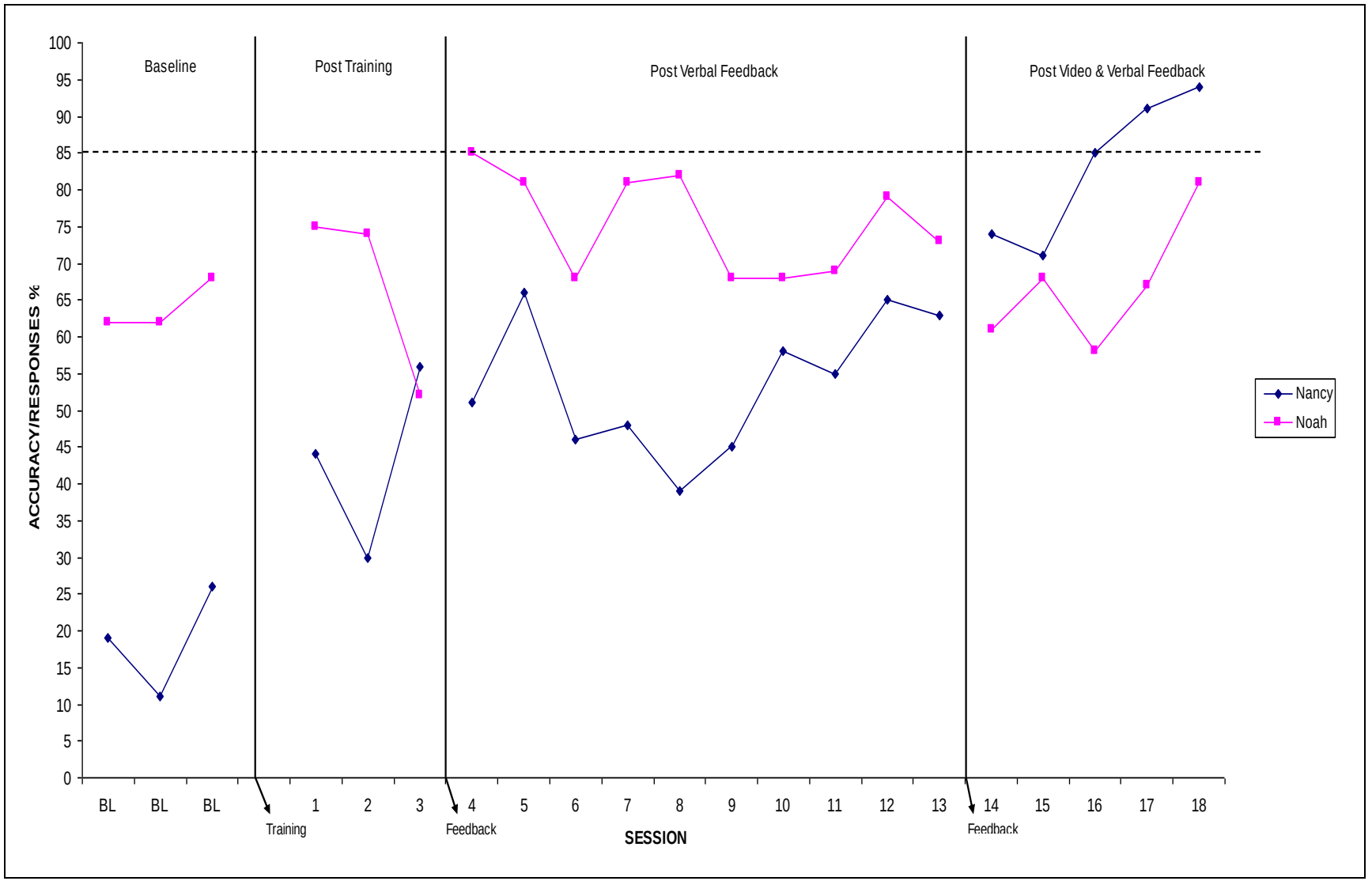

Figure 4. Summary of intervention performance percentages for Nancy and Noah.

Donny and Daniel

Donny and Daniel completed a total of 22 discrete trial language intervention sessions, over a period of 16 days. Data collection began on January 27th and concluded on March 13th. Occasionally, the language intervention was not implemented due to absences of the paraprofessional or the student. Daniel is a full-time student in the self-contained TAP classroom and receives inclusive education with non-disabled peers for special/elective classes. Donny received three phases of intervention in the course of the study (Baseline, Post-Training, and Post Verbal Feedback). The fourth phase of intervention was not provided as Donny met and maintained the established criterion of 85% during the third phase.

Baseline. Figure 5 provides a graphical depiction of the progress of Donny and Daniel throughout the course of this study. Baseline data were collected for a total of four observations. During the baseline phase, Donny's accuracy prior to receiving any DTT training was recorded at levels of 6%, 13%, 26%, and 10% respectively. Daniel's correct response percentages were 24%, 28%, 41%, and 33% during the baseline observations.

Post-Training. After receiving the 2 hour didactic instruction on implementing discrete trial procedures, Donny and Daniel conducted four language intervention sessions, across six calendar schooldays. In the first session of the intervention, Donny was 76% accurate delivering the intervention. At that time, Daniel correctly responded to 78% of his language tasks. The second session saw Donny obtain an accuracy score of 60% while Daniel was only 50% correct in his responding. In sessions 3 and 4, Donny followed the procedures with 88% and 60% accuracy. Likewise, in these sessions,

Daniel was 93% and 35% correct in responding. Since Donny had not consistently met the established criterion of 85% accuracy, the author provided him with verbal feedback after this fourth session of the intervention.

Post Verbal Feedback. After receiving verbal feedback, Donny and Daniel implemented the language intervention again for 18 sessions across 24 schooldays. Donny's accuracy percentage increased to 85% accuracy in the session immediately following the verbal feedback that was provided. Daniel was 41% correct responding to the language items presented to him in this session. Session 6 saw Donny obtain an accuracy score of 87% while Daniel was 55% correct. In sessions 7, 8, and 9, Donny delivered the intervention with 93%, 95% and 96% accuracy in following discrete trial procedures. Daniel provided correct responses to 59%, 69% and 78% of his language tasks. The 10th session resulted in Donny obtaining an accuracy percentage of 97% while Daniel responded with 67% correctness. Session 11 provided Donny with 96% accuracy. Daniel was 66% correct in session 11 as well. The 12th session of implementation resulted in Donny delivering the intervention with 90% accuracy although Daniel's percentage of correct responding dropped to 47%. In sessions 13, 14, 15, and 16 Donny continued to implement the language intervention with accuracy percentages above the desired criterion. His scores in these sessions were at 98%, 91%, 92% and 98%. Daniel's response correctness in these sessions was 66%, 50%, 75% and 82%. In session 17, Donny's accuracy dropped slightly to 82% while Daniel responded to 56% of the language training items correctly. In the 18th and 19th sessions, Donny again exceeded the desired criterion with accuracy percentages of 91% and 94% in implementing the discrete trial procedures. Daniel responded correctly to 71% and 78% of the language

items presented in the 18th and 19th sessions. The final sessions of the intervention, session 20, 21 and 22 resulted in Donny delivering the intervention with 90%, 87% and 93% accuracy with following the procedures in a discrete trial format. Daniel's performance continued to vary at the conclusion of the study as he was 78%, 64% and 69% correct providing responses to the language items that were presented to him in this task. At the conclusion of the study, Donny had achieved and maintained the desired criterion of 85% with the discrete trial procedures, receiving only three phases of intervention (baseline, post-training, and post verbal feedback). Although Daniel did not meet and consistently maintain the 85% response accuracy criterion, he did demonstrate a significant growth trend (indicated by a positive slope in his performance) in correctly responding to the language tasks in this intervention. The graphs depicting the paraprofessionals' accuracy percentages in implementing the discrete trial language intervention are shown in Figure 6 and Figure 7.

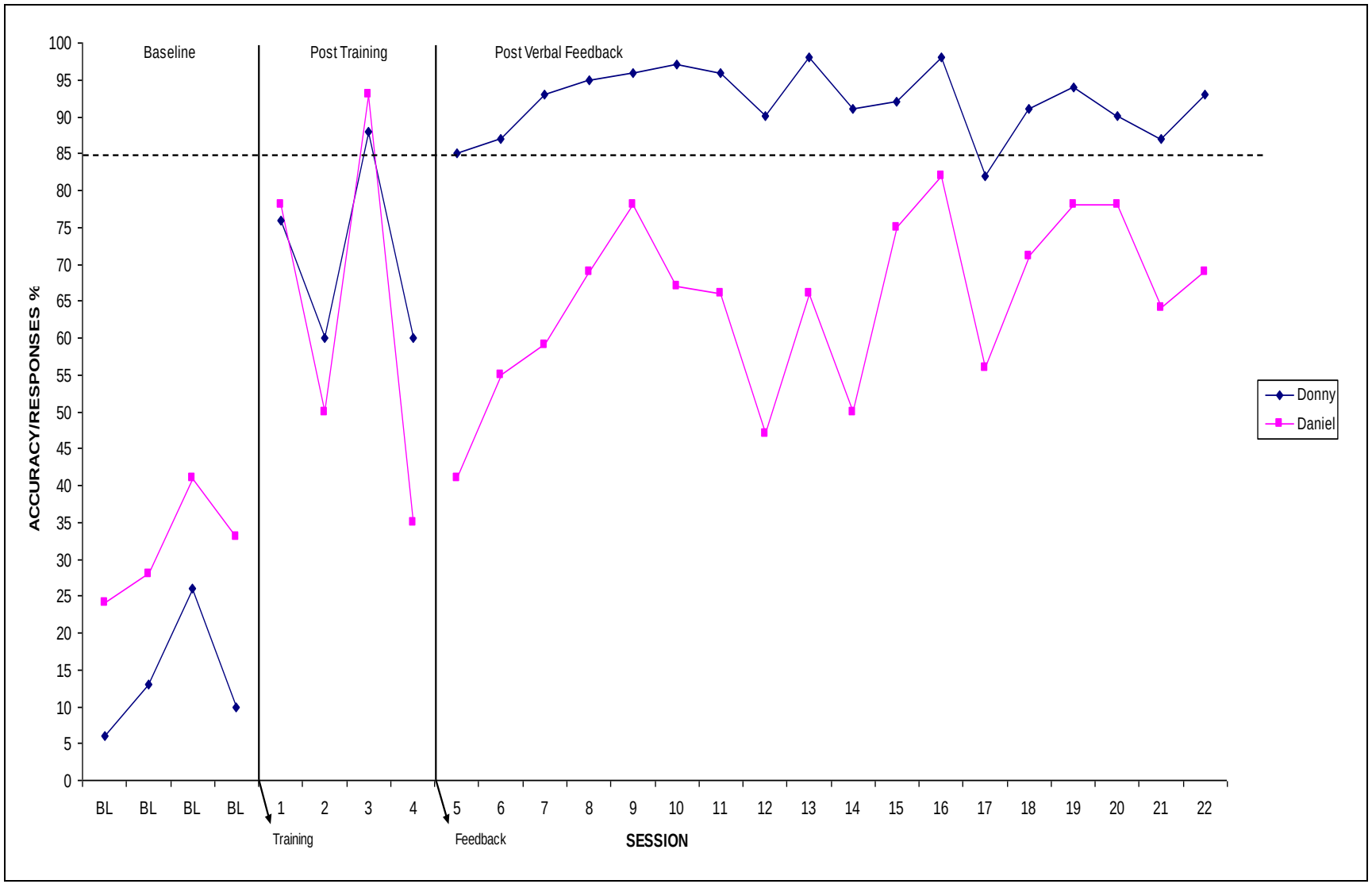

Figure 5.Summary of intervention performance percentages for Donny and Daniel.

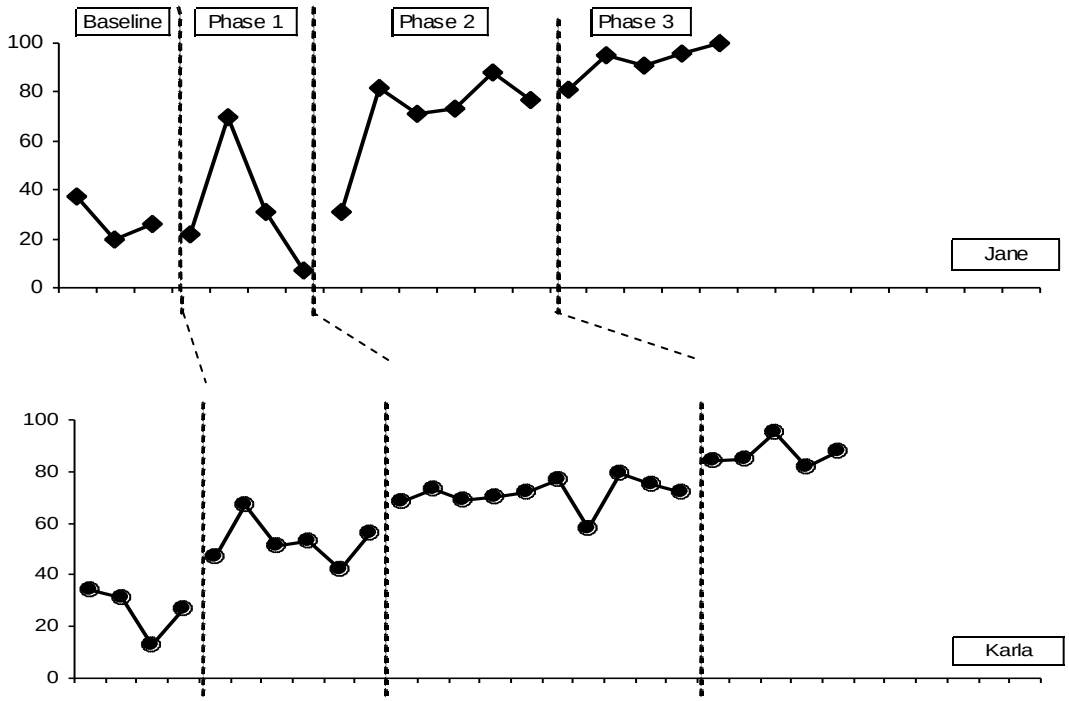

Figure 6. Graphs of accuracy percentages for Paraprofessional Cohort 1

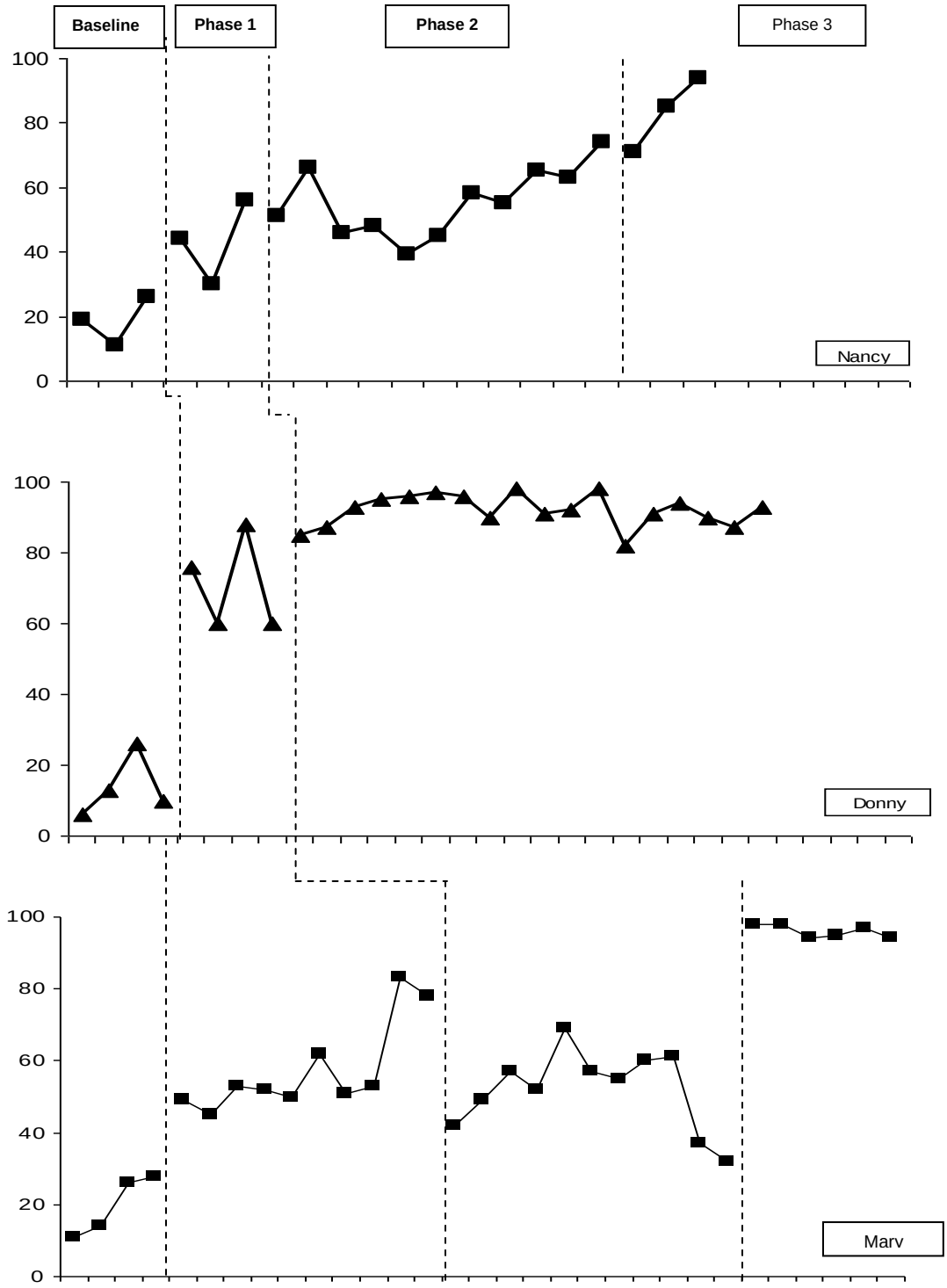

Figure 7. Graph of accuracy percentages for Paraprofessional Cohort 2

Paraprofessional and Teacher Acceptability Ratings

Upon completion of data collection for this study, the paraprofessional participants and classroom teachers assigned to the self-contained TAP classroom were

asked to complete a 6 point Likert scale rating regarding their perceived acceptability of the Discrete Trial Training process. The measure was adapted from the original Behavior Intervention Rating Scale (BIRS) developed by Elliott and Treuting (1991). The rating scale that was administered to paraprofessional and teacher participants is located as Appendix A in this document. Based on a 6-point Likert scale, scores from the five paraprofessional participants and two lead teachers of the TAP classroom ranged from a 1 or "Strongly Disagree", to a 6, "Strongly Agree" with an overall mean of 5.69

Summary of Findings

Research Question #1: How many hours of DTT instruction are needed for paraprofessionals to reach 85% procedural accuracy?

After the initial two-hour training session received by all paraprofessionals, all five participants also received individual conferences ranging in length from 19 minutes to 47 minutes in duration, where the author provided verbal feedback regarding each participant's accuracy with implementation of the discrete trial procedures. Subsequent to the first round of verbal feedback, four of the five paraprofessional participants also received an additional round of feedback with verbal suggestions and performance feedback from video sessions were discussed. The duration of these verbal and video feedback sessions ranged from 28 minutes to 51 minutes of discussion. All paraprofessionals achieved the desired criterion of 85% accuracy with discrete trial procedures at the conclusion of the study. The cumulative amount of hours spent providing training or feedback to the participants was a minimum of 2 hours 26 minutes to a maximum of 3 hours 19 minutes.

Research Question #2: After training to 85% accuracy, will paraprofessionals maintain integrity in implementing DTT procedures to teach functional communication skills in nonverbal or low language ability children with Autism?

The findings in this study indicate that once the paraprofessionals achieved the desired criterion, their performance integrity varied by participant. Graphical depictions show the variability in the accuracy percentages obtained by each participant. Jane's performance integrity reached the desired criterion in 33% (5 of 15) of the intervention sessions that were conducted once receiving the initial training. Karla's performance integrity was 14%, in that she carried out the DTT with accuracy in 3 of the 21 sessions conducted, having reached the desired criterion at the conclusion of the study. Mary's performance integrity was 21% (6 of 28 sessions) regarding implementation of the intervention at the expected criterion level with consistent implementation exceeding the expected levels at the conclusion of the study. Nancy conducted the intervention with 16% integrity (3 of 18 sessions) once the 85% accuracy criterion was met. Donny held the highest integrity rate of any paraprofessional participant in the study. He implemented the procedure with 77% integrity (17 of 22 sessions) and continued to maintain or exceed the established criterion at the conclusion of the study.

Research Question #3: When DTT is carried out by paraprofessionals, are academic goals achieved, as measured by percentage of correct responses produced by the child?

Results from this study indicate that all student participants obtained positive growth slopes in their performance during this language intervention, although some students' growth was more significant than others'. Additionally, one student experienced progress in an outcome area that was initially unintended in this study. Student

participant Daniel frequently exhibited self-stimulatory behaviors in the intervention session as well as in the regular classroom environment. Video data were reviewed and the amount of time the student spent engaged in self-stimulatory behaviors (hand drumming and vocalizations) was calculated by duration of seconds in each session. A linear trend line was then added to this graphical depiction to demonstrate the decrease in the amount of time Daniel spent engaged in stimming behaviors in each session.

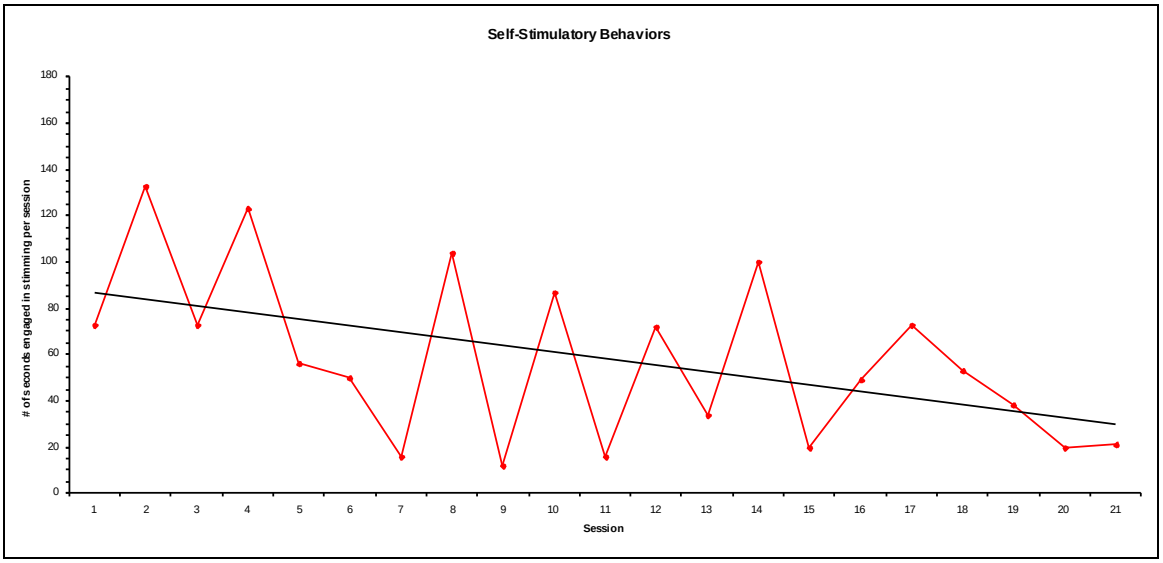

Figure 8. Summary of self stimulatory behavior engagement for Daniel.

CHAPTER V

CONCLUSION

The purpose of this study was to investigate training outcomes when paraprofessionals are trained to implement discrete trial procedures in schools to children and youth with Autism, supplemental to the existing speech-language services the children may be receiving at school. The aim of this study was to address how many hours of training are necessary for paraprofessionals to achieve mastery criterion with discrete trial training procedures. Additionally, it was determined whether paraprofessionals can implement DTT procedures with accuracy and integrity to produce positive growth outcomes in the functional communication skills of nonverbal or low language ability children with Autism. A subsequent aim of this study attempted to establish the classroom teachers' and paraprofessionals acceptability of utilizing DTT procedures in the classroom.

In this study, paraprofessionals were able to be trained in less than four hours to implement a language intervention using discrete trial training procedures for children with Autism. Upon obtaining the desired criterion of 85% accuracy with the steps of the discrete trial process, over time the paraprofessionals involved in this study delivered the intervention with varying degrees of integrity, ranging from 14% to 77%. Each of the student participants made positive growth in their language skills with the language tasks addressed by this intervention. Some students' growth slopes were more significant than

others. Additionally, paraprofessionals indicated overall acceptability of the training procedures and the discrete trial process.

Implications

This study incorporated elements similar to previous research studies where staff were taught to implement behavior protocols. In the present study, the researcher spent a cumulative total of 3 hours and 19 minutes providing training and feedback to paraprofessionals learning to implement discrete trial procedures for language intervention. Several studies showed that training to the same established criterion of 85% or greater could occur with training that required less time; however an analysis of these studies indicate that participants were taught to perform one specific task such as conducting a preference assessment (Lavie & Sturmey, 2002).

Ducharme and Feldman (1992) utilized the same concept as the current study in that, they videotaped the staff members throughout all phases of the study. Also in the Ducharme and Feldman (1992) study, the staff members were trained by the first author, using a combination of modeling, rehearsal, and feedback procedures. These researchers utilized a criterion level of 85% correct skill use and were also able to train participants in approximately three hours. Unlike the current study however, Ducharme and Feldman (1992) obtained follow-up data on six of the participants who remained employed in the setting three and six months after the study was conducted.

Koegel et al. (1977) selected students with language impairments as subjects in their study of training teachers to use behavior modification principles with children. Half of the student participants in their study were essentially mute, or primarily echolalic. Two of the five participants in the current study fell into these categories of language

behaviors. Similar again to the current study, Koegel et al. (1977) used a training package involving the use of modeling, feedback and training manuals. They collected data on the responses of the children in their study and found that when teachers showed consistently high percentages of using the procedures correctly, their teaching was effective in producing gains in the children's responding; further validating that it is important to carefully measure both the behavior of the teacher and the behavior of the child, in order to discover functional relationships between the two. Teachers in Koegel et al.'s (1977) study were trained over multiple days, resulting in a maximum amount of 25 hours spent in training.

Crockett et al. (2007) chose to train parents to implement discrete trial training techniques with their autistic children across a variety of behavioral classes. Data collection in the Crockett et al. (2007) study differed from that of the present study. Whereas the present study examined specific components of the discrete trial technique as to whether they were performed correctly or incorrectly, the Crockett et al. (2007) study, required the parent to have met each criterion for each component of the DTT procedure for an entire trial to be scored as correct,. The two studies were similar in that the participants implemented the discrete trial training procedures for only a fraction of the time that is suggested by the literature as necessary to produce significant child gains.

Moore et al. (2002) suggested that teachers utilizing behavioral interventions required direct training in order to implement behavior protocols with an adequate degree of integrity. This study attempted to train teachers on a specific skill, conducting a functional analysis, rather than training them to implement a procedure of technique that could be applicable to a range of behaviors. Again, similar to the current study, all

teacher participants had very limited prior experience with behavior-analytic procedures such as discrete trial training..

Lafasakis and Sturmey (2007) also videotaped each session of their study and scored the videotape at a later time. Lafasakis and Sturmey (2007) established a criterion of 90% or more correct responding on two consecutive sessions before participants could exit that phase of the study. The participants were given a script on the 10 procedural components of discrete trial teaching and were later given graphs of their baseline performance and data sheets from their performance in each session. In their study, Lafasakis and Sturmey (2007) also modeled correct procedures and answered any questions their participants had. However, similar to the current study, they did not conduct a component analysis of the behavioral skills training package to determine which component of the treatment package was responsible for producing change.

Additionally, Leblanc et al. (2005) taught paraprofessional staff to implement discrete trial procedures in a relatively short time frame (8-10 minutes), although their only training modality included verbal explanation and clarification of the discrete trial procedures. Had their training involved more detailed elements of modeling, role-play, or practice similar to the current study, the length of time required would likely have been considerably longer. Although, Leblanc et al. (2005) found that the staff members rapidly acquired the discrete trial instructional skills and were able to maintain these skills after an 11 week follow-up, student outcome data was not collected so as to determine whether their acquisition and implementation of the discrete trial procedures was actually effective for the students.

Parsons and Reid (1995) trained supervisors to provide feedback in an amount of time equivalent to that spent in training paraprofessionals in this study. However, their research involved training supervisors responsible for the oversight of others' correct use of behavior management procedures, whereas the training provided by the current study involved those directly responsible for implementing the intervention.

Overall, the evidence shows that teachers, paraprofessionals and other direct care staff members can be trained to implement discrete trial teaching procedures or other behavioral protocols. However, the amount of time required to train staff may vary according to several factors such as the skill that is being taught (discrete trials, preference assessment, functional analysis, staff management, etc), the comprehensiveness of training and the methods used (training manuals, role-play/rehearsal, and modeling) and whether the person being trained is the person involved in carrying out the taught skill

Although it has been demonstrated that school staff members can be trained to a desired level of mastery criterion, many previous studies did not provide documentation of the staff member's acceptability perceptions regarding the training procedures and behavior modification skills they may have been taught. This information is important as it provides further clarification into what procedures staff members are more accepting of and likely to continue implementing as well as offering insight into what training packages are rated less desirable.

The present study is the first to incorporate showing video data to the paraprofessional participants when providing feedback regarding their performance and accuracy in implementing discrete trial procedures. Although some of the studies

previously reviewed utilized videotaping sessions of the trained staff member with the student or client, in those studies the video data were used for scoring purposes, rather than for allowing the trainees the opportunity to see themselves and their performance with the procedure. This element of feedback seemed to make a difference for the paraprofessionals in this study, as the four participants who had not previously met the established criterion of 85% fidelity with the DTT procedures managed to do so after the final round of verbal feedback where videos were shown to them as well. Further validation of video feedback as a training component is needed in future studies.

Additionally, the present investigation is one of only a handful of studies that trained nonprofessionals to carry out discrete trial procedures in natural settings. In previous studies where naturalistic data collection took place, teachers were taught several behavior modification procedures to implement in the classroom according to the behavioral skill being addressed (Koegel, Russo & Rincover, 1977). Likewise, studies that have taught parents to implement discrete trial procedures have also done so in a contrived research setting (Crockett et al., 2007).

This study improved upon elements of previous training in that paraprofessional participants of this study were trained in significantly less time than has previously been done and in the natural setting of the public school. Conducting the paraprofessionals' training in the site where they work and subsequently training the students in a familiar environment lends several benefits to this study. First, paraprofessionals were trained on an in-service day when they were required to be at work although the students had not yet returned to school from Winter Break. An additional benefit to conducting the training at this time is that the participants were not removed from their regularly scheduled duties.

Similar to these benefits, the students receiving the intervention remained in the comfortable and familiar surroundings of their school building and thus did not seem to have any difficulties adjusting to the small conference room or speech therapy room where the discrete trial intervention was carried out. This option for service provision was selected since the standard recommendation is for individuals with Autism to receive 40 or more hours per week of ABA therapy. However, most children with Autism are in some type of educational environment for this amount of time, and may lack the necessary financial or supportive resources to receive this additional, intensive and individualized form of Autism treatment.

This study provided unintended yet beneficial qualitative information in addition to the quantitative data that were collected. This qualitative information is specific to the individual cases of this study, yet it provides valuable information that can be taken into consideration in future situations when student teacher dyads are considered and evaluated. For example, it should be noted that the two paraprofessionals assigned to the self-contained classroom, Karla and Donny, had better rapport with their students and this established relationship could likely have contributed to the overall correctness of the student's responses in the study. Additionally, Nancy is an inclusive paraprofessional and was not a constant fixture in the Autism classroom. It is speculated that her performance may have been better throughout the course of the study if she had a better understanding of the student Noah, with whom she worked, although he possessed the challenging speech behavior of echolalia. It was previously explained that Daniel's engagement in self-stimulatory behaviors decreased as his paraprofessional became more adept with the discrete trial procedures. A continuation of the study or further analysis of elements of

the video data could confirm this qualitative finding or determine that Daniel's behaviors decreased as he became more familiar with the routine. Dib and Sturmey (2007) showed that after being taught to implement discrete-trial procedures, improvements in staff behavior were accompanied by large reductions in stereotypy in students with Autism spectrum disorders.

Limitations

This study included several limitations that are typical for studies involving this and similar types of behavioral intervention. Opportunities to implement the intervention varied due to the natural setting of study. Some dyads conducted the intervention twice daily for consecutive days, while other dyads may have implemented the intervention once daily or one to two times a day on a sporadic schedule of days.

Discrete trial training, although previously proven as an effective strategy for teaching individuals with cognitive delays in development, may not be the treatment of choice for all individuals with Autism and those exhibiting communication delays. This point is best illustrated by Noah, a student participant in this study, who exhibited behaviors of echolalia in addition to other symptoms of Autism. In particular, discrete trial may not have been the most appropriate instructional strategy for this student due to his limited abilities in producing spontaneous speech. For a student such as this, a strategy that is less reliant upon verbal prompts and cues should be considered as an approach to reduce the verbalizations that are parroted by the echolalic student and replace these communication behaviors with speech that is more spontaneous and functional in nature.

Suggestions for Future Research

This study contributes to the literature in that it further validates the modalities of didactic instruction, role-play, modeling and feedback as effective methods for training paraprofessionals to implement discrete trial procedures. However, knowing just which of these methods are most effective in training has yet to be determined.

Future directions could expand on this study in many ways. Paraprofessionals could be given more extensive training, consultation and follow-up as they are in the process of implementing an intervention using discrete trials. This additional training could expand the ways that DTT can be used to address skills other than language. An added component of the training could be to include a student with Autism in the training environment so that the role-play and modeling elements of the training are not so contrived.

Stokes and Baer (1977) recommended that researchers and practitioners not assume that generalization will occur, but that they program for generalization from the outset. In light of the limited generalizability of discrete trial procedures, future research would do well to examine the ability to train paraprofessionals to supplement DTT with other procedures such as incidental teaching, pivotal response training or milieu therapies to facilitate the generalization of skills.

Summary

As Autism continues to be addressed in educational settings, more information will be sought regarding the most effective and appropriate treatments for addressing the academic, educational and behavioral needs of these students. The individual time that each student spent receiving discrete trial training language intervention was

supplemental to the scheduled IEP speech services the students received from the speech pathologist at the middle school. This additional time spent in language intervention sessions could only be beneficial to the student since the speech language pathologist often had extensive caseloads that did not allow for lengthy amounts of time and individualized attention to be focused upon their students.

Qualitatively, one student/paraprofessional dyad reported an increase in their relationship. Specifically, the student would come to the paraprofessional and ask to receive the intervention by pulling the paraprofessional towards the door of the classroom and saying "Go Speech". Moreover, this was also the paraprofessional that inquired with the researcher about continuing the intervention even after the conclusion of the study and directly stated "This is fun!". It could be argued that the paraprofessionals also benefited from this study in that they learned techniques and strategies to advance their student academically. It is evidenced by the video data that as the study progressed, the paraprofessional responded to the child's level of progress by showing exuberance when the student was successful. Although the paraprofessionals were trained to heavily reinforce the students' "best responses", they independently became adept at recognizing when the student showed he had learned the task.

This study has contributed to the abundant literature base that currently exists regarding discrete trial behavioral interventions and the training of laypersons in educational settings. In addition, this study expanded upon the existing research that has validated the effectiveness of applied behavioral analysis, specifically the teaching strategy of discrete trial training (DTT). Above all, this study demonstrated an intensive intervention being carried out in the natural setting of a public school environment.

Although it can be concluded that this type of intervention may not be most appropriate to implement in a public school setting where staff and other resources are limited, this study confirmed that discrete trial techniques can be implemented by laypersons given that they receive adequate initial training, along with specific follow-up, consultation, and feedback throughout implementation of the procedure. Findings from this study suggest that paraprofessional educators, with varying levels of education and experience, can be trained to implement the applied behavioral analysis technology of discrete trial training or instruction. It is hoped that findings from this study may assist in program development or the provision of services for students with Autism in natural public school settings.

REFERENCES

American Psychiatric Association (2000). *Diagnostic and Statistical Manual of Mental Disorders*. (4th ed. Text Revision). Washington, DC: Author.

American Speech-Language-Hearing Association. (2000). *What's language? What's speech?* Rockville, MD: Author.

Association for Science in Autism Treatment (2007). Summaries of scientific interventions on research on autism. Retrieved from http://www.asatonline.org/intervention/treatments_desc.htm

Autism Society of America. (2008). About Autism. Retrieved from http://www.autism-society.org/site/PageServer?pagename=about_home

Baron-Cohen, S. & Bolton, P. (1993). *Autism: The facts.* (pp. 58-91) New York: Oxford University Press.

Bartak, L. (1978). Educational approaches. In M. Rutter & E. Schopler (Eds.), *Autism: A reappraisal of concepts and treatments.* (pp. 144-179) New York: Plenum Press.

Berman, J. S. & Norton, N. C. (1985). Does professional training make a therapist more effective? *Psychological Bulletin, 98,* 401-406. doi:10.1037/0033-2909.98.2.401

Bettleheim, B. (1967). *The empty fortress: infantile Autism and the birth of the self.* New York: Free Press.

Boulware, G., Schwartz, I., Sandall, S., & McBride, B. (2006). Project DATA for toddlers: An inclusive approach to very young children with Autism spectrum disorder. *Topics in Early Childhood Special Education, 26,* 94-105. doi:10.1177/02711214060260020401

Bryson, S. (1996). Brief Report: Epidemiology of Autism. *Journal of Autism and Developmental Disorders, 26,* 165-168. doi: 10.1007/BF02172005

Bryson, S. E., Rogers, S. J., & Fombonne, E. (2003). Autism spectrum disorders: Early detection, intervention, education, and psychopharmacological management. *Canadian Journal of Psychiatry, 48,* 508-516.

Carkhuff, R. R. (1968). Differential functioning of lay and professional helpers. *Journal of Counseling Psychology, 15,* 117-126. doi:10.1037/h0025632

Carr, E. G. (1985) Behavioral approaches to language. In E. Schopler & G.B. Mesibov (Eds.) *Communication problems in Autism.* New York: Plenum Press.

Centers for Disease Control (2009). National Center on Birth Defects and Disabilities *Counting Autism*, Retrieved from http://www.cdc.gov/ncbddd/features/counting-autism.html

Christensen, A., & Jacobson, N. S. (1994). Who (or what) can do psychotherapy: The status and challenge of nonprofessional therapies. *Psychological Science, 5,* 8-14. doi:10.1111/j.1467-9280.1994.tb00606.x

Crockett, J. L., Fleming, R. K., Doepke, K. J., & Stevens, J. S. (2007). Parent training: Acquisition and generalization of discrete trials teaching skills with parents of children with Autism. *Research in Developmental Disabilities, 28,* 23-36. doi:10.1016/j.ridd.2005.10.003

Dahle, K. B. (2003). Services to include young children with Autism in the general classroom. *Early Childhood Education Journal, 31,* 65-70. doi:10.1023/A:1025193020415

De Boer, S. (2007). *How to do discrete trial training*. Austin: Pro-ed.

De Giacomo, A. & Fombonne, E. (1998). Parental recognition of developmental abnormalities in Autism. *European Child & Adolescent Psychiatry, 7*, 131-136. doi:10.1007/s007870050058

Dib, N., & Sturmey, P. (2007). Reducing student stereotypy by improving teachers' implementation of discrete-trial teaching. *Journal of Applied Behavior Analysis, 40,* 339-343. doi:10.1901/jaba.2007.52-06.

Donnellan, A. M., Mesaros, R. A., & Anderson, J. L. (1984). Teaching students with Autism in natural environments: What educators need from researchers. *The Journal of Special Education, 18*, 505-522. doi:10.1177/002246698401800407

Ducharme, J. M. & Feldman, M. A. (1992). Comparison of staff training strategies to promote generalized teaching skills. *Journal of Applied Behavior Analysis, 25,* 165-179. doi: 10.1901/jaba.1992.25-165

Durlak, J. (1979). Comparative effectiveness of paraprofessional and professional helpers. *Psychological Bulletin, 86,* 80-92. doi:10.1037/0033-2909.86.1.80

Elliott, S. N. & Treuting, M. (1991). The Behavior Intervention Scale: Development and validation of a pretreatment acceptability and effectiveness measure. *Journal of School Psychology, 29,* 43-51. doi:10.1016/0022-4405(91)90014-I

Gargiulo, R. (2003). *Special Education in Contemporary Society: An Introduction to Exceptionality.* Belmont, CA: Wadsworth.

Gilberg, C. (1992). *The biology of the autistic syndromes* (2nd ed.). London, England: MacKeith Press.

Goldstein, H. (2002). Communication intervention for children with Autism: A review of treatment efficacy. *Journal of Autism and Developmental Disorders, 32*, 373-396. doi: 10.1023/A:1020589821992

Hancock, T. B., & Kaiser, A. P. (2002). The effects of trainer-implemented enhanced milieu teaching on the social communication of children with Autism. *Topics in Early Childhood Special Education, 22*, 39-54. doi:10.1177/027112140202200104

Harris, S. L. & Glasberg, B. (1996). Pervasive developmental disorders: Distinguishing among subtypes. *School Psychology Review, 25*, 308-315.

Harris, S. L. & Handleman, J. S. (1994). Preschool programs for children with Autism. In S. L. Harris & J. S. Handleman (Eds.) *Preschool Education Programs for Children with Autism.* Austin: Pro-Ed.

Harris, S. L., Wolchik, S. A., Weitz, S. (1981). The acquisition of language skills by autistic children: Can parents do the job? *Journal of Autism and Developmental Disorders, 11*, 373-384. doi:10.1007/BF01531613

Hart, B. & Risley, T. (1975). Incidental teaching of language in the preschool. *Journal of Applied Behavior Analysis, 8*, 411-420. doi: 10.1901/jaba.1975.8-411

Harvey, M. T., May, M. E., & Kennedy, C. H. (2004). Nonconcurrent multiple baseline designs and the evaluation of educational systems. *Journal of Behavioral Education, 13*, 267-276. doi:10.1023/B:JOBE.0000044735.51022.5d

Heward, W. L. (1987). Reversal and alternating treatments design. In J. Cooper, T. Heron, & W. Heward (Eds.) *Applied Behavior Analysis* (163-194). New Jersey: Prentice Hall.

Howlin, P. A. (1981). The effectiveness of operant language training with autistic children. *Journal of Autism and Developmental Disorders, 11,* 281-290. doi: 10.1007/BF01531343

Howlin, P. (1997). Prognosis in Autism: Do specialist treatments affect long-term outcome? *European Child and Adolescent Psychiatry, 6,* 55-72. doi: 10.1007/BF00566668

Howlin, P. (2006). Augmentative and alternative communication systems for children with Autism. In T. Charman & W. Stone (Eds.) *Social and Communication Development in Autism Spectrum Disorders: Early Identification, Diagnosis, and Intervention* (236-259). New York, NY: Guilford Press.

Hwang, B., & Hughes, C. (2000). Increasing early social-communicative skills of preverbal preschool children with autism through social interactive training. *Journal of the Association for Persons with Severe Handicaps, 25,* 18-28.

Ivancic, M. T., Reid, D. H., Iwata, B. A., Faw, G. D., & Page, T. J. (1981). Evaluating a supervision program for developing and maintaining therapeutic staff-resident interactions during institutional care routines. *Journal of Applied Behavior Analysis, 14*, 95-107. doi: 10.1901/jaba.1981.14-95.

Jacobson, J. W. (2000) Converting to a Behavior Analysis Format for Autism Services: Decision-Making for Educational Administrators, Principals, and Consultants. *The Behavior Analyst Today, 1*, 6-16.

Kanner, L. (1943). Autistic disturbances of affective contact. *Nervous Child, 2,* 217-250.

Kazdin, A. E. (1982). *Single-case research design: Methods for clinical and applied settings.* New York: Oxford.

Klinger, L. G., Dawson, G., & Renner, P. (2003). Autistic Disorder. In E. Mash & R. Barkley (Eds.) *Child Psychopathology* (409-454). New York: Guilford Press.

Koegel, R. L., Russo, D. C., & Rincover, A. (1977). Assessing and training teachers in the generalized use of behavior modification with autistic children. *Journal of Applied Behavior Analysis, 10,* 197-206. doi: 10.1901/jaba.1977.10-197

Lafasakis, M. & Sturmey, P. (2007). Training parent implementation of discrete-trial teaching: Effects on generalization of parent teaching and child correct responding. *Journal of Applied Behavior Analysis, 40,* 685-689. doi: 10.1901/jaba.2007.685-689.

Landry, R., & Bryson, S. E. (1999, July). *Impaired disengagement and its relationship to self-regulatory behavior in young children with autism.* Paper presented at the biennial meeting of the Society for Research in Child Development, Albuquerque, NM.

Lavie, T. & Sturmey, P. (2002). Training staff to conduct a paired-stimulus preference assessment. *Journal of Applied Behavior Analysis, 35,* 209-211. doi: 10.1901/jaba.2002.35-209.

Leblanc, M. P., Ricciardi, J. N., Luiselli, J. K. (2005). Improving discrete trial instruction by paraprofessional staff through an abbreviated performance feedback intervention. *Education and Treatment of Children, 28,* 76-82.

Lerman, D. C., Vorndran, C. M., Addison, L., & Kuhn, S. C. (2004). Preparing teachers in evidence-based practices for young children with Autism. *School Psychology Review, 33*, 510-526.

Lewis, M. H., & Lazoritz, M. L. (2005). Psychopharmacology of Autism spectrum disorders. *Psychiatric Times, 28*.

Lord, C. & Paul, R. (1997). Language and communication in Autism. In D. Cohen & F. Volkmar (Eds). *Handbook of Autism and Pervasive Developmental Disorders* (2nd ed., pp. 195-225). New York: Wiley.

Lovaas, O. I. (1987). Behavioral treatment and normal educational and intellectual functioning in young autistic children. *Journal of Consulting and Clinical Psychology, 55,* 3-9. doi:10.1037/0022-006X.55.1.3

Lovaas, O. I., Berberich, J. P., Perloff, B. F., & Schaffer, B. (1966). Acquisition of imitative speech by schizophrenic children. *Science, 151,* 705-707.

Marianda-Linne, F. & Melin, L. (1992). Acquisition, generalization and spontaneous use of color adjectives: A comparison of incidental teaching and traditional discrete trial procedures for children with Autism. *Research in Developmental Disabilities,13*, 191-210. doi:10.1016/0891-4222(92)90025-2

McBride, B. J. & Schwartz, I. S. (2003). Effects of teaching early interventionists to use discrete trials during ongoing classroom activities. *Topics in Early Childhood Special Education, 23*, 5-17. doi: 10.1177/027112140302300102

Mercer, C. (1997). *Students with Learning Disabilities.* 5th Ed. Upper Saddle River, NJ: Prentice Hall.

Mesibov, G. B., Adams, L. W., & Klinger, L. G. (1997). *Autism: Understanding the disorder*. New York: Plenum Press.

Moore, J. W., Edwards, R. P., Sterling-Turner, H. E., Riley, J., DuBard, M., & McGeorge, A. (2002). Teacher acquisition of functional analysis methodology. *Journal of Applied Behavior Analysis, 35*, 73-77. doi: 10.1901/jaba.2002.35-73.

National Research Council (2001). *Educating Children with Autism*. Washington, DC: National Academy Press.

Newsom, C. (1998). Autistic Disorder. In E.J. Mash & R.A. Barkley (Eds.) *Treatment of Childhood Disorders.* New York: Guilford Press.

Newsom, C. & Rincover, A. (1989). Autism. In E.J. Mash and R.A. Barkley (Eds.). *Treatment of Childhood Disorders.* New York: Guilford Press.

Noens, I. & Berckelaer-Onnes, I. (2004). Making sense in a fragmentary world: Communication in people with Autism and learning disability. *Autism, 8*, 197-218. doi: 10.1177/1362361304042723

Ogletree, B. T. (1998). The communicative context of Autism. In R.L. Simpson & B.S. Myles (Eds.) *Educating Children and Youth with Autism*. (pp. 141-172). Austin, TX: Pro-Ed.

Ogletree, B. T. & Oren, T. (1998). Structured yet functional: An alternative conceptualization of treatment for communication impairment in Autism. *Focus on Autism and Other Developmental Disabilities, 13,* 228-233. doi: 10.1177/108835769801300404

Ogletree, B. T., & Oren, T. (2001). Application of ABA principles to general communication instruction. *Focus on Autism and Other Developmental Disabilities, 16,* 102-109. doi: 10.1177/108835760101600206

Oklahoma State Department of Education. (2006). Special Education Parent Handbook.

Olley, J. G. (1992). Autism: Historical overview, definition, and characteristics. In D. E. Berkell (Ed.) *Autism: Identification, education, and treatment*. New Jersey: Lawrence Erlbaum Associates.

Page, T. J., Iwata, B. A., & Reid, D. H. (1982). Pyramidial training: A large-scale application with institutional staff. *Journal of Applied Behavior Analysis, 15*, 335-351. doi: 10.1901/jaba.1982.15-335

Parsons, M. B. & Reid, D. H. (1995). Training residential supervisors to provide feedback for maintaining staff teaching skills with people who have severe disabilities. *Journal of Applied Behavior Analysis*, *28*, 317-322. doi: 10.1901/jaba.1995.28-317

Parsons, M. B., Reid, D. H., Green, C. W. (1996). Training basic teaching skills to community and institutional support staff for people with severe disabilities: A one-day program. *Research in Developmental Disabilities, 17*, 467-485. doi:10.1016/S0891-4222(96)00031-5

Pierre-Leblanc, M., Ricciardi, J. N., Luiselli, J. K. (2005). Improving discrete trial instruction by paraprofessional staff through abbreviated performance feedback intervention. *Education and Treatment of Children, 28,* 76-82.

Posey, D. J. & McDougle, C. J. (2000). The pharmacotherapy of target symptoms associated with autistic disorder and other pervasive developmental disorders. *Harvard Review of Psychiatry, 8,* 45-64.

Posner, M. I. (1980). Orienting of attention. *Quarterly Journal of Experimental Psychology, 32,* 3-25. doi: 10.1080/00335558008248231

Prizant, B. (1996). Brief Report: Communication, language, social, and emotional development. *Journal of Autism and Developmental Disorders, 26,* 173-178.

Quilitch, H. R. (1975). A comparison of three staff-management procedures. *Journal of Applied Behavior Analysis, 8,* 59-66. doi: 10.1901/jaba.1975.8-59.

Rimland, B. (1964). *Infantile autism: The syndrome and its implications for a neural theory of behavior.* New York: Appleton-Century-Crofts.

Risley, T. R. (1968). The effects and side effects of punishing the autistic behaviors of a deviant child. *Journal of Applied Behavior Analysis, 1,* 21-34. doi: 10.1901/jaba.1968.1-21.

Rogers, S. (1996). Brief report: Early intervention in Autism. *Journal of Autism and Developmental Disorders, 26,* 243-246.

Rule, S., Losardo, A., Dinnebeil, L., Kaiser, A., & Rowland, C. (1998). Translating research on naturalistic instruction into practice. *Journal of Early Intervention, 21,* 283-293. doi: 10.1177/105381519802100401

Rutter, M. (1978). Diagnosis and definition. In M. Rutter & E. Schoepler (Eds.) *Autism: A reappraisal of concepts and treatment.* (pp 1-25). New York: Plenum Press.

Rutter, M. (2000). Genetic studies of Autism: From the 1970s into the millennium. *Journal of Abnormal Child Psychology, 28,* 3-14. doi: 10.1023/A:1005113900068

Scheuermann, B. & Webber, J. (2002). *Autism: Teaching does make a difference.* Canada: Wadsworth/Thomson Learning.

Schopler, E. (1996). Collaboration between research professional and consumer. *Journal of Autism and Developmental Disorders, 26,* 277-280.

Schopler, E. & Reichler, R. (1971). Parents as co-therapists in the treatment of psychotic children. *Journal of Autism and Childhood Schizophrenia, 1,* 87-102. doi: 10.1007/BF01537746

Schreibman, L., Kaneko, W. M., & Koegel, R. L. (1991). Positive affect of parents of autistic children: A comparison across two teaching techniques. B*ehavior Therapy, 22,* 479-490. doi:10.1016/S0005-7894(05)80340-5

Schuler, A. & Prizant, B. (1985). Echolalia. In E. Schoepler & G. Mesibov (Eds.), *Communication problems in Autism* (pp. 163-184). New York: Plenum Press.

Sigman, M. & Capps, L. (1997). *Children with Autism: A developmental perspective.* Massachusetts: Harvard University Press.

Silverman, F. (1995). *Communication for the Speechless.* Needham, MA: Allyn & Bacon.

Skinner, B. F. (1957). *Verbal Behavior.* New York: Appleton-Century-Crofts, Inc.

Smith, T. (2001). Discrete trial training in the treatment of Autism. *Focus on Autism and Other Developmental Disabilities, 16,* 86-92. doi: 10.1177/108835760101600204

Smith, A. E. & Camarata, S. (1999). Using teacher-implemented instruction to increase language intelligibility of children with Autism. *Journal of Positive Behavior Interventions, 1,* 141-151. doi: 10.1177/109830079900100302

Smith, T., Donahoe, P. A., & Davis, B .J. (2001). The UCLA Young Autism Project. In J.S. Handleman & S.L.Harris (Eds.), *Preschool education programs for children with Autism.* Austin, TX: Pro-Ed, Inc.

Smith, T., Eikseth, S., Kelvstrand, M., & Lovaas, I. (1997). Intensive behavioral treatment for preschoolers with severe mental retardation and pervasive developmental disorders. *American Journal of Mental Retardation, 102*, 238-249.

Stokes, T. F. & Baer, D. M. (1977). An implicit technology of generalization. *Journal of Applied Behavior Analysis, 10,* 349-367. doi: 10.1901/jaba.1977.10-349

Sundberg, M. L. & Michael, J. (2001). The benefits of Skinner's analysis of verbal behavior for children with Autism. *Behavior Modification, 24,* 698-724. doi: 10.1177/0145445501255003

Sundberg, M. L. & Partington, J. W. (1998). *Teaching language to children with Autism or other developmental disabilities.* Pleasant Hill, CA: Behavior Analysts, Inc.

Sweeney, D. P., Forness, S. R., & Levitt, J. G. (1998). An overview of medications commonly used to treat behavioral disorders associated with Autism, Tourette's syndrome, and pervasive developmental disorders. *Focus on Autism & Other Developmental Disabilities, 13,* 144-150. doi: 10.1177/108835769801300302

Szatmari, P. (2000). The classification of Autism, Asperger's syndrome, and pervasive developmental disorder. *Canadian Journal of Psychiatry, 45,* 731-738.

Tsai, L. (2000). Children with Autism spectrum disorder: Medicine today and in the new millennium. *Focus on Autism & Other Developmental Disabilities, 15*, 138-145. doi: 10.1177/108835760001500302

Volkmar, F., Szatmari, P., & Sparrow, S. (1993). Sex differences in pervasive developmental disorders. *Journal of Autism and Developmental Disorders, 23*, 579-591. doi: 10.1007/BF01046103

Von Brock, M. B. & Elliott, S. N. (1987). Influence of treatment effectiveness information on the acceptability of classroom interventions. *Journal of School Psychology, 25,* 131-144. doi:10.1016/0022-4405(87)90022-7

Watson, P. J. & Workman, E. A. (1981). The non-concurrent multiple baseline across individuals design: An extension of the traditional multiple baseline design. *Journal of Behavior Therapy and Experimental Psychiatry, 12*, 257-259. doi:10.1016/0005-7916(81)90055-0

Weisz, J. R., Weiss, B., Alicke, M. D., & Klotz, M. L. (1987). Effectiveness of psychotherapy with children and adolescents: A meta-analysis for clinicians. *Journal of Consulting and Clinical Psychology*, *55*, 542-549. doi: 10.1037/0022-006X.55.4.542

Wilczynski, S. M., Cowan, R. J., Wolf, K., Vause, T., Lewis, L. J., Hayes, A., Yetter, G., Meadows, J. R., Elliott, A., & Thompson, K. (2003). Project BEST-CASE: A model for structuring an intensive early childhood intervention program or children with autistic spectrum disorder. *Proven Practice, 5*, 23-36.

Yoder, P. & Stone, W. (2006). A randomized comparison of the effect of two prelinguistic communication interventions on the acquisition of spoken communication in preschoolers with ASD. *Journal of Speech, Language, and Hearing Research, 49,* 698-711. doi: 10.1044/1092-4388

Young, J. M., Krantz, P. J., McClananhan, L. F., & Poulson, C. F. (1994). Generalized imitation and response class formation in children with Autism. *Journal of Applied Behavior Analysis, 27*, 685-698. doi: 10.1901/jaba.1994.27-685.

Appendix A

Acceptability Rating Form for Paraprofessionals

Please evaluate the intervention by circling the number which best describes your agreement or disagreement with each statement. You must answer each question.

SD=Strongly Disagree **D**=Disagree **Sl.D**=Slightly Disagree **Sl.A**=Slightly Agree **A**=Agree **SA**=Strongly Agree

	SD	D	Sl.D	Sl.A	A	SA
1. This would be an acceptable intervention for the child's behavior.	1	2	3	4	5	6
2. Most teachers would find this intervention appropriate for behavior problems in addition to the one presented by this student.	1	2	3	4	5	6
3. This intervention should prove effective in changing the child's problem behavior.	1	2	3	4	5	6
4. I would suggest the use of this intervention to other teachers.	1	2	3	4	5	6
5. I would be willing to continue using this intervention in the classroom setting.	1	2	3	4	5	6
6. The intervention would not result in negative side-effects for the child.	1	2	3	4	5	6
7. The steps of this intervention were easy to learn.	1	2	3	4	5	6
8. This intervention would be appropriate to use for children with similar problems.	1	2	3	4	5	6
9. This intervention was a good way to handle this child's behavior problem.	1	2	3	4	5	6
10. This intervention was worth learning.	1	2	3	4	5	6
11. I would like to receive more training on how to	1	2	3	4	5	6

use this intervention with other behaviors.

12. I like the procedures used in the intervention.	1	2	3	4	5	6
13. The time this intervention required to implement was worth it.	1	2	3	4	5	6
14. I would use this intervention again in the classroom	1	2	3	4	5	6
15. This intervention produced improvements in the student that make it worth implementing.	1	2	3	4	5	6

Appendix B

Baseline Data Coding Form

Setting _____ Task_____ Date_____

Paraprofessional_____

√=Performed correctly - = Not Performed Correctly **X** = Not Able to Observe

	:20	:40	1:00	1:20	1:40	2:00	2:20	2:40	3:00	3:20	3:40	4:00	4:20	4:40	5:00
Paraprofessional has all materials ready and accessible to begin session															
Paraprofessional ensures child is attending and willing to participate															
Paraprofessional delivers initial stimulus or task															
Paraprofessional allows adequate time for child to respond (approx. 3-5 secs)															
(Child responds)…Paraprofessional delivers reinforcement															
(Child does not respond) Paraprofessional ensures child is attending and willing to participate															
Paraprofessional represents stimulus or task															
Paraprofessional allows adequate time for child to respond (approx. 3-5 secs)															
(Child responds…) Paraprofessional delivers reinforcement															
(Child does not respond) Paraprofessional delivers correction procedure															

Additional Notes about Observation

_____

_____

_____

_____

Appendix C

Data Coding Form

Paraprofessional _____

√ = Performed correctly **-** = Not Performed Correctly **X** = Not Able to Observe

Procedure	Rating (Trial #) 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25	Student's Response (Trial #) 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
Paraprofessional has all materials ready and accessible to begin session		
Paraprofessional ensures child is attending and willing to participate		
Paraprofessional delivers initial stimulus		
Paraprofessional allows adequate time for child to respond (approx. 3-5 secs)		
(Child responds)…Paraprofessional delivers reinforcement		5 10 15 20 25
Paraprofessional drops token in container		
TRIAL ENDS HERE		
(Child does not respond) Paraprofessional delivers correction procedure		
Paraprofessional ensures child is attending and willing to participate		
Paraprofessional re-presents stimulus		
Paraprofessional allows adequate time for child to respond (approx. 3-5 secs)		
(Child responds)…Paraprofessional delivers reinforcement		5 10 15 20 25
(Child does not respond) Paraprofessional delivers correction procedure		
Paraprofessional drops token in container		
TRIAL ENDS HERE		

Appendix D

Sample Handout of Feedback Given to Paraprofessional Participants

Feedback – Donny

- Great job of working with Daniel; great start to sessions with "Okay Daniel"; Daniel will catch you off guard with the snack sometimes!

- Good job using his name to keep him oriented, but be careful so that you don't overuse his name (he would eventually learn that I don't have to respond unless my name is said)

- Good pace to your sessions; no need to rush to cover lots of material

- Sometimes Daniel is humming, or self- stimming, try to get him to stop doing this before you present the language task to him. This ensures that he has heard your instructions before he reaches for an item to respond.
    - You may have to use cookies or the spinning lights toy to distract him and get him to stop humming.

- Follow the correction procedure so Daniel can learn the items. Then immediately ask him again the same way you said it to him first.

- In between items, give Daniel a toy or a large edible to reinforce him while you get the next set of materials ready. This may keep him busy and cut down on his vocal and motor stimming.

- Remember to conduct preference assessments to know what Daniel is willing to work for.

- Be sure to give reinforcement through verbal praise and/or edible items or deliver correction. (this helps me to know when watching the video, whether he got the item right or wrong)

- When verbally presenting the stimulus, try not to make gestural prompts with your hand (showing him which item to pick up)

VITA

Dalawna Tishawn O'Guin

Candidate for the Degree of

Doctor of Philosophy

Dissertation: TRAINING PARAPROFESSIONALS TO IMPLEMENT A DISCRETE TRIAL LANGUAGE INTERVENTION FOR CHILDREN WITH AUTISM

Major Field: Educational Psychology

Biographical:

Personal Data: Born February 24, 1982 in Okmulgee, OK. Daughter of Deborah O'Guin, and Darl and Kathy O'Guin. Three siblings, Gary, Jermaine and Allyson..

Education:

Attended Okmulgee High School and graduated in May, 2000. Received Bachelor of Science degree in Human Development and Family Science from Oklahoma State University, December 2003Completed the requirements for the Master of Science in Educational Psychology at Oklahoma State University, Stillwater, Oklahoma in December, 2005.

Experience: Employed by Me-Maw's Play and Learn Center throughout graduate school. Employed by Oklahoma State University as graduate teaching assistant and graduate associate in the College of Education-Office of Education outreach. Completed school-based and clinic based practicum requirements focusing on assessment, consultation and intervention at Oklahoma State University; completed pre-doctoral internship requirements with Fort Worth Independent School District in Fort Worth, Texas. Currently employed by Tulsa Public Schools.

Professional Memberships: National Association of School Psychologists, Oklahoma School Psychological Association, Oklahoma SAFEKIDS Coalition.

Name: Dalawna T. O'Guin Date of Degree: May, 2010

Institution: Oklahoma State University Location: Stillwater, Oklahoma

Title of Study: TRAINING PARAPROFESSIONALS TO IMPLEMENT A DISCRETE TRIAL LANGUAGE INTERVENTION FOR STUDENTS WITH AUTISM

Pages in Study: 115 Candidate for the Degree of Doctor of Philosophy

Major Field: Educational Psychology

Scope and Method of Study: This study investigated training outcomes when paraprofessionals were trained to implement discrete trial communication therapy in schools, supplemental to existing speech-language services the child receives at school. The aim of this study was to address how many hours of training are necessary for paraprofessionals to achieve mastery criterion with discrete trial training procedures. Additionally, it was determined whether paraprofessionals could implement DTT procedures with accuracy and integrity to produce positive growth outcomes in the functional communication skills of nonverbal or low language ability children with Autism. A subsequent aim of this study attempted to establish both classroom teachers' and paraprofessionals perceptions about utilizing DTT procedures in the classroom.

Findings and Conclusions: This study demonstrated that paraprofessionals could be trained within a reasonable amount of time (maximum of 3 hours 46 minutes) to implement discrete trial training procedures. When the paraprofessionals implemented the intervention at the desired accuracy criterion of 85%, all five student participants obtained positive growth slopes in their functional communication skills that were being addressed, although the extent of growth outcomes varied for each student. The paraprofessional and teacher participants provided acceptability ratings of the overall discrete trial procedures indicating their willingness to implement this intervention in the future with other students, targeting various behaviors. This study has contributed to the current literature in that it demonstrates paraprofessionals can be trained to implement discrete trial procedures in a naturalistic setting.

ADVISER'S APPROVAL: Dr. Georgette Yetter