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A Case Study: Use of Applied Behavior Analysis with an Austistic Adolescent

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A CASE STUDY: USE OF APPLIED BEHAVIOR ANALYSIS WITH AN AUTISTIC ADOLESCENT

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Dissertation Approval

This is to certify that the thesis presented to us by Evan Jaffe

on the 16th day of November, 2010, in partial fulfillment of the requirements for the degree of Doctor of Psychology, has been examined and is acceptable in both scholarship and literary quality.

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Abstract

Socialization between individuals is an important characteristic in human development. In individuals with autism, there is a profound deficit with social skills and with social reciprocity. Interventions and techniques are utilized to help enhance these skills. The purpose of this study was to examine the effects that Applied Behavior Analysis using discrete trials can have on the ability to elicit a spontaneous greeting in various settings by an adolescent male diagnosed with autism. This study analyzed data collected during a ten week intervention program. Behavior ratings reflected some uneven progress over the ten weeks, but significant improvements in the targeted social behaviors were exhibited by the tenth week of training. The behavior checklist appeared to be an effective tool for assessing the social behavior of an adolescent male diagnosed with autism.

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Chapter 1: Introduction

Statement of the Problem

Research has demonstrated the need for social interaction from infancy to adulthood in normal human development. Initiating conversation, making eye contact, and responding to dialogue are important components of social competence. Individuals begin to develop these social skills (i.e., how to greet and engage in conversation) at an early age through modeling by others. As children mature, they refine these social skills as they enter adolescence and grow into adulthood. However, children with autism develop and mature differently. Children with autism exhibit many social difficulties. It appears that they do not comprehend nonverbal aspects of communication and usually lack social reciprocity, such as understanding conversations or their partners' thoughts, feelings, ideas, and desires.

Impaired social development is one of the major criteria in the diagnosis of autism. Social deficits are significant and appear throughout the child's development. Rutter (1978) emphasized the fact that the unusual social development observed in autism was one of the essential defining features of autism; it was distinctive and not simply a function of co-morbid mental retardation. Social development and cognitive ability define the functional levels of the individual, which range from low functioning to high functioning.

Children with autism often lack the necessary skills to make initial greetings or gestures. They are more responsive in situations in which their parents or other adults initiate conversations and maintain proximity, but they do not tend to initiate the conversation the way that other children do. Can children with autism learn how to initiate conversation with others in

an unfamiliar setting? Research has shown that children with autism are more likely to initiate an interaction if prompted by another person (Gadia, Tuchman, & Rotta, 2004). Studies have also shown that children with autism can learn to make initial greetings in structured settings such as school. However, there are few studies that demonstrate success in getting individuals with autism to initiate conversation in unstructured settings with little or no initial prompting.

The ability to establish a conversation with another person through an initial greeting or gesture is an important ingredient to a successful social interaction. These skills must be developed through continuous reinforcement and repetition. Research has shown that continuous exposure to a skill, using applied behavior analysis and discrete trials, will have more successful outcomes and be more likely to be generalized to other settings (Gadia, Tuchman, & Rotta, 2004). Observing and comparing the outcomes of children with autism when initiating conversation in structured and familiar environments (home and school) and unfamiliar environments (the community) is needed to measure the impact of interventions that are taught in structured settings.

Purpose of the Study

The purpose of this study is to examine the effectiveness that a social skills intervention can have on children with autism in making an initial greeting in an unfamiliar setting. A major purpose of instruction for students with autism and other severe social handicaps is to develop functional skills in natural home and community environments (Haring, & Kennedy et al., 1987). This study will present data on a child with autism while he is observed in unfamiliar settings. The study will assess whether or not interventions taught in a structured, academic setting will

improve the child's ability to initiate a spontaneous greeting in an unfamiliar setting. Structured observations will be conducted to examine if a single social skill, taught in school and at home, can be generalized and applied in unfamiliar settings.

Research Questions

1. Is applied behavior analysis/discrete trials teaching effective in increasing six specific behaviors involved in the occurrence of spontaneous social greetings in an adolescent child diagnosed with autism during social encounters in public places?
2. Will all of the six social greeting behaviors that are being targeted with Applied Behavior Analysis/Discrete Trials teaching show the same level of response in an adolescent diagnosed with autism?
3. Can an adolescent diagnosed with autism who is taught to engage in six social greeting behaviors make the transition from prompting to self-initiation of social greeting behaviors over a ten week period?

Chapter 2: Literature Review

Introduction

Although autism is a well-known and widely researched disorder, the exact causes of autism remain an enigma. Individuals with autism have significant difficulties in socializing with others, in expressing their own feelings and in identifying and understanding the social cues of others (Barbera, 2003, Linder, 1993). Center for Disease Control and Prevention (CDC, 2009) has reported that autistic spectrum disorders are caused by a problem with the brain, but scientists cannot identify specific causes. It has been suggested that a genetic predisposition and/or environmental factors might contribute to the disorder (Barbera, 2003); Individuals can be diagnosed as early as three years of age. The CDC has reported that early identification has become more common because of growing public and professional awareness of autism.

History of autism

Children displaying behaviors characteristic of current conceptions of autism have been recognized since the 1700's. The term 'autism' was first used by the Swiss psychiatrist Eughen Bleuler in 1911 to designate loss of contact with reality, which can cause difficulty with or incapacity of communication (Gadia, Tuchman, & Rotta, 2004, p 8). Bleuler used the term autism to describe schizophrenics who had difficulty relating to people and who appeared to be turned inward or towards themselves (Pearson, 2008).

In 1943, Leo Kanner studied eleven children who demonstrated extreme aloneness and labeled this condition as early infantile autism (Gadia, Tuchman & Rotta, 2004). The typical difficulties that Kanner observed in these children were language abnormalities, social skill

deficits and unusual behavior patterns that showed a tendency to preserve the environment (Matson & Minshawi, 2006). These behaviors were often compared with childhood schizophrenia, but the age of onset, family history, and intelligence level were thought to distinguish between the two disorders. Kanner believed that children with autism were born without an innate ability to develop normal affective contact with other people. He suggested that the parents of these children were very much career-oriented and intelligent but were socially awkward, and displayed little affection toward their children (Matson & Minshawi, 2006; Gadia, Tuchman & Rotta, 2004). Kanner suggested that the parents' child-rearing practices directly correlated with their children's developing autism. These beliefs became causal explanations of autism in the 1960's (Gadia, Tuchman, & Rotta, 2004, Linder, 1993). Further etiological factors, including stimulus deprivation, parental personality disorder, and some interaction between the biology and the experiences of the child were also considered (Linder, 1993, Matson and Minshawi, 2006)

In 1961, Ferster theorized how the role of parents as mediators of reinforcement could be a potential cause of autistic behavior. These speculations by Ferster were not found to be valid, but his beliefs did contribute to the initiation of behavioral analytic research leading to data-based interventions for autism. Behavioral analytic principles attempted to address the learning needs of children through the use of social reinforcers (i.e., tokens provided to elicit a behavior response) (Gadia, Tuchman, & Rotta, 2004). This research was very much influential in the development of therapeutic interventions, such as Ivar Lovaas' work with applied behavior analysis (Volkmar & Cohen, 1997). .

The 1970's brought increased efforts to educate the public about autism. Parents became

more highly involved and formed the National Society for Autistic Children. By the 1980's, autism was recognized as a distinct disorder in the Diagnostic and Statistical Manual of Mental Disorders (DSM) (Matson & Minshawi, 2006).

Classification of Autism and Pervasive Developmental Disorders

The two accepted classification systems used for diagnosing autism are the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM-IV-TR) (American Psychiatric Association, 2000) and the International Classification of Diseases (ICD-10) (World Health Organization (WHO), 2007).In addition, the Individuals with Disabilities Education Improvement Act (IDEIA, U.S. Congress, 2005), also referred to as *The Individual* with *Disabilities Education Act (IDEA)* is used for purposes of educational classification of individuals with autism.

According to the DSM-IV-TR (APA, 2000), autism is manifested by delays or abnormal functioning in at least one of the following areas prior to age 3 years: reciprocal social interaction; language as used in social communication; and symbolic or imaginative play. It is estimated that 650 to 1,000 of every 100,000 children are born with autism spectrum disorder and that it affects boys four to five times as often as it affects. There is a higher risk of autism among siblings of individuals with the disorder. Autism is more prevalent than Down's syndrome, pediatric AIDs and diabetes combined (Center for Disease Control, 2001). The DSM-IV diagnostic criteria for autism include the following:

(1) qualitative impairment in social interaction, as manifested by at least two of the following:

a. marked impairment in the use of multiple nonverbal behaviors such as eye to eye gaze, facial expression, body postures, and gestures to regulate social interaction.

b. failure to develop peer relationships appropriate to developmental level.

c. a lack of spontaneous seeking to share enjoyment, interests, or achievements with other people.

d. lack of social or emotional reciprocity

(2) qualitative impairments in communication as manifested by at least one of the following:

a. delay in, or total lack of the development of spoken language

b. in individuals with adequate speech, marked impairment in the ability to initiate or sustain a conversation with others

c. stereotyped and repetitive use of language or idiosyncratic language

d. lack of varied, spontaneous make-believe play or social imitative play appropriate to developmental level

(3) restricted repetitive and stereotyped patterns of behavior , interests and activities, as manifested by at least one of the following:

a. encompassing preoccupation with one or more stereotyped and restricted patterns of interest that is abnormal either in intensity or focus

b. apparently inflexible adherence to specific, nonfunctional routines or rituals

c. stereotyped and repetitive motor mannerisms

d. persistent preoccupation with parts of objects

(4) Delays or abnormal functioning (with onset prior to age 3 years) in at least one of the

following areas; social interaction, language as used in social communication, or symbolic or imaginative play.

(5) The disturbance is not better accounted for by Rett's disorder or Childhood Disintegrative Disorder.

In IDEA regulations autism is defined as *"a developmental disability significantly affecting verbal and nonverbal communication and social interaction, generally evident before age three that adversely affects a child's educational performance. Other characteristics often associated with autism are engagement in repetitive activities and stereotyped movements, resistance to environmental change or change in daily routines, and unusual responses to sensory experiences" (US Congress, 2005)* This definition differs from the DSM-IV definition and is used primarily for educational purposes to implement effective interventions in the school setting (Pearson, 2008).

According to the Center for Disease Control and Prevention (2009), Autism is one of five disorders in the category of Pervasive Developmental Disorders, the term, "Pervasive" referring to a problem that cuts across multiple types of communication (Cowan, 2007). The other disorders in this category include Asperger's Syndrome, Pervasive Developmental Disorder-Non Otherwise Specified (PDD-NOS), Rett's Disorder, and Childhood Disintegrative Disorder. As reported by Muller (2006), many states have adopted the term Autism Spectrum Disorders (ASDs) to refer to these various conditions as a related group. Asperger's Syndrome is exhibited in individuals with relatively good verbal language but mild non-verbal language problems, a limited range of interests and decreased ability to relate with others (Muller, 2006; APA, 2000. PDD-NOS is displayed in individuals who show non-verbal language problems and do not meet

criteria for any other PDD disorder (Muller, 2006; APA, 2000). Rett's Disorder is a rare neurodegenerative disorder that affects only girls (Cowan, 2007; APA, 2000). Childhood Disintegrative Disorder is used to characterize individuals who demonstrate normal development during the first two year after birth, but soon thereafter exhibit a loss of acquired language, social, motor and adaptive skills, poor bladder control, and a reduced ability to play (Cowan, 2007; APA, 2000).

Social, Cognitive and Adaptive Impairments in Children with Autism

Children with autism typically exhibit impairments in social functioning. The social impairments are observed early in the development of children with Autism Spectrum Disorder (Dryden-Edwards & Shiel, 2007; Lord, Storoschuk, Rutter, Pickles, 1993). Although the social impairments associated with autism can affect the bonding between a mother and an infant, Dryden-Edwards & Shiel (2007) suggest that, "contrary to popular belief, many, if not most, autistic persons are capable of showing affection and do demonstrate affection and do bond with their mothers or other caregivers" (p 2) As the infant develops, social interactions with others becomes more obviously abnormal. Typical social skill deficits include difficulties with "reciprocity, initiating interactions, maintaining eye contact, sharing enjoyment, displaying empathy, and inferring the interests of others" (Bellini, 2003, p 3). These abnormalities in social behavior displayed at an early age often enable diagnosticians to confirm the presence of autism spectrum disorder in young children. Young, Brewer, and Pattison (2003) researched the ability of parents to recognize the behavioral abnormalities in children who were diagnosed with autism spectrum disorders. The deficit areas most noted by parents included gross motor difficulties,

social awareness and play deficits, language and communication difficulties, and unusual preoccupations.

The CDC (2005) reported that the functional capabilities and the severity of autistic symptoms can vary widely, ranging from low functioning individuals with severe impairments who may be silent, mentally disabled, and who demonstrate stereotyped behaviors such as hand flapping and rocking to high functioning individuals who may have active but distinctly odd social behaviors, narrowly focused interests, and repetitive communication patterns. Volkmar & Cohen (1997) have proposed a system of classification of autism whereby the disorder is divided into low-, medium- and high-functioning autism (LFA, MFA, and HFA), based on IQ and/or daily living skills. Although individuals diagnosed with Asperger's Disorder tend to perform better cognitively than those diagnosed with autism, the distinction between Asperger Syndrome and high functioning autism remains unclear (Volkmar & Cohen, 1997).

Some researchers (Bellini, 2003, Dryden-Edwards & Shiel, 2007) suggest that individual with autism spectrum disorder have auditory processing deficits that lessen the ability to attend to important information in conversations, such as signals for transitions or at times when statements are misunderstood and need to be clarified. Individuals with autism spectrum disorder rely heavily on routines and do not adapt well to new surroundings, thereby restricting their development of organizational skills and their understanding of the flexible nature of the social world (Young, Brewer, and Pattison, 2003). Deficits in functional language and social interaction have been identified as common characteristics of children with autism (Gadia, Tuchman & Rotta, 2004). Social skills deficits can greatly impact the development of a child with autism and may lead to social withdrawal and isolation. Children who have a tendency to

withdraw are rejected by peers, and often are perceived to be deviant in some way (Bellini,2003).

Normally-developing infants spend a great deal of time making eye contact with their caregivers, but infants with autism spend little or no time engaged in eye contact with their caregivers. If present from birth, a lack of attention to social stimuli may result in a failure to initiate and integrate the basic interpersonal patterns that are believed to be the foundation for later communication (Volkmar & Cohen, 1997, Webb & Jones, 2009). Younger children with autism typically engage in solitary activities, forming few or no attachments with others and in not responding to strangers, and older children with autism typically exhibit more attachments with others but tend not to initiate social interactions. Some individuals with autism spectrum disorder are very much interested in engaging others in social interactions but the odd and eccentric behaviors they often exhibit can cause difficulties during social interactions. Social deficits associated with autism spectrum disorders include failure to establish joint interaction and failure to observe social norms or take a listener's feelings into account (e.g., looking at an adult and remarking "You are very fat"). They often rely on conventional formal social greetings followed by elaboration of idiosyncratic interest or the echoing of a statement made to them. When engaging in social interactions, individuals with autism are very poor at the appropriate use of nonverbal social behaviors such as establishing eye contact, using proper voice tone, and maintaining appropriate social distance from others. The functional communication skills of a child with autism typically are impaired to some degree. Communication problems can include poorly developed language, low rates of spontaneous speech, poor conversational skills, rigid or overly scripted social language, unusual variations in volume and pitch, or limited understanding of and use of, physical gestures when talking. Repeating verbatim what is said, commonly

referred to as echolalia, is often displayed by children diagnosed with autistic spectrum disorder. Tantrums are employed as a way to escape from demands, to recruit social attention or to obtain desired items (Prior, 2003, Webb & Jones, 2009).

Additional problems often exhibited by children with autistic spectrum disorder are narrow interests, inflexible adherence to routines or rituals, repetitive motor movements, preoccupation with parts of objects and unusual sensory preferences. Children diagnosed with autism may experience difficulties in adjusting to novelty, in problems with sensory and motor functioning, trouble developing adaptive daily living skills, problems with the use of executive functions (e.g., sequencing, organization, sustaining, and shifting attention), and inconsistent performance across settings (Prior, 2003). Stereotypical behaviors such as swinging, clapping repeatedly, walking or repeating certain words, sentences or songs also are displayed frequently by individuals with autism (Gadia, Tuchman, & Rotta, 2004, Schriver,, Allen, & Matthews, 1999).

Autistic Characteristics by Developmental Stage

Early Development (Ages 1-5 years old)

In the first year of life, infants who later go on to develop autism may exhibit subtle disruptions in social interest and attention, communication, temperament, and head circumference growth that occur prior to the onset of clinical symptoms (Webb & Jones, 2009). Parents will typically report that they have had concerns with their child since birth or immediately afterwards because of the child's lack of social interaction. Volkmar & Cohen (1997) determined that the eye gaze of the child is frequently reported to be abnormal by parents of children with autism; 90% of parents reported that their children often, very often, or almost

always avoided eye contact. Social attachments do occur in these children but typically, they are significantly delayed. Young children may react to environmental changes, but interactions with other individuals hold less interest for them. They are unlikely to seek physical comfort from their parents, unlikely to share interesting or pleasurable events, and unlikely to take pleasure in interaction with their parents (Webb & Jones, 2009). They often fail to exhibit a shared gaze, i.e., fail to show or point to objects or gaze alternately at an interactive partner and a desired or interesting object/activity (Webb & Jones, 2009). They may ignore friendly greeters and show little or no response to the speech of their parents, leading some parents to believe the child is deaf. These deficits seem to be the most persistent problems exhibited by children with autism between the ages of one and five.

School Age (Ages 5 to 21 years old)

During this age range, social functioning gradually improves over time in some children with autism, but those who do improve rarely achieve levels social functioning levels consistent with same-age peers , instead remaining passive or odd in their styles of interaction (Webb & Jones, 2009). They continue to prefer to be left alone and often engage in self-stimulatory and other unusual behaviors (Volkmar & Cohen, 1997). The mutual or cooperative play that is typically seen in children of this age usually is absent. Adolescents have difficulties taking another person's point of view into account because theory of mind deficits are evident (Webb & Jones, 2009). Social relationships mainly occur with adults and interest in interacting with other children is rare (Volkmar & Cohen, 1997).

Del Valle, McEachern, & Chambers (2004) examined the way children with autism

respond to various situations and the way that they offer empathic responses. They found that individuals with autism do not express concerns in response to another person's anger or distress. Children with autism exhibit impairments in prosocial behaviors, such as, giving, sharing, helping, or offering affection to others. They have trouble learning, and then generalizing the rules of social interchange. Wing (1991) found that inappropriate social interaction seen in children with autism spectrum disorder were associated with impairments of two-way social communication that affected non-verbal communication as much as or more than verbal communication. The use of social stories, however, was found to help teach children with autism how to behave appropriately in social situations and encouraged them to elicit certain responses. Volkmar & Cohen (1997), Webb & Jones (2009), observed that social stories focus on the development of social interaction by teaching autistic children not only how to identify problem situations but also appropriate ways to cope with these problem situations.

In young adults with autism, a range of social outcomes have been observed. The higher functioning individuals experience challenges in their attempts to develop friendships and relate to others. Their desires to make social contact may be strong, but their abilities to do so are very much limited. Feelings of inadequacy and isolation often are exhibited. (Volkmar, Cohen, 1997)

The significant difficulties with socialization that children with autism experience make it difficult for them to interact appropriately with their caretakers, their siblings and other individuals (Webb & Jones, 2009). Assessments can be very helpful in identifying the specific difficulties that each individual encounters, and in selecting effective techniques and interventions to address these weaknesses.

Theory of Mind

Individuals diagnosed with autism are thought to experience difficulty in understanding the perspectives of other persons. The ability to grasp the perspective of another person is referred to as *Theory of Mind* (Lind & Bowler, 2010). At five months of age, children typically can recognize the different facial expressions of other persons and within a few more months are able to understand the meaning of these facial expressions. As young children become able to interpret the facial expressions of others, they begin to use this knowledge to alter or adapt their behavior. This can be observed when a toddler looks at his mother's face for cues about whether or not it is safe to approach an unfamiliar person. This understanding that other people may think and feel differently from one' self is one example of a child's use of "theory of mind" knowledge (Baron-Cohen (1997). An absence of, or slowed acquisition and use of this type of theory of mind knowledge is thought to underlie some of the social impairments and deficits in empathy that is often seen in individuals with autism. The idea of joint attention is discussed next as it is compared with theory of mind in individuals with autism.

Lind & Bowler (2010) researched the concept of joint attention and its relationship to theory of mind with autistic children. Joint attention skills are behaviors produced by the child that involve monitoring or directing the target of another person's attention by coordinating his or her attention with that of the other person. Joint attention deficits in autism impact the individual's ability to appreciate another person's point of view. It has been suggested that joint attention is a precursor to the development of theory of mind. A study was conducted with children under the age of 5 diagnosed with autism to observe the use of pointing to determine the meaning of the gesture and its relationship to joint attention. The study found that these children

were observed pointing to request something but were not pointing to get the attention or interest of another person. This difference in the use of pointing behavior was found to be a significant indicator of the theory of mind problems in autistic individuals, highlighting their distinct lack of interest in interacting with or attending to others.

Baron-Cohen (1997) further elaborates about the theory of mind concept by suggesting that theory of mind deficits reflect a lack of self-awareness of how one's own thoughts and feelings shape one's behavior. As a result, individuals with autism have trouble understanding thoughts and behaviors of others and with interpreting the verbal and nonverbal intents of others. This deficit in theory of mind makes self-introspection difficult when attempting to identify their own thoughts or ideas as their own behaviors. Therefore individuals with autism are believed to live in a "black and white, here and now world" (p 63) and have a tendency to make responses in a predictable and rigid manner (Lind &Bowler, 2010). This helps to explain the ritualistic, concrete ways in which autistic individuals relate to others. Additionally, typically developing children demonstrate an age-appropriate capacity for understanding irony, sarcasm, "white lies", the distinction between literal and non-literal speech and metaphors. This capacity reflects an ability to understand the social intentions of others that are conveyed through the use of these language mechanisms (Baron-Cohen, 1997). Autistic individuals often struggle with these intention-driven forms of language comprehension. Because of deficits in theory of mind, individuals with autism experience difficulty in understanding many social conventions that are not explicitly stated and that often change with the social context.

According to theory of mind, individuals with autism have difficulty interacting with others and listening and making appropriate interpretations of another person's intent. Without a

theory of mind, “the idea that there is a way of knowing what makes people tick would be totally alien. There would be no inquisitiveness about other people’s beliefs…Without a theory of mind, one would merely be an attached observer of behavior” (Frith, 1989, p.131). According to Frith, individuals with autism exhibit abnormalities in the ways in which they interact with others because they do not take into account the other person’s state of mind. This causes these individuals to repeat what others say or to make embarrassing remarks, or to make remarks that appear to be overly formal and inappropriate, given a close affective relationship to the listener. Frith (1989) commented that nonverbal communication problems are commonly exhibited in individuals with autism. They typically use “instrumental” gestures such as “come here” hand motions but they experience difficulties in understanding expressive gestures such as a raised eye brow. This is important to note, because these types of gestures, which require realization of one’s own state of mind and others’ states of mind, are imperative for social interaction.

Autism has been called a condition of mindblindness (Lind & Bowler, 2010), meaning that children with autism are unable to understand mental states. This concept can be explained by a deficit in metarepresentation. Metarepresenation is the inability to develop mental representation for the contents of other people’s minds (Volkmar & Cohen, 1997, Baron-Cohen, 1997). Younger autistic children are unable to engage in pretend play because they are believed to be lacking the metapresentational ability to coin one’s own thoughts as imaginary (Lind & Bowler, 2010). Autistic children experience challenges relating in social situations because they are unable to predict the actions of others and they cannot perceive others’ beliefs, desires and intentions. Therefore they are able to interpret only the actions that are immediately in front of them. They experience difficulties with cognition and emotions and have significant deficiencies

with social interaction and communication. This deficit inhibits their basic cognitive ability to understand and recognize others' thoughts and perceptions.

Kanner believed that individuals with autism are unable to relate to others and that this was observable from birth. He felt that they were born with an innate inability to form appropriate contact with others, and that they had difficulties forming bonds and interactions.

Proponents of the theory of mind hypothesis differ about when metarepresentational capacities would be initially observed. Some believe that theory of mind is first observed in a young child's ability to exhibit pretend play, yet others believe that it is first observed with the development of joint attention behaviors when the child is 8 to 12 months old (Volkmar & Cohen, 1997). According to this belief of theory of mind, abnormalities in an autistic child's social functioning should not be apparent before the age of 8 to 12 months (Lind & Bowler, 2010, Volkmar & Cohen, 1997). There is debate about the exact time at which these behaviors emerge; Kanner's belief, however, supports the idea that impairments in social functioning are found before the age predicted by the theory of mind.

Members of the neo-Kanner school do not doubt that children with autism are lacking the necessary social cognitions described within the context of theory of mind. The failure to acquire theory of mind is the result of their weakness in social relatedness and desire to socialize with others, and in their ability to share their experiences with others. These beliefs are felt to be "motivational deficits" and if they emerge as early as birth, then infants are likely to have deficiencies across development, including impairments in social behavior, language and cognition.

The theory of mind deficit attempted to explain the social, communicative, and

imaginative abnormalities that are commonly found in autistic individuals. These deficits impact the individual's ability to reflect on one's own mental states and those of others.

Assessment for the Identification of Autism

Early Identification:

It is debatable whether or not autism can be identified in the early months of life. According to a study by Gillberg, Ehlers, & Shaumann (1990), it is possible to identify autism during early infancy. These researchers found that early age symptoms include peculiarities in eye gaze, hearing and play. Avoidance of establishing eye contact is a common characteristic of individuals diagnosed with autism. Infants with autism display eye gazes that tend to be brief and only out of the corner of their eyes. Peculiarities in hearing also are present in most cases. Children with autism often are believed to be deaf at an early age. However, they rarely are found to be suffering from a hearing loss even though they may not respond to their names, and appear to be sensitive to odd auditory changes in the environment. Babies with autism show a lack of interest in the types of games that typical babies enjoy, and they are not engaged in any play activities with their parents or others. Babies with autism do not point out things of interest, do not take an active part in playing baby games and do not want to share activities. Assessment for autism at this early age is conducted by a multidisciplinary team of experts in the field, typically in a child development unit. This unit would include a pediatrician, clinical psychologist, child psychiatrist, speech therapist, play therapist, nurse specialist and social worker. During multidisciplinary team assessments, the parent is asked to provide a family history, history of the pregnancy, and the child's behavior and developmental progress. A

physical examination is required to determine any underlying medical conditions that may be contributing to deviations and/or delays in expected developmental progress. These developmental assessments include assessment of fine and gross motor skills, language, sensory perception, social and emotional development and play. The quality of development is a critical focus of the assessment process. When the results of the assessment indicate a diagnosis of autism, recommendations are made for early intervention opportunities that can provide social experiences and learning opportunities.

School Age Identification:

Assessment of a child with autism spectrum disorder during the school-age years needs to be conducted by an expert in the field who is knowledgeable about the characteristics of the disorder. Because of the complexity of behaviors commonly found in individuals with autism, a thorough assessment across multiple settings should be completed. In school, the assessment should include input from teachers, speech-language pathologists, and occupational therapists. The evaluations for autism should target the specific domains known to reflect the problems encountered by autistic children including social competence, communication (verbal, nonverbal and pragmatics), behavior variability, and environmental influences (Ingram, 2005).

Eligibility for Special Education Classification in the United States

A child who is diagnosed with any autistic spectrum disorder is eligible for special education programming (National Research Council, 2001). Special education programs in the United States report the number of children receiving services for autistic children to the CDC. According to the CDC (2009), from 1998 to 2007, the number of 6 to 21 year old children

diagnosed as autistic and receiving services as in public special education programs increased five-fold from 54,064 to 258,305. In accordance with federal and state law, schools must provide a free, appropriate public education (FAPE) for children diagnosed with autism (National Research Council, 2001). However, children with a disability cannot be given any service or support that a parent feels is unwarranted. The child is typically provided with an educational program chosen as a result of what is available and affordable in the given district. Because of the litigation related to implementation of the Individuals with Disability Act, the complexity of autistic spectrum disorder has become a prominent issue between parents and school districts.

Mandell & Palmer (2005) reported that states varied in the number of children diagnosed with Autistic Spectrum Disorder. Education-related spending, the number of pediatricians in the state, and the number of school-based health centers in the state were positively associated with the prevalence of identification of Autistic Spectrum Disorder. Increased access to pediatricians and school-based health centers may lead to improved recognition of Autistic Spectrum Disorder. Indeed, the increased prevalence of autistic spectrum disorders impacts education-related spending, necessitating the hiring of better-trained educational staff who can recognize the problem, and also highly qualified in-school specialists who can provide the necessary screening and comprehensive assessment required for diagnosis. In 1990, Autistic Spectrum Disorder was categorized as a separate condition that qualifies children for special education services. However, appropriate screening and assessment are expensive. In addition, there is a shortage of professionals in the United States who are adequately trained in the diagnosis and treatment of ASD. Specialized classrooms, 1-on-1 instruction, and intensive behavioral interventions are costly and not available in many communities (Mandell & Palmer, 2005).

Instruments Used in Assessment:

The assessment for diagnosing a child with autism spectrum disorder requires the examiner to be aware of the characteristics of the disorder and the response patterns typically demonstrated (Ingram, 2005). Assessment procedures used in the diagnosis of autism rely heavily on observation, consultation with teachers, interviews with parents, and behavior rating scales. Observations should be completed across multiple settings when assessing for autism. Observation recording should reflect how long the behavior is exhibited, and the frequency with which it occurs. The observer must be aware that an individual's ability to engage and play with others stems from the individual's social and cognitive abilities. Children with autism exhibit less sophisticated individual play and minimal amount of engagement in group play (Guralnick & Groom, 1985).

Prior (2003) discussed multiple ways to conduct assessments of children with autism. Social skill interviews with primary caregivers provide a great deal of information regarding the child's typical characteristics and behaviors at home. Behavior rating scales such as the Autism Behavior Checklist (ASIEP) (Krug, Arick, & Almond, 1993), Childhood Autism Rating Scale (CARS) (Schopler, Reichler, & Renner, 1988), Vineland Adaptive Behavior Scales (VABS) (Sparrow, Cicchetti & Balla, 1984), Autism Diagnostic Interview-Revised (ADI-R) (Lord, Rutter, & LeCoteur, 1994),), and the Gilliam Autism Rating Scale (GARS) (Gilliam, 1995) are thought to useful instruments in the diagnostic process (Prior, 2003).

The ABC is a direct observation instrument that surveys five categories including sensory integration, relating to others, body and object use, language, and social and self-help (Faherty, 2000). Teachers and/or parents can complete the scales. The child is assessed according to how

his/her behaviors deviate from those of a sample of normal functioning children of the same age. The CARS is a fifteen-item rating scale that helps differentiate children with autism from those with other developmental delays (Faherty, 2000).

The VABS is divided into various sections, assessing the child's functional abilities in various settings (home, school, community etc.) The abilities assessed include social skills, communication skills, daily living skills, and motor skills development. Social skill assessments are practical and useful with school-age children in educational settings. Assessments in the educational setting are usually conducted by school psychologists and case managers who collaborate with teachers and other related service providers (i.e., occupational therapists, speech therapists). All of the assessments are valuable resources, and the results can be helpful in determining appropriate interventions to remediate social skill deficits.

Additional assessments used in the diagnosis of autistic spectrum disorders include the following:

Autism Screening Instrument for Educational Planning (ASIEP) (Krug, Arich, & Almond, 1993)-observational protocol with 5 standardized subtests including observations and clinical interviews.

Autism Diagnostic Observation Schedule-WPS (ADOS-WPS) (Lord, Rutter & LeCoteur, 1994)-an interactive observation format where the examiners socialize with the child using a standardized algorithm scoring format.

Autism Diagnostic Rating Schedule (ADOS) (Lord, Rutter, & LeCoteur, 1994) - a direct interaction assessment instrument that provides opportunities to observe and assess communication patterns, social-reciprocal interactions and stereotypical play patterns.

Psychoeducational Profile-Revised (PEP-R) (Schople, Reichler, Bashford, Lansing, & Marcus, 1990) is a diagnostic instrument requiring the examiner to interact directly with the child. The instrument assesses a wide array of developmental functioning in areas including imitation, fine motor, gross motor, eye-hand integration, cognitive performance and cognitive-verbal capacities.

Approaches to Intervention for Children Diagnosed with Autism

The prevalence of autistic spectrum disorders has been increasing and the need for intense intervention in schools has become a necessity. The National Research Council (2001) has noted that the courts have significant involvement in the determination of how autistic children are being educated in schools. As previously discussed, the types and ways in which interventions are implemented differ across the country (National Research Council, 2001). Barbera (2003) stated that a "one size fits all" methodology for treating these individuals is neither practical nor realistic. Each child requires an individualized education plan (IEP) that is unique to his/her specific needs and addresses the specific goals, services, and accommodations necessary to treat him/her effectively.

According to the CDC Autism Fact Sheet (2010), the main research-based treatment for autistic spectrum disorders is intensive, structured teaching of skills, commonly known as behavioral interventions. There are several components that must be addressed when providing an educational program well-suited to the needs of an individual child diagnosed with autism, including individualized supports and services, systematic instruction, comprehensive and structured learning environments, specialized curriculum focus, a functional approach to problem behavior, and family involvement (Iovannone, Dunlap, Huber & Kincaid, 2003). Furthermore, it

was stated that IDEA supports the theory of Positive Behavioral Interventions and Supports (PBS). Positive Behavioral Interventions and Supports reward desirable behaviors and take rewards away when undesirable behaviors are exhibited (Rutherford, Wilcox, & Stowe, 2002). The social skills interventions used with children diagnosed with autism are considered a form of positive behavior intervention and support.

Social skill interventions have expanded over the years. Some of the basic skills taught include the ability to gain a listener's attention, and initiating a topic and staying on topic for an appropriate period of time while expressing his/her personal views and opinions. Social groups, peer partnerships, formal social skills training programs and narrative and/ or pictorial approaches-including social stories and comic strips-are some of the non-technological social skill interventions available for teaching these skills (Faherty, 2000). For individuals with autism, the development of social interactions and relationships can depend on many variables including the number, type, setting and distribution of peer social interactions. Interventions used should provide interactions at a rate similar to those found in the child's environment, and should utilize age-appropriate activities. Attention should be paid to the social validity of the interactions taught in the interventions. In implementing social interventions with autistic individuals one should use direct instruction of relevant social behaviors, which relies on the overt manipulation of task-analyzed skills to promote higher frequencies of social behavior. Another method is to provide a prompt in order to elicit a response, followed by reinforcement (attention or praise) to commend him/her on the positive interaction with another person.

Social groups allow children to recognize the importance of being a good listener and foster the ability to take turns in speaking and listening in a variety of settings. It is

recommended that social groups be appropriately structured with the following guidelines: meeting on a consistent basis; keeping the group small; displaying a schedule of events; providing visual cues; using social stories to explain problematic situations; and beginning and concluding the session with a familiar routine. Social groups have had positive outcomes in promoting social interaction among children with autism, allowing them to play and interact appropriately and facilitate communication (Faherty, 2000).

Peer partnerships are a practical method to utilize when trying to promote friendships and interaction skills in children with autism. The child is encouraged to partner with another whom he/she has met through class, as a peer tutor, or through extracurricular activities or class assignments. These relationships can be very successful when the partner is sensitive and aware of the child with autism (McGinnis & Goldstein, 1984, 1990).

Social skills training has elicited significant outcomes with increased prompting and reinforcement. A study was conducted in teaching children social interaction, with teacher prompting in order to demonstrate appropriate responses and ways to initiate conversations (Volkmar & Cohen, 1997). The prompting eventually faded when the children were able to exhibit the responses independently. In this study, the children were encouraged to interact with their peers with autism, but the continuation of the social skill improvements were contingent on the teacher's prompting of peers to direct social initiations to the children with special needs. Peers were taught strategies such as getting their friends' attention, getting their friends to play, sharing with their friends, and talking to their friends. The children with autism were prompted by their teachers but after the various strategies were taught, the children with autism practiced using them without prompting. The social skills that were taught were considered as having been

mastered when the child demonstrated the social interaction routine in three consecutive instances without teacher prompting. These children were also taught to self-evaluate their reactions by checking a “yes” box or “no” box with the assistance of their teacher. Results from this study suggested that responsiveness from the children with autism increased. However, there were no improvements in their ability to initiate conversation. The carry-over to different settings also was proven successful with the children in this study. The children who learned how to monitor their social responses began to decrease inappropriate behaviors and to improve their social skills (Volkmar & Cohen, 1997).

Social skills training programs such as the SCORE Skills (Vernon, Schumaker & Deshler, 1996) and Skillstreaming (McGinnis & Goldstein, 1984, 1990) can teach appropriate social skills. Five skills are explored in the SCORE Skills Training Program: “share ideas”; “compliment others”; “offer help or encouragement”; “recommend changes nicely”; and “exercise self-control” (Vernon, Schumaker & Deshler, 1996). The skills are reinforced through the use of role-playing and modeling after the concepts are clearly understood by the individual. This program can be extremely successful in high functioning children with autism. It is initially difficult for the individual to grasp the idea of role-playing, but children with autism who are higher-functioning and more sociable are able to participate in simple role-playing exercises. They eventually increase their self-awareness and demonstrate greater self-control in social interactions after learning and practicing the skills (Vernon, Schumaker & Deshler, 1996).

Skillstreaming, another structured social skills intervention, uses role-playing, modeling, performance feedback, and transfer of training to teach children positive social behaviors. Skillstreaming programs group individuals, based on their social skills. They are

grouped by target social skills: beginning social skills such as “listening” and “asking for help”; school-related skills such as “asking a question” or “following directions”; friendship-making skills such as “joining in” and “sharing”; dealing with feelings such as “asking to talk” or “showing affection”; alternatives to aggression such as “dealing with teasing” and “being mad”; and dealing with stress such as “being honest” and “saying no” (McGinnis & Goldstein, 1984,1990). Skillstreaming has been used with autistic children, but little research has been reported on the effectiveness of the program.

Carol Gray (1994) developed “social stories” as a technique that defines the relevant cues in a social situation and describes appropriate responses. Social stories can use a specific activity, such as homework time. The components of a social story should provide social modeling, task analysis, visual aids, practice with corrective feedback and priming. Research and previous studies have concluded that social stories can be extremely effective, and the concepts can carry over into other settings and even into other scenarios (Gray, 1984 and Thieman & Goldstein, 2001).

Comic Strip Conversations depict interactions between people to help children with autism understand conversations (Gray, 1994). This technique uses symbols to demonstrate basic conversational skills, including “listening”, “interrupting”, “loud”, and “quiet words”, “talk”, and “thoughts”. This technique can reinforce learning and facilitate appropriate conversations. Social skills “picture stories” (Baker, 2001) use digital pictures of actual children exhibiting the various social skills. The pictures usually include small captions showing what the child may be saying or thinking. The picture stories demonstrate the various social skills, sorting them by topics, including asking for help, and initiating or joining conversations. These pictures illustrate the

various steps in carrying out a conversation, showing what is appropriate to say or do in an interaction. This technique has demonstrated good success, and children emulate many of the target social behaviors. They become more highly focused in conversations, and higher functioning students often can engage in conversations for a short period of time.

There have also been significant technological advances in interventions addressing autism spectrum disorder. Some of these interventions have included animated cartoon characters (Bosseler & Massaro 2003) and robots (Dautehhahn & Weery 2004). Research has shown that animated cartoons that teach vocabulary have been effective in helping children learn new vocabulary words, retain knowledge, and apply the newly learned words to new images outside the realm of the computer program.

The Aurora Project has created robots that reinforce behaviors involved in social interaction such as eye-gaze, turn-taking, and imitation games. The robots are described as "highly personable, conforming to the needs, interests and abilities the child who socializes with it" and it is effective in providing a "scaffold for learning that can be gradually faded as the child's skills and competencies in the area increase" (Dautehhahn & Weery 2004). This project has been used with autistic children and results have indicated that the children generally showed more interest in the robot (in terms of gaze, touch, etc.) and were more engaged in interactions with the robot than with another non-robotic toy (Dautenhahn & Billard, 2002). The main limitation of the robot currently used in the Aurora project lies in the fact that it can offer only a small number of interactions (limited to spatial approach/avoidance turn-taking games) (Dautenhahn & Billard, 2002).

Pivotal Response Training (PRT) emphasizes responses to multiple cues and improved

motivation. This technique instills the proper means to elicit appropriate responses to questions asked of individuals with autism. This method was used on two adolescents with autism, and produced positive outcomes in social behavior and communication (i.e., reductions in social perseverations and inappropriate facial expressions) that generalized beyond the immediate treatment setting (Cohen & Volkmar, 1997).

It is important to teach to individuals with autism to establish multiple means of communication so that they learn ways to make requests and interact appropriately. As with gestures, one must provide clearly visible models by being at an individual's physical level, encouraging face-to-face gaze, and producing words slowly, clearly, and repetitively. Specific speech repetition enhances the training and usage of the words. There are several methods that can be used to reinforce positive social interaction, including using imitation of an individual's vocalizations and modifying them in playful turn taking; using short relevant phrases and intonation patterns; using stereotypic and ritualized utterances in routines; modeling short utterances; and singing songs or reciting rhymes that have slots for filling in words or sounds. Using appropriate modeling and opportunities to vocalize and imitate sounds and gestures can be beneficial for autistic individuals who are verbal.

Teaching children with autism ways to initiate conversations is an important part in socialization. A study was conducted to teach children with autism how to initiate conversations with peers. The role of self- initiation was presented. For example, Oke and Schreibman (1990) taught non-handicapped peers to initiate interactions with children with autism. The children were videotaped while initiating conversations to teach them appropriate ways to interact. There was an increase in the level of social interaction by the autistic children; through the use of this

strategy the children did demonstrate a greater capacity for initiating conversation.

A study by Belchic and Harris (1994) studied how preschool children interacted socially with children with autism. The children were initially taught to initiate interaction with adults and then were expected to generalize this with other children. The children with autism modeled the behavior and were able to generalize this behavior with their siblings and with other children. Situational and communicative scripts are important ways to increase the social skills of children with autism. These strategies are taught through real life experiences and situations. The children also are encouraged to communicate in these real life settings because it is felt that there is greater likelihood for carryover and generalization to everyday experiences when the interventions are focused on true events. Individuals with autism have significant difficulties with understanding the meaning and relevance of acquiring social skills in social events. Exposing these children to these situations allows them to learn proper exchanges in situations such as using the telephone, ordering food in a restaurant, or engaging in the discourse of classroom instruction and response.

Applied Behavior Analysis

Applied Behavior Analysis (ABA) is a systemic application of behavioral principles to address deficits in socially significant behavior, verbal skills and reasoning skills. The key aspects of ABA include observing the frequency of occurrence of behaviors as well as the antecedents to the behaviors and the consequences that follow the behaviors; breaking down desired skills into steps; teaching the steps through repeated presentation of discrete trials and collecting performance data to evaluate if there should be any changes over time (Prior, 2003). .

Baer, Wolf, and Risely (1967) outlined seven essential elements of an ABA-based

program:

A) The program must be applied. The behaviors that one chooses to focus upon should have some social significance.
B) The program must be behavioral. The environment and physical events should be recorded with precision.
C) The program must be analytic. There should be clear and convincing evidence, through carefully collected data, that the intervention is responsible for a change in a behavior.
D) The program must be conceptually systematic. There should be relevance to established and accepted principles.
E) The program must be effective. The program should seek to change the targeted behavior to a meaningful degree.
F) The program should display some generality. A change in behavior should be seen in a wide variety of environments, or should spread to a wide variety of related or similar behaviors.

All of these elements are imperative when implementing ABA with autistic individuals to obtain the desired outcomes. The following terms and definitions are commonly used in Applied Behavior Analysis (Alberto & Troutman, 2003):

Repeated Opportunities for Learning-Teaching new skills with repeated trials so that the new skill becomes ingrained and the child has more opportunities to recognize when the skill is to be used.

Generalization of skills-This refers to the ability to demonstrate a skill, taught under specific conditions, in novel situations such as new locations, with different

people, with different materials or when asked in a different way.

Prompting-An added stimulus that increases the probability of the desired response.

Fading- The gradual removal of prompts allowing the discriminative stimulus to occasion a response independently.

Pairing-The simultaneous presentation of primary and secondary reinforcers to condition the secondary reinforcer. After the association has been established, the secondary reinforcer takes over the reinforcing function, and the primary reinforcer is no longer necessary.

Modeling-The demonstration of a desired behavior in order to prompt an imitative response.

Shaping-Teaching new behaviors through differential reinforcement of successive approximations to a specified target behavior.

Chaining- An instructional procedure that reinforces individual response in sequence, forming a complex behavior.

Effectiveness of Applied Behavior Analysis

When discussing any treatment modality it is important to examine the efficacy of the technique. There has been some debate regarding the benefits and drawbacks of this program. This section is a critique of the use of Applied Behavior Analysis with autistic individuals.

Lovaas' (1987) study of children diagnosed with autism at the Young Autistic Project led him to conclude that these children can learn most effectively using the ABA technique, particularly with a Discrete Trials methodology. He found that children that were receiving approximately forty hours per week of ABA demonstrated the greatest improvements in behavior. Francis (2005) noted that the intensity of the behavioral intervention was the most significant factor in predicting treatment outcome. The length of treatment also was critical in achieving successful outcomes; it was found that long-term treatment achieved better results than shorter-term treatment. The children with autism who received intensive ABA treatment made larger improvements in most skill areas than children who participated in the other interventions. Parents whose children received intensive ABA reported less stress than parents whose children received other treatments. In addition, the social behaviors of approximately one-half of the group became indistinguishable from the social behaviors of neuro-typical peers in a first grade class.

Lovaas' seminal study has drawn criticism as well as praise. One criticism is that Lovaas' study was not empirically sound (Francis, 2005; Gresham et al., 1999; Wheeler et al., 2006). In addition, Lovaas' technique was felt to be obsolete and too narrow in its approach to language acquisition (Francis, 2005). His work was also believed to give false hope to parents, who had very little knowledge of the disorder. Lovaas' study, however, did encourage these parents to seek the necessary services from their child's public school. This increased school districts' awareness of autism as well as their ability to start identifying the disorder and providing and implementing effective programs to address the needs of autistic children.

Dillenburger, Keenan, Gallagher, & McElhinney (2004) examined parents' responses to the use of applied behavior analysis with their children. Their findings confirmed a high level of perceived effectiveness of applied behavior analysis. The parents felt that applied behavior analysis was effective in terms of attaining behavioral goals, creating strong intervention strategies, and improving the overall quality of life for their children. The quality of the training provided to educational staff using the applied behavior analysis techniques was critical; the study found that college educated therapists were more successful with applied behavior analysis when compared with parent-employed therapists who had received short-term training. Last, this study showed that the age of the child and the onset of treatment is an important factor in the success rate.

Applied Behavior Analysis is an accepted approach to help improve social skills in autistic individuals (Dillenburger, Keenan, Gallagher, & McElhinney, 2004). However, some are concerned that the practice of Applied Behavior Analysis creates 'robots' because the consistent repetition of skills makes it less likely that the individual with autism will learn to think independently (Prior, 2003; Wheeler et al., 2006). The fact that most children with autism have a monotonous voice quality also makes them sound robotic (Barbera, 2003). The strategies taught require the individuals to repeat words, phrases and sentences because the continuous practice provides more comfort and ease with verbal communication. ABA is similar to learning a new language. One must practice the skills taught in ABA repeatedly just as one would practice to become fluent in a new language. A second criticism pertains to the frequency with which the program is applied. Discrete trial teaching is typically recommended for 40 hours per week (Barbera, 2003; Hernandez, 2008). This can be very stressful for parents and can create potential

difficulties in the household. ABA is not an “all or nothing” approach; as long as the program is being applied, results should be observed. However, they may not be observed as quickly when training is reduced in frequency and duration. A third challenge with ABA is finding qualified professionals who can effectively conduct the program (Barbera, 2003; Wheeler et al., 2006). Parents must inquire about the professionals’ abilities and qualifications and examine information related to the clinician’s formal training, experience and competency.

Children with autism exhibit social skill deficits that impact their ability to make eye contact, respond appropriately to others, and follow social cues. Social skills programs are frequently implemented in schools to reinforce these skills. Applied Behavior Analysis is a technique used to reinforce social skills by breaking the various skills into manageable parts for the autistic child to learn. Although Applied Behavior Analysis has shown success with children with autism for more than thirty years (Dillenburger, Keenan, Gallagher, & McElhinney, 2004), many questions about the technique continue to be raised, such as, “Can children with autism apply what they have learned across various settings?” Research has shown that skills taught through school-based instruction are typically not generalized to natural environments or settings (Haring & Kennedy, et al., 1987). One way to promote generalization however, has been to teach the skills in additional settings until the skills emerge in yet-to-be trained settings- a strategy known as “training sufficient exemplars”(Haring & Kennedy, et al. 1987).

Discrete Trial Training and Verbal Behavior Approach

The two main types of ABA are the discrete trial approach and verbal behavior approach.

The following are brief descriptions of each technique and their impacts on individuals with autism.

Discrete Trial Training (DTT)

Discrete Trial Training (DTT), an educational approach for teaching children with autism, has received strong empirical support (Downs et al., 2007). It has been reported that 47% of children with autism taught through an organized early intensive curriculum employing DTT instruction achieved normal levels of intellectual and academic functioning after two or three years of treatment, and that their gains were maintained over several years (Lovaas, 1987; McEachin, Smith, & Lovaas, 1993).

Discrete trials are defined as a discrete opportunity for occurrence of a behavior. A trial is operationally defined by its three behavioral components: an antecedent stimulus, a response, and a stimulus (Reed, Osborne, & Corness, 2006). The delivery of the antecedent stimulus marks the beginning of the trial, and the delivery of the stimulus signifies the termination of the trial. Applied Behavior Analysis yields positive outcomes with children diagnosed with autistic spectrum disorders by enhancing their life skills (Reed, Osborne, & Corness, 2006). The Discrete Trial Training allows for continuous opportunities for trial/error learning. It is teacher-controlled (the teacher determines the sequence of instruction and material taught); minimal thinking is required by the student; it is easy to collect and evaluate data related to program implementation (Simpson, 2005; Hernandez, 2008).

The DTT instructional method has several advantages. The most important is the five step instructional procedure that is used to teach young children a wide range of skills. It has been particularly effective in teaching children with autism new behaviors and skills (Downs et

al., 2007). The five instructional steps include: the discriminative stimulus, which is the instructional or environmental cue to which the teacher would like to respond; the prompting stimulus, a prompt or cue from the teacher; the response, the skill or behavior that is the target of instruction; the reinforcing stimulus, which is the reward designed to motivate the child to respond correctly; and the inter-trial interval, which is a brief pause between consecutive trials (Downs et al., 2007). Downs (2007) also reports that DTT is an effective instructional method that can be used to teach autistic children how to generalize trained skills through the use of imitation, receptive language, expressive language and conversational skills. Furthermore, DTT procedures are readily adaptable to individualized, developmentally appropriate curricula and facilitate ongoing data collection that allows for a continuous formative assessment of student progress. Downs (2007) & Cowan (2007) indicated that although it is often thought of as occurring outside of students' typical routines, DTT instruction can be embedded throughout the school's ongoing daily activities.

In their study in 2007, Downs, Downs, Johansen and Fossum investigated the effectiveness of providing DTT instruction to children with autism within a public school setting. The effects of providing DTT on the participants' cognitive, language, behavioral and social-functioning were evaluated. Results showed positive changes in adaptive behavior development and social emotional functioning for students who received DTT. Furthermore, Wolf (1964) found that DTT is an effective method of teaching children with autism. These children rarely exhibit personally and socially desirable behaviors to which reinforcements can be applied while they are engaged in behaviors that interfere with teaching and learning. To eliminate these behaviors and teaching appropriate and desirable behaviors, it is imperative to create highly

controlled and carefully monitored teaching environments. The DTT method can be used with young children in the early stages of development to improve such behaviors as attending, imitating, following instructions, and answering questions (Anderson, Taras, & Cannon, 1996).

Some concerns with the use of DTT have been expressed. One of these concerns is that students are not interacting with peers during intervention, a fact that may interfere with their social-emotional development (Downs., et al., 2007). Greenspan (1992) has argued that behavior analytic approaches to intervention such as DTT hinder the social-emotional and behavioral development of young children with developmental disabilities. However, Downs et al. (2007), found the opposite to be true because these children can exhibit improvements in social functioning. Last, teaching in a highly controlled situation results in responding that is under the control of a few highly specific stimuli. The treatment gains observed in a controlled setting rarely carry over to new situations, people, or tasks (Cowan, 2005).

The Verbal Behavior (VB) Approach to Intervention with Children Diagnosed with Autism

The Verbal Behavior Approach (VB) to teaching children with autism is based on Skinner's behavior theory (1957). The verbal behavior approach is a treatment of autism that focuses primarily on the development of verbal responses. This technique recognizes language as a specific behavior and teaches the child how to use language to request an item that he/she desires. The basic teaching procedures of VB consist of the standard methodology of ABA (Cooper, Heron, & Heward, 1987; Hernandez, 2008). The VB approach suggests that in order to learn a skill, a child must have an imitation repertoire (Burk, 2007).

Sundberg (2006) stated:

> The verbal behavior approach is simply normative, applied behavior analysis with a few refinements. That is, it incorporates all of the standard methodology of applied behavior analysis, but it explicitly adopts Skinner's interpretive framework for analyzing verbal contingencies. In other words, it is a minor variation on a methodology that has an enormous empirical foundation. The worst-case scenario is that the added framework does not help. But even in a case in which it does not work, the child is still getting a full-fledged program of applied behavior analysis procedures. It is simply hard to believe that a set of procedures guided only by a distinction between receptive and expressive language can be as sharp as one that respects all of the various types of contingencies analyzed by Skinner.

In the Verbal Behavior approach, expressive language is seen as a behavior that can be taught, and different functions of words are taught explicitly (Barbera & Rasmussen, 2007). An example of this technique is the use of teaching the word "ball". Using the verbal behavior approach, the word "ball" could be taught using either verbalization or sign language. A child with autism is expected to ask for the ball or make a request using sign language. In addition, the child with autism would be able to identify a picture of a ball and answer questions about its function. Sign language is encouraged if the child is nonverbal. This is important because the main focus of the verbal behavior approach is being able to interact with another person to make a request (Barbera & Rasmussen, 2007).

Barbera (2007) found that the VB approach reduces tantrums and other problem behaviors because it begins by assessing the child's likes and interests, and then uses those likes

and interests (reinforcers) to motivate the child so that he or she can start to learn. After the reinforcers have been identified, the child will immediately start receiving objects of reinforcement, and then will ask for objects either verbally or through sign language. After the child responds to the reinforcers and asks for several items or activities, the skill is considered learned (Barbera, 2007; Hernandez, 2008). In a study conducted by Murphy, Holmes and Holmes (2005), three children with autism were examined as they made requests for a given reinforcer. The task required these three children to make a request for a token on three successive occasions. The results indicated that for children with autism, a request will be given when reinforcers are immediately given, following appropriate conditional discrimination training.

To summarize, ABA describes human behavior in observable measures and reinforcement is an important part of this approach. ABA must be conducted in a highly structured environment in which opportunity for data collection is permissible. Both Discrete Trial Training and Verbal Behavior are variations of ABA that can have positive effects when implemented appropriately. There has been debate over the effectiveness of ABA and its various approaches. Some speculate that there is not enough research to support these approaches and that generalization of the trained skills is weak. Despite the criticism, ABA has become a widely known technique, improving the ability of school districts to identify and better serve the needs of children diagnosed with autism.

Multiculturalism and the treatment of autism

Individuals with autism spectrum disorder are found in all cultures, ethnicities, and within

all socioeconomic levels. The diagnostic criteria in the United States are consistent with the criteria identified in other cultures. Dyches, Wilder, Sudweeks, Obiakor & Algozzine (2004), have reported that individuals with autism who are Black or Asian/Pacific Islander have been diagnosed with autism at about twice the rate of Caucasian students. Autistic children face additional challenges when placed in culturally different environments in which multiple languages are in use. Schools must have trained personnel who are able to meet the needs of diagnosed children from culturally diverse backgrounds.

It is important to note that school personnel need to take the cultural backgrounds into consideration when educating individuals with autism because most likely the children will continue to reside and work in the dominant culture. Therefore, teachers of multicultural students with autism need to develop ways to teach appropriate social skills that are relevant to their cultural backgrounds (Wilder, et al., 2004). Parents must also take an active role in the treatment and education of their child in order for positive results to show greater likelihood of generalization in culturally diverse situations (Hernandez, 2008).

Summary

In the sixty-seven years since Leo Kanner initially described childhood autism, a tremendous amount of research has gone into the diagnosis of the disorder, into theories about its causes, and into its treatment. Autism has been described as a developmental disorder of neurobiologic origin (Barbera, 2003). Refinements in diagnosis have led to an understanding of the wide array of disorders that fall within the autistic spectrum. This, along with a greater awareness on the part of the general public, has led to a dramatic increase in the prevalence of

identified cases of autism. Assessing autistic children at an early age can lead to more effective treatment for these individuals.

Although an understanding of the causes of autism remains unclear, significant progress has been made in treating affected individuals. State education agencies have recognized that individuals diagnosed with autism are underserved as well as inappropriately served (Hernandez, 2008). Comprehensive programs that address the deficits identified in these individuals must be designed and implemented in the public school structure. The goal of determining a successful behavioral approach is based on the quality of evidence that supports its use. Behavioral approaches such as Applied Behavior Analysis have been shown repeatedly to have a significant impact on autistic individuals' social functioning. However, there has been little research on the effects of generalizability using Applied Behavior Analysis. Furthermore, autistic individuals are believed to have deficits with theory of mind (Baron-Cohen, 1997), which is reflected in difficulties interpreting the perceptions of others and is believed to impact their overall behavior. Several studies have shown that Applied Behavior Analysis can provide an in-depth structured approach that, if administered by qualified personnel, can lead to positive effects on social behavior (Cowan, 2007).

The study reported here examined the data collected during a ten week ABA training program. This case study focused on the use of Applied Behavior Analysis using discrete trials to train an autistic child to provide a spontaneous response in various settings. The training was completed to demonstrate that the use of Applied Behavior Analysis with Discrete Trials both at home and at school can generalize what was taught into other settings. The student taught in this case study was taken to various settings and observed producing spontaneous social greetings. It

was hypothesized that the training completed both in school and at home would increase the student's ability to make a socially appropriate greeting and demonstrate appropriate social behaviors in a variety of settings.

Chapter 3: Method

Data Source

The data used in this study were obtained from the treatment records collected on a twelve year old adolescent male student with autism. At the time of implementation of the treatment program during which the data were collected, the student resided with his parents and younger brother. The family is of Hispanic background. Both parents were working long hours, and the paternal grandparents were caring for the student and his siblings after school.

Records reviewed for this study included the results from a psychological evaluation given in June, 2007 that yielded the following scores on the Comprehensive Test of Nonverbal Intelligence: Nonverbal IQ Standard Score = 67 (Very Poor range); Pictorial Nonverbal IQ Standard Score = 70 (Borderline range); Geometric Nonverbal IQ Standard Score = 68 (Very Poor range). Academic skills assessment indicated that the student could identify numerals and number words to nineteen, sing parts of the alphabet song, randomly identify letters of the alphabet, identify colors and shapes, name planets, point to body parts, match words/phrases to pictures, read words and passages on level 1 sequential reading program, tell biographical information, place four cards in sequence, and complete open ended sentences by matching a picture with a verbal response. The student's parents also completed the Vineland Adaptive Behavior Scales (VABS) as part of the assessment. The VABS results were as follows: Communication Skills age equivalent 2.6; Daily Living Skills age equivalent 3.5; Socialization Skills age equivalent 3.2; and Motor Skills age equivalent 4.11.

At the time of the original data collection, the student was attending school in a self-contained special education classroom in a suburban middle school. His class consisted of five students with one head teacher and five aides; one was assigned to each student. The class utilized applied behavior analysis (ABA) and discrete trials to teach social and academic skills. In addition to applied behavior analysis being implemented in the classroom, the student was receiving applied behavior analysis training five nights a week for a total of ten hours per week, per recommendation in his individualized education plan (IEP). The school- and home-based ABA programs were run concurrently. The skills taught in school were reinforced daily at home.

Procedures and Measure

This study assessed the effectiveness of Applied Behavior Analysis on improving socialization skills in a student with autism. Previously collected data were accessed for analysis using a single case study design. The literature review explained applied behavior analysis as a structured methodology used to increase a child's capacities (i.e., social skills, academics) through discrete trials learning. In this study, the student's ability to make an appropriate greeting to others was observed and evaluated. The student was taught to exchange a greeting (i.e., say "hello"), when initially prompted. It was expected that he would gradually begin to greet others spontaneously without prompting and the prompting could be gradually faded. The educational program was conducted so that skills were continuously reinforced. The educational program was conducted for a ten-week period. During the program, the student was taught the skill of making an initial greeting in school and at home with a familiar person. An initial greeting was defined either as a "hello" when first making eye contact with the other

person. A familiar person was defined as a parent, grandparent, teacher, or ABA therapist. The student was then exposed to various settings in which he was expected spontaneously to greet those unfamiliar to him. Unfamiliar people were defined as anyone not included as familiar people (e.g., a store clerks).

The data collected during program implementation evaluated the student's spontaneous and prompted social greeting behaviors with unfamiliar persons in social settings in public places (e.g., McDonald's restaurant; CVS drug store), based on criteria that reflected the social greeting skills taught to the student at home and school. The student's encounters with unfamiliar person were observed and evaluated for the frequency of occurrence of the socially appropriate greeting behaviors that were emphasized in the social greeting discrete trial teaching sessions. Evaluations of the student's social greetings were recorded using a checklist, indicating the frequency of occurrence of specific greeting behaviors (see Appendix A). Four different observers used the behavior checklist to record their evaluations of the adequacy of the student's performance of six behaviors that are part of social greetings.

The observers included two Applied Behavior Analysis therapists that worked with the student in the school and home settings, the head teacher in the student's classroom, and the one-to-one aide assigned to the student in the classroom. The observers were qualified persons who had been trained prior to the start of the program to observe and evaluate the student's social greetings. The observers were provided with the behavior checklists along with brief operational definitions of the social greeting behaviors to assist the observers with the scoring of each checklist item.

Behaviors on the checklist were assigned a score of “0” or “2” based on whether or not they were performed spontaneously. Three of the six items also allowed for intermediate scores of “1” if prompting was needed to produce the socially appropriate greeting behavior. A prompt was defined as providing the student with reminders and/or commands to offer the desired behavior; for example, telling the student to say “hello” to a service worker but the student did not respond within 5-10 seconds.

The specific behaviors that were rated during social greeting interactions included: 1) making eye contact; 2) acknowledging the other person without prompting; 3) offering an adequate verbal response to the other person’s greeting; 4) responding reciprocally with a wave or a smile; 5) maintaining appropriate distance between him and the other person; 6) not engaging in self-stimulating behaviors. Each behavior was evaluated using specifically defined ratings.

The first behavior pertained to the student making eye contact with an unknown person. As noted in the checklist, this item could only be scored “0” or “2”. If the student made eye contact, a “2” would be assigned. If the student did not make eye contact a “0” would be assigned. Making eye contact was defined as looking directly at the other person’s eyes and sustaining a mutual gaze for at least 2 seconds.

The second behavior was rated as a “2” if the student spontaneously acknowledged an unfamiliar person, whereas acknowledging the unfamiliar person with prompting was assigned a ‘1”, not acknowledging the unfamiliar person with or without prompting was rated as “0”. Acknowledging the unfamiliar person was defined as looking in the direction of the other person at least once and demonstrating body position cues (i.e., face and body are positioned in the

direction of the unfamiliar person, shoulders still and perpendicular to the floor demonstrating appropriate posture) that could be interpreted as a readiness to engage the other person in some form of social interaction.

The third behavior pertained to offering a verbal greeting. If the student offered an adequate verbal response such as, “Hello”, a score of “2” was assigned., If the student offered an inadequate verbal response, such as repeating what the other person said, a score of “1’ was assigned. If the student offered no verbal response, a score of “0” was assigned. A verbal greeting was defined as saying “Hello” or offering some other verbal response consistent with the other person’s greeting, such as saying “I’m fine thanks” if asked, and ,“How are you?”

The fourth behavior pertained to offering a reciprocal nonverbal greeting when offered a nonverbal greeting by an unfamiliar person, such as a wave or a smile. If the student responded reciprocally with a wave or a smile, a “2” was assigned, but if the student did not respond, a “0” was assigned. A nonverbal response was defined as a reciprocated head nodding and smiling when the other person nodded and smiled at the student.

The fifth behavior pertained to maintaining appropriate proximity between the student and the unfamiliar person. Maintaining an appropriate distance was scored as a “2” and not maintaining an appropriate distance between him and the person was scored as a “0”. Maintaining a socially appropriate distance was operationally defined as maintaining approximately 2-3 feet between him and the other person while engaging in a social greeting, ordering a product, or asking a question.

The sixth behavior pertained to the occurrence of self-stimulation during the interaction. If the student did not engage in self-stimulating behaviors, a score of “2” was assigned. If the

student engaged in self-stimulating behaviors but discontinued when prompted to do so, a score of "1" was assigned. If the student engaged in self-stimulating behavior and did not discontinue when prompted to do so, a score of "0" was assigned. Avoiding engagement in socially inappropriate, self-stimulating behaviors was operationally defined as not doing any of the following; waving his hands in the air, staring at various objects, or staring closely at his fingers for the duration of the social interaction.

Ratings of social greetings with unfamiliar persons during the first two weeks of the education program were used to establish a baseline. The student was observed in various public settings that afforded opportunities to offer spontaneous social greetings. During the first two weeks, the student was provided with prompting. A prompt was operationally defined as a reminder provided by the rater, (e.g., a whispered verbal command to say "hello"). During the second two weeks, the prompting by the rater was faded gradually but the student was given positive reinforcement immediately after a spontaneous greeting was offered (i.e., being told "good job", being given a piece of candy, or being given a drink). The student was expected to provide a spontaneous greeting without the assistance of a prompt or reinforcement during the remaining six weeks of the education program. Prompting and/or positive reinforcement were still provided, however, if the student did not engage in a social greeting when the opportunity to do so was present. In these instances, a prompt was provided and the appropriate rating of "1" was assigned to behaviors that were completed when prompted. .

Data Analysis

The behavior checklists were completed daily (Monday through Friday) by four separate raters for ten consecutive weeks. The four raters observed the student in public places daily, at various times of the day. After ratings were assigned for ten weeks, the scores were transferred to an excel spreadsheet. The scores were divided into separate columns according to the individual raters. The scores were initially recorded by day over the ten week period in order to allow for examination of progress within the individual weeks for each of the six behaviors that were rated. Weekly scores were generated for each behavior by summing the daily scores for each week. The weekly scores ranged from 0 to 10 for each behavior.

For the purpose of this study's data analysis, the weekly scores were converted into percentages from 0% to 100% to represent the frequency of occurrence of the target behaviors for any specific week. Weekly frequencies of occurrence of behaviors were plotted on bar graphs for the ten week training program period. Each bar graph included four bars for each week with each bar representing the weekly ratings of one of the four raters. In the case of behaviors 1, 4, and 5, one graph was completed for each behavior, with each graph representing the frequency of occurrence of behaviors that occurred spontaneously. For behaviors 2, 3, and 6, three separate bar graphs were used to represent the frequency of spontaneously occurring behaviors, behaviors that occurred only after prompting, and lack of spontaneous or prompted behaviors. The bars were also color coded to highlight differences found among the raters.

Chapter 4: Results

The data representing the results of a ten week educational program designed to teach an adolescent male diagnosed with autism to offer spontaneous social greetings were analyzed. During the program, the student was observed in public places where there was potential for interacting with people unfamiliar to the student. These unfamiliar people included various cashiers or clerks working in public establishments where the student was observed. A behavior checklist was created and used by raters to examine six behaviors likely to be part of an appropriate spontaneous social greeting. There were four raters assigned to rate the student's behavior and provide prompts and reinforcement as needed. Ratings occurred on a daily basis, Monday through Friday, for a ten week period while the educational program was being conducted. The weekly scores from each of the four raters for each of the six behaviors are depicted in the following graphs.

Figure 1 shows the frequency of occurrence of the behavior *Making Eye Contact*, based on the weekly ratings of the four raters. Behaviors scored as a '0' appear as blank spots on the bar graph and indicate that the student did not exhibit the behavior during the designated week. Scores for the ten week period ranged from 0% to 100% showing significant improvements after week 5.

Figure 1. Making Eye Contact

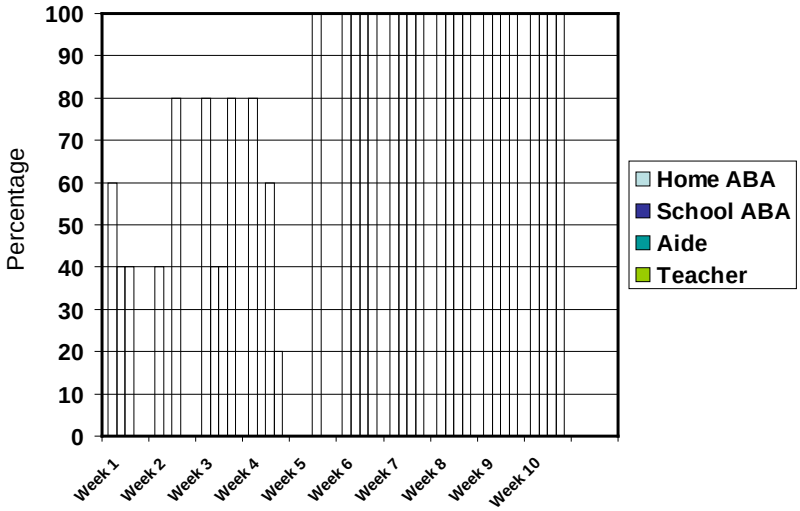


Figure 1: Making Eye Contact

The student was observed in various public places (i.e., McDonalds, CVS) where he had the opportunity to make appropriate eye contact with unfamiliar persons (i.e., clerks or cashiers). Eye contact was observed and rated, based on whether or not the student was able to look directly at the other person's eyes and sustain a mutual gaze for at least 2 seconds. Ratings reflected inconsistent performance of this behavior during the first five weeks of the program, with results ranging from 0% to 80%. The school ABA therapist did not observe the student make eye contact during weeks 2, 4, and 5. The teacher did not see the student make eye contact during weeks 1, 2, and 5. The home ABA therapist did not observe the student make eye contact during week 5. The aide saw the student make eye contact at least once every week. The scores became more consistent across the four raters after week five, with the student being observed performing

the behavior with greater frequency. During weeks 6 to 10, all four raters observed the student making eye contact with an unfamiliar person in at least 80% of all social encounters.

Figures 2A, 2B and 2C show the frequency of occurrence of the behavior *Acknowledging Others* without prompting (2A) or with prompting (2B), and frequency of the absence of the behavior even after prompting (2C), based on the weekly ratings of the four raters. The blank spaces on the bar graph in Figure 2A indicate that the behavior did not occur after prompting during that week. The blank spaces on the bar graph in Figure 2B indicate that the behavior did not occur without prompting during that week. The blank spaces in Figure 2C indicate that the behavior occurred either with prompting or spontaneously without prompting during that week.

Figure 2A: Acknowledging Others without Prompting

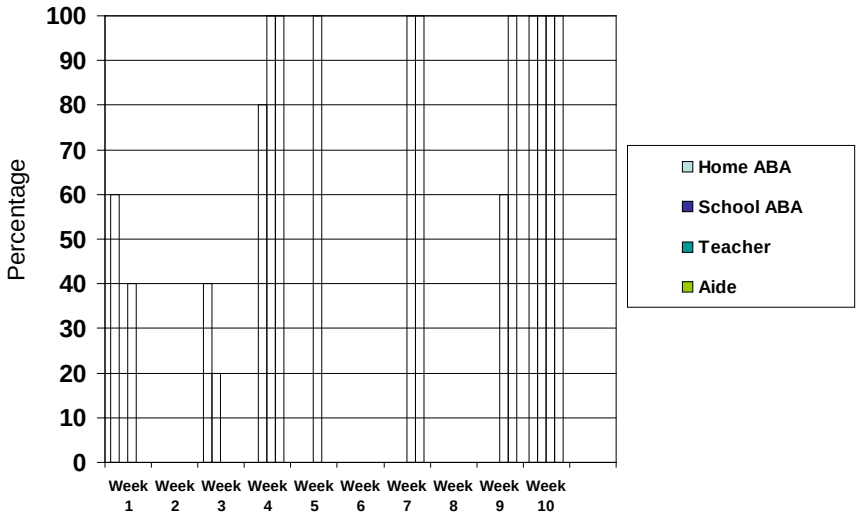


Figure 2B: Acknowledging Others with Prompting

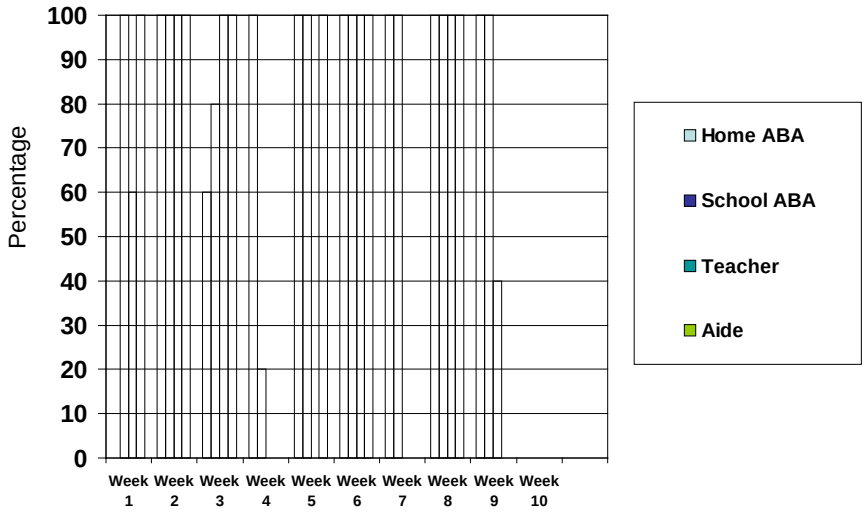
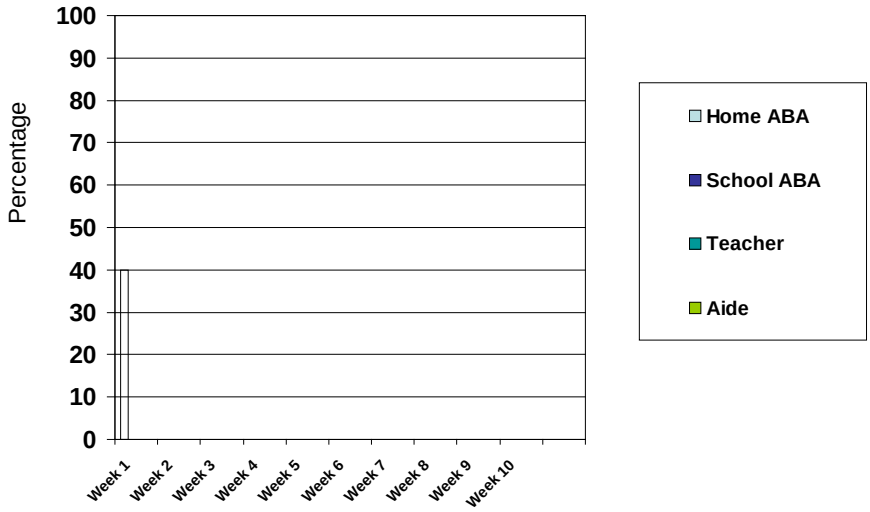


Figure 2C: No Behaviors Observed



The student was observed in situations that afforded opportunities to acknowledging the presence of an unfamiliar person by looking in the direction of the person at least once and demonstrating body position cues (i.e., the student's face and body are positioned in the direction of the unknown person, shoulders still and perpendicular to the floor demonstrating appropriate posture) that would be interpreted as a readiness to engage the other person in some form of social interaction. Figures 2A, 2B and 2C indicate that the target behavior was observed either after a prompt was provided or without a prompt during weeks two to nine. The home ABA therapist was the only rater who did not observe the behavior consistently during the first week (without prompting 60%, see Figure 2A, no behavior exhibited 40%, see Figure 2C). The school ABA therapist, the teacher and the teacher aide observed the behavior predominately with prompting provided during the first week (Figures 2A and 2B); the school ABA therapist and aide observed the behavior with prompting given 100% of the time; the teacher observed the behavior with prompting given, 60% of the time and without prompting given, 40% of the time. During weeks two, six, and eight, the behavior was observed 100% of the time with prompting by all four raters (Figure 2B). There were inconsistencies in the student's performance during weeks 3, 4, 5, 7, and 9. During week 3, the student was observed acknowledging others 100% of the time with prompting by the teacher and aide (Figure 2B). The home ABA therapist observed the behavior 60% of the time with prompting (Figure 2B) and 40% of the time without prompting (Figure 2A). The school ABA therapist observed the behavior with prompting 80% of the time (Figure 2B) and without prompting 20% of the time (Figure 2A). During week four, the teacher and aide observed the student acknowledging others without prompting 100% of the time (Figure 2A). However, the home ABA therapist observed the behavior 100% of the time with

prompting (Figure 2B) and the school ABA therapist observed the behavior 80% of the time without prompting (Figure 2A) and 20% of the time with prompting (Figure 2B). On week five, the two ABA therapists observed the behavior 100% of the time with prompting (Figure 2B). Conversely, the teacher observed the behavior 100% of the time without prompting (Figure 2A). During week seven, the teacher and aide observed the behavior 100% of the time without prompting (Figure 2A) and the ABA therapists observed the behavior 100% of the time with prompting (Figure 2B). During week nine, the two ABA therapists observed the behavior 100% of the time with prompting (Figure 2B), whereas the aide observed the behavior 100% of the time without prompting (Figure 2A). The teacher observed the behavior 40% of the time with prompting (Figure 2B) and 60% of the time without prompting (Figure 2A). Finally, on week ten, the four raters observed the student exhibiting the behavior 100% of the time without prompting (Figure 2A).

Figures 3A, 3B and 3C show the weekly ratings of the four raters of the frequency of occurrence of the behavior *Offering a Verbal Response* without prompting (3A), with prompting (3B), and absence of the behavior even after prompting (3C). The blank spaces on the bar graph in Figure 3A indicate that the behavior did not occur after prompting during that week. The blank spaces on the bar graph in Figure 3B indicate that the behavior did not occur without prompting during that week. The blank spaces in Figure 3C indicate that the behavior occurred either with prompting or spontaneously without prompting during that week.

Figure 3A: Offering a Verbal Response Without Prompting

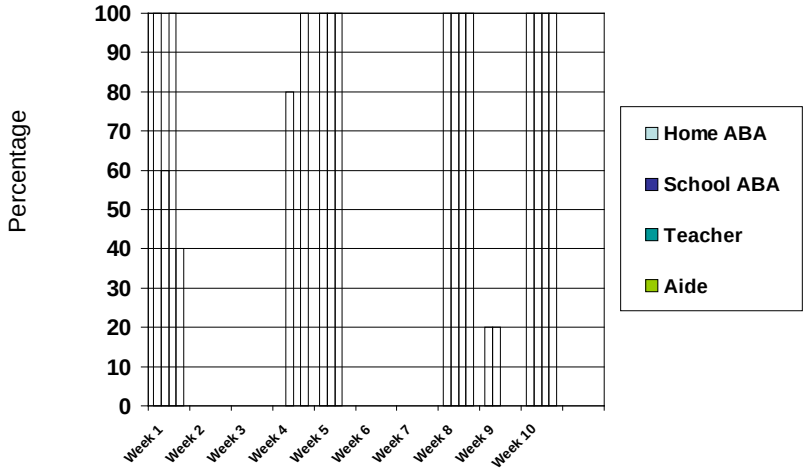


Figure 3B: Offering a Verbal Response with Prompting

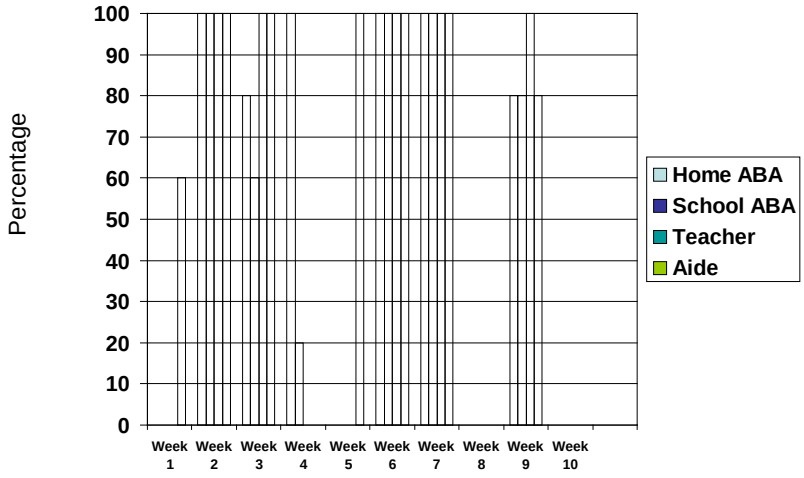
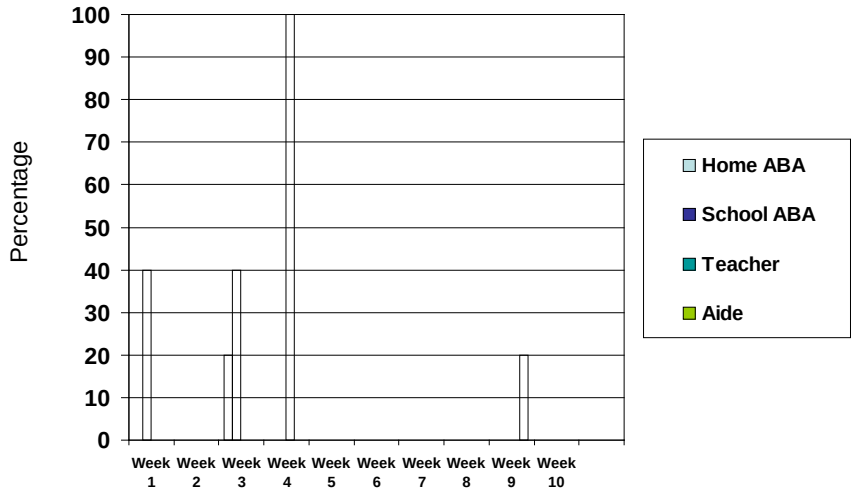


Figure 3C: No Behaviors Observed



The student was observed in situations that afforded the opportunity to offer a socially appropriate verbal greeting. A verbal greeting was defined as saying, “Hello”, or a verbal response consistent with another person’s greeting, such as saying, “I’m fine thanks”, if asked “How are you?” Ratings reflected behaviors observed with/without a prompt provided, and behaviors not exhibited at all during the week. The ratings demonstrated inconsistent performance of this behavior over the ten week period. During week one, the home ABA therapist and the teacher observed the behavior 100% of the time, without prompting (Figure 3A). The school ABA therapist observed the behavior without prompting 60% of the time and observed no behaviors 40% of the time (Figure 3C). The aide observed the behavior with prompting 60% of the time (Figure 3B) and without prompting 40% of the time (Figure 3A). All four raters observed the behavior 100% of the time with prompting during weeks two, six, and

seven (Figure 3B). On week three, the teacher and aide observed the behavior 100% of the time with prompting (Figure 3B). The home ABA therapist observed the behavior with prompting 80% of the time (Figure 3B) and 20% of the time the behavior was not exhibited (Figure 3C). The school ABA therapist observed the behavior 60% of the time with prompting (Figure 3B) and 40% of the time the behavior was not exhibited (Figure 3C). During week four, the home ABA therapist observed the behavior, with prompting 100% of the time (Figure 3B). The school ABA therapist observed the behavior with prompting 20% of the time (Figure 3B) and 80% of the time without prompting (Figure 3A). The teacher observed no behavior 100% of the time (Figure 3C) but the aide observed the behavior 100% of the time without prompting (Figure 3A). During week five, both ABA therapists and the teacher observed the behavior 100% of the time without prompting (Figure 3A) but the aide observed the behavior 100% of the time with prompting (Figure 3B). During week eight, all four raters observed the behavior 100% of the time without prompting (Figure 3A). During week nine, the ABA therapists observed the behavior 80% of the time with prompting (Figure 3B) and 20% of the time without prompting (Figure 3A). The teacher observed the behavior 100% of the time with prompting (Figure 3B). The aide observed the behavior 80% of the time with prompting (Figure 3B) but did not observe the behavior 20% of the time (Figure 3C). During week ten, all four raters observed the behavior 100% of the time without prompting (Figure 3A).

Figure 4 shows the frequency of occurrence of the behavior *Offering a Nonverbal Response* based on the weekly ratings of the four raters.

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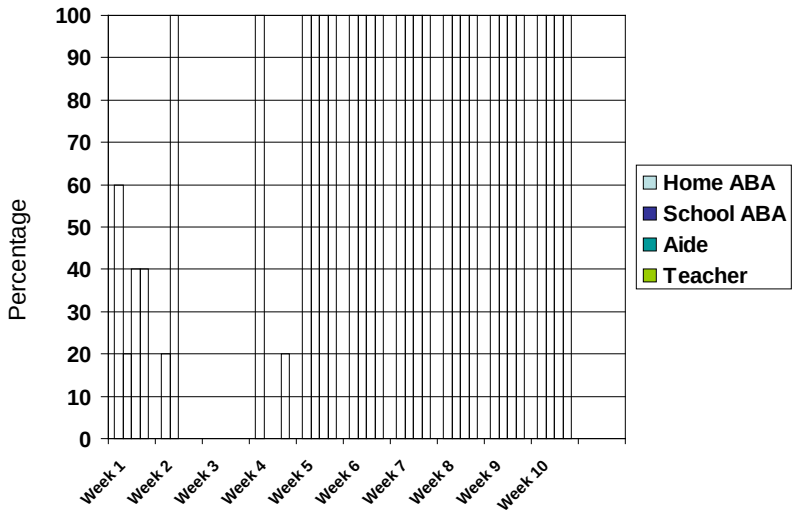
Figure 4. Offering a Nonverbal Response

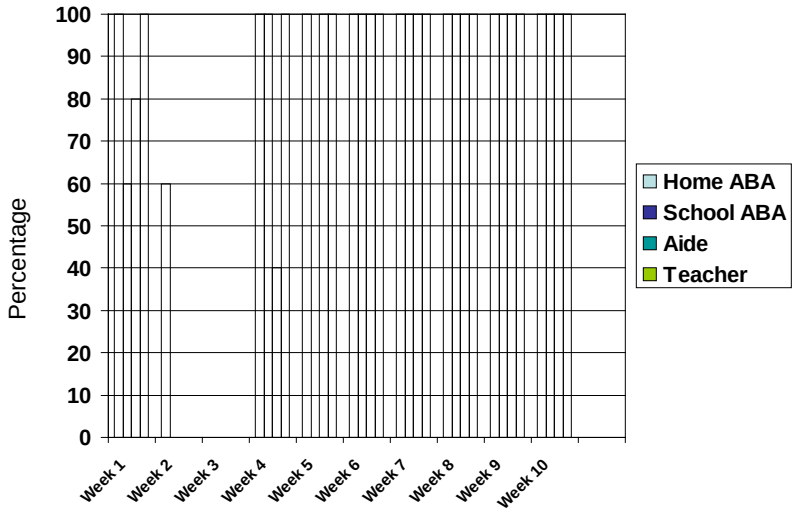


The student was observed making a nonverbal response consistent with the nonverbal greeting by another person, such as head nodding and smiling when the other person nodded or smiled at him. The student's behavior was inconsistent during the first four weeks. During week 1, the home ABA therapist observed the student offering a nonverbal response 60% of the time; the aide and the teacher observed the behavior 40% of the time and the school ABA therapist observed the behavior 20% of the time. During the second week, the home ABA therapist observed the behavior 20% of the time but the school ABA therapist observed the behavior 100% of the time. However, the aide and the teacher did not observe the behavior occurring during that week. During week three, none of the raters observed any occurrences of the target

behavior. During week four, the home ABA therapist observed the behavior 100% of the time and the school teacher observed the behavior 20% of the time. The school ABA therapist and aide did not observe the behavior occur. During weeks five through ten, the target behavior was observed 100% of the time by all four raters.

Figure 5 shows the frequency of occurrence of the behavior *Maintaining Appropriate Distance During Interaction* based on the weekly ratings of the four raters.

Figure 5. Maintaining Appropriate Distance During Interaction



The student was observed in public places where he had the opportunity to maintain a socially appropriate distance of approximately 2-3 feet between himself and an unfamiliar person while engaging in a social greeting, ordering a product, or asking a question. The home ABA therapist and teacher observed the student exhibiting the behavior 100% of the time during the first week. The school ABA therapist observed this behavior 60% of the time during the first

week. The aide observed the behavior 80% of the time. Frequency of occurrence of the target behavior declined during the second and third weeks of the program. During the second week, the student was observed maintaining an appropriate distance 60% of the time by the home ABA therapist and 0% of the time by the other three raters. The student was not observed exhibiting the behavior during the third week by any of the four raters. During week 4, the ABA therapists and the teacher observed the behavior 100% of the time but the aide observed the behavior only 40% of the time. During week 5, the home ABA therapist, the teacher and the aide observed the behavior 100% of the time. However, the school ABA therapist did not observe the behavior during week 5. During weeks six to ten, all four raters observed the student maintaining a socially appropriate distance during interactions 100% of the time.

Figures 6A, 6B and 6C show the weekly ratings of the four raters for the frequency of occurrence of the avoidance of engagement in self-stimulating behaviors (6A), the discontinuation of self-stimulating behaviors when prompted (6B), and continuation of self-stimulating behaviors even after prompts to discontinue (6C). The blank spaces on the bar graph in Figure 6A indicate that the student was observed engaging in self-stimulating behavior by a rater during that week. The blank spaces on the bar graph in Figure 6B indicate that self-stimulating behavior that was not discontinued after a prompt was observed by the rater during that week. The blank spaces in Figure 6C indicate that the behavior either did not occur or was discontinued after prompting during that week.

Figure 6A: Avoidance of Engaging in Self-Stimulating Behaviors

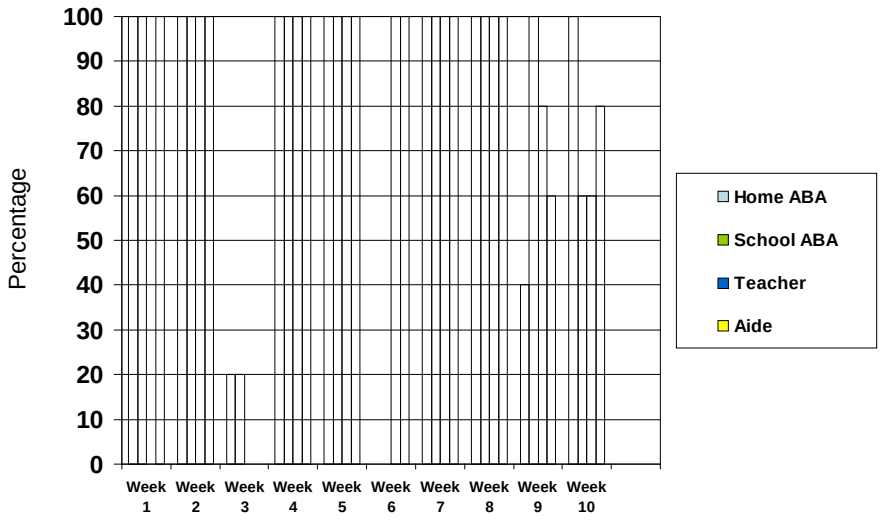


Figure 6B: Discontinuation of Self-Stimulating Behaviors

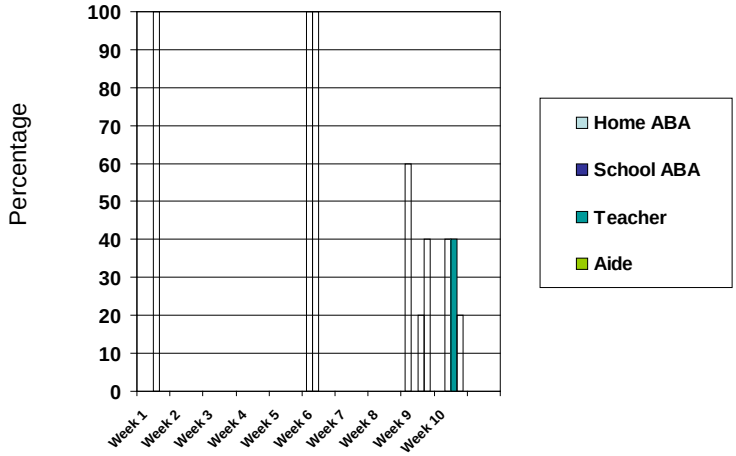
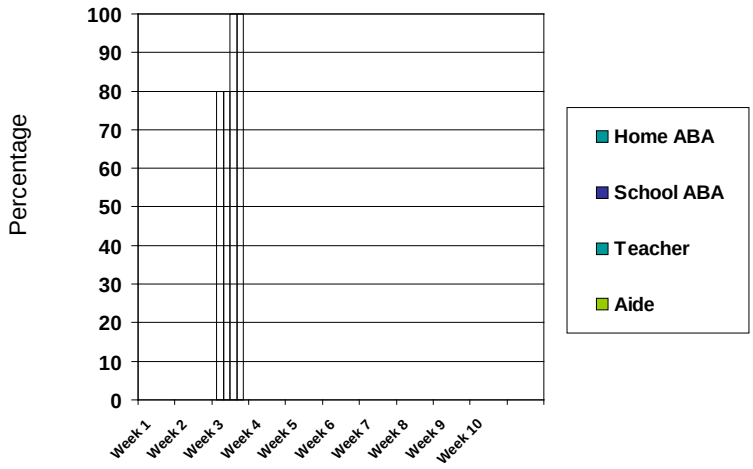


Figure 6C: Continuation of Self-Stimulating Behaviors



The student was observed for socially inappropriate self-stimulating behaviors, such as waving his hands in the air, staring at various objects, or staring closely at his fingers for the duration of social interactions with unfamiliar persons in public places. During weeks two, four, five, seven, and eight, all four raters observed the student resist engaging in self-stimulating behaviors 100% of the week without prompting (Figure 6A). However, there were inconsistencies during the other five weeks. On week three, the teacher and aide observed the student engage in self-stimulating behaviors in all social interactions with unfamiliar persons (Figure 6C). The ABA therapists observed this behavior 80% of the time (Figure 6C). However, both observed the student resist this behavior 20% of the time with prompting (Figure 6B). On week six, the teacher and aide observed the appropriate behavior without prompting 100% of the time (Figure 6A). On the contrary, the ABA therapists observed the behavior without

prompting 100% of the time (Figure 6A). On the ninth week, the home ABA therapist observed the appropriate behavior 40% of the time with prompting (Figure 6B) and 60% of the time without prompting (Figure 6A). The school ABA therapist observed the appropriate behavior 100% of the time without prompting (Figure 6A). The teacher observed the appropriate behavior 80% of the time without prompting (Figure 6A) and 20% of the time with prompting (Figure 6B). The aide observed the appropriate behavior 60% of the time without prompting and 40% of the time with prompting. By the tenth week, the home ABA therapist observed the appropriate behavior 100% of the time without prompting (Figure 6A). The school ABA therapist and teacher observed the appropriate behavior 40% of the time without prompting (Figure 6A) and 40% of the time with prompting (Figure 6B). The aide observed the appropriate behavior without prompting 80% of the time (Figure 6A) and with prompting 20% of the time (Figure 6B).

Chapter 5: Discussion

This study analyzed the data collected from raters who observed a student diagnosed with autism in situations that provided the student with the opportunity to demonstrate socially appropriate greetings while undergoing a ten week ABA training program designed to improve the student's ability to engage in such socially appropriate behaviors.

Given the study results, interpretation of the findings has noted specific factors that may have had an impact on this student's ability to engage in socially appropriate behaviors. These include possible idiosyncrasies in the behaviors of this autistic student; possible subjectivity or bias among raters; the various times of the day and the specific days of the week that the student was observed; variations in environmental settings where behavior observations were conducted; and variations in how prompting was interpreted or provided. Overall results are viewed in light of the factors noted above. Similar to findings by Simpson (2001), ABA was effective in increasing spontaneous greetings in this student with autism and has improved his socialization by targeting specific behaviors that impacted upon his ability to interact with others. During the ten week program, the student demonstrated improvement in his ability to make a spontaneous social greeting and exhibited appropriate behaviors while interacting with others (i.e., making eye contact, demonstrating appropriate proximity between him and another person). Of greatest importance, the student learned and implemented the skills needed to interact successfully with others across various settings (home and school) which denote generalization of skills (Prior, 2003)

Children with autism typically exhibit impairments in social functioning which are evidenced by failing to form typical social relatedness (Dryden-Edwards & Shiel, 2007). There are significant inconsistencies expected in how individuals with autism learn, and regression can typically occur if the program implemented is not structured and conducted consistently. Autistic individuals are believed to have difficulty understanding the perspectives of other persons and are lacking what is commonly known as having a "theory of mind" (Baron-Cohen, 1997). Because of deficits in theory of mind, individuals with autism experience difficulty in understanding many social conventions that are not explicitly stated and that often change with the social context (Frith, 1989). In this study, the student was taught appropriate ways to provide a spontaneous social greeting and behave appropriately in the context of the interaction. However, due to deficits in theory of mind, this student initially experienced difficulties in exhibiting appropriate behavior (i.e., engaging in self-stimulating behaviors). This student's performance appeared to fluctuate in the beginning weeks as acquisition of learning was taking place, but his performance became more stable as the study progressed, and he became more familiar and comfortable with the expectations.

Given that ABA as an intervention is responsible for analysis of behaviors in order to achieve behavioral change (Faherty, 2000), one may question the consistency of implementation and the extent of time needed to produce beneficial social behavioral change. In this regard, there was a positive relationship between the consistency of the ABA program, its daily implementation for ten weeks, and the desired outcomes. This is in line with ABA programs that need to be taught and applied daily and structured consistently in order to achieve positive results (Simpson, 2001). Of note is the degree of behavioral change over the course of the study;

whereas, this student was inconsistent in his efforts to interact appropriately with others during the first few weeks of the study, his behavior improved during the second half of the study, revealing significant improvements by the last week. Part of this inconsistency can be attributed to the learning curve, but it could also be attributed to inconsistency in the ways in which his behaviors were being rated. The individual ratings appeared to be inconsistent during the first few weeks of the study as well, but they gradually became more consistent during the second half of the study. The ratings demonstrated differences in the offering of prompts for the occurrence of desired behavior between raters, with results revealing that prompting was faded completely by the tenth week of the educational program. In terms of self-stimulating behaviors, the findings were inconsistent, but there was an improvement for the demonstration of appropriate behaviors daily by the tenth week, with continued prompting.

According to Frith (1989), children interpret the facial expressions of others and use this knowledge to alter or adapt their behavior. This understanding that other people may think and feel differently from oneself is one example of a child's use of "theory of mind" knowledge (Baron-Cohen (1997). In this case study, understanding the facial expressions and social cues of others was imperative. If the unknown person appeared not to be interested, then the student would be less inclined to socialize. However, if the unknown person appeared to be interested (i.e., smiling or waving) then the student would be more inclined to approach the person and interact. An absence of, or slowed acquisition and use of this type of theory of mind knowledge is thought to underlie some of the social impairments and deficits in empathy often seen in individuals with autism. However, these individuals become more adaptable to surroundings as they become more familiar with them. This student's theory of mind deficit was observed in his

difficulty with interpreting the facial expressions of others. The student's comfort level and inclination to provide a response was impacted by his understanding of the person's social behavior. The student was initially more reserved and had difficulty interpreting the facial expressions of others. The student would initially engage in self-stimulating behaviors (i.e., flapping hands) and he did not seem prepared or inclined to provide any greeting or nonverbal gesture. However, as the educational program progressed, the student gradually became comfortable with and more consistent in greeting various clerks and he was seemingly more confident with what was expected of him. Relative to targeting specific behavior domains with ABA, the same level of response may not always occur in different social contexts. In this study, the student had initial difficulty with reading other people's nonverbal behaviors, which can complicate two-way social communication (Wing, 1991). Because nonverbal communication problems are commonly exhibited in individuals with autism, it is not surprising that this student had difficulty with understanding expressive gestures such as a raised eyebrow (Frith, 2989). As the study progressed, this student improved his ability to engage in and read nonverbal communication, and this area appears to be the most clearly defined area of behavior change utilizing ABA.

It is well known that engaging in self-stimulating behaviors is prominent in autistic children (Barbara, 2007; Wing, 1991). Despite the growth in reading of nonverbal behaviors, this student found the least amount of success in eliminating self-stimulatory behaviors and continued to rely on prompting to disengage these self-stimulating behaviors.

Continuous prompting is beneficial when initially learning a new behavior and the reduction of prompts is often associated with increased independent performance of skills and

the generalization of newly learned skills to different environments (Lewis, 2010). Children with autism frequently cannot apply what they have learned in one situation and utilize it in a similar, though not identical, setting. This has important implications in a therapeutic context. Parent-professional involvement and community-based instruction can increase the generalization of social learning in students with autism. The generalization of the ability to self-initiate can be improved by providing treatment in the classroom and home, such as providing intervention within everyday classroom routines with typical peers, or within everyday routines at home whereby parents are taught to incorporate therapeutic techniques. This was certainly apparent with the student in this study. This student typically kept to himself and was seemingly introverted. However, he did not exhibit this behavior while this study was conducted. He was able to exhibit the behavior taught across multiple settings more frequently as the study progressed. Lewis (2010) believes that generalization in various environments is the "acid test" for mastered social skills. The results of this study showed that intense programming completed at home and in school for this student increased the generalization and self-initiation of social skills across the multiple settings in which the student was observed. The student visited various settings and was consistently expected to approach others and make a spontaneous greeting. He became increasingly more confident, smiling and showing interest in approaching unfamiliar persons rather than engaging in avoidance behaviors or withdrawing into himself.

Furthermore, research has shown that children with autism are involved more often in solitary activities, forming few or no attachments with others and not responding to others; however, very often children with autism are interested in engaging others in social interactions but their odd and eccentric behaviors often negatively impact these social interactions (Baron-

Cohen, 1997). When engaging in social interactions, individuals with autism have difficulties with engaging in nonverbal social behaviors such as establishing eye contact, using proper voice tone, and maintaining appropriate social distance from others. In addition, autistic individuals display abnormalities in how they interact with others because they do not take into account the other person's state of mind. These individuals have a tendency to repeat what others say, make embarrassing remarks, or make remarks that appear to be extremely formal and inappropriate given a close affective relationship to the listener (Frith, 1989).. These behaviors by the student were observed when the educational program began. This student had a tendency to repeat what others said and did not make appropriate eye contact or effectively use social gestures. By the tenth week, use of the ABA program increased this student's ability to make an appropriate social greeting and demonstrate the necessary nonverbal behaviors involved when interacting (i.e., making eye contact, using gestures and being in proximity to the others).

The student was able to transition from prompting to self-initiation of these behaviors over the ten week period. The most significant improvements were exhibited in socially appropriate nonverbal behaviors such as head nodding and making eye contact, and with his ability to offer a verbal response. According to theory of mind, individuals with autism have difficulty interacting with others and listening and making appropriate interpretations of the other person's intent (Lind & Bowler, 2010). It appeared that the student no longer relied on the prompting from others to make appropriate eye contact, offer a head nod, maintain appropriate distance, and offer a greeting. This became a 'learned behavior' that the student could now initiate. The educational program was successful in increasing the student's ability to make social greetings through ABA and the skills were reinforced and applied in social situations

daily.

A factor that may have caused some of the inconsistencies in performance reflected in the results is the subjectivity among the raters' judgments about the frequency of occurrence of specific target behaviors (i.e., low inter-rater reliability). The raters scored the student's behavior based on their observations of the student in various settings. There were inconsistencies in ratings among all four raters for all six target behaviors. Each day the student was being observed in various settings at two different times. The two ABA therapists typically recorded data around the same time in the afternoon and the teacher and teacher aide typically recorded data around the same time in the morning. However, there were instances in which one rater was observing the student exhibit behavior but the other rater was not observing him because he/she was tending to something else. This may explain the reasons why the teacher and teacher aide's ratings were different in many instances and why the ABA therapist's ratings were different in some instances. In addition, the raters had their own interpretations of various aspects of the student's behavior that also could have led to differences in ratings. For example, one rater may have observed the student and interpreted his behaviors as representative of making a head nod (nonverbal greeting), but the other rater observed the same behavior but did not interpret it as a head nod. In future studies, more specific training should be provided to raters in attempts to increase the consistency of interpretation of observed behaviors among raters.

Limitations of the Study

This study examined the effects of Applied Behavior Analysis, using discrete trials to improve the social interaction of one adolescent male with autism. Results showed various degrees of improvements in specific targeted behavior components of social interaction being observed by various raters. Some of the targeted behaviors were exhibited consistently by the end of the training period, whereas other targeted behaviors were exhibited inconsistently. Observation of the outcomes was limited to a ten week period during which the training was being conducted, making it difficult to conclude with certainty that the behaviors would continue to be exhibited without prompting after conclusion of the training program..

Another limitation was that this was a single case study design exploring the effectiveness of a social skills program on an adolescent with autism. Although this student showed clear improvements in his social interactions, a study of a larger number of autistic children would be necessary to demonstrate generalizability of the results. A study involving a larger number of students would allow for examination variation in training effectiveness based on factors such as gender, IQ, age, and race.

Another limitation was the length of the program. The program was conducted over the course of only ten weeks. Some targeted behaviors were observed as having emerging sooner and having been performed with greater consistency sooner than others over the course of the ten weeks of training. Therefore, the study would need to be extended to determine if the less frequently exhibited behaviors eventually occurred with consistency.

A fifth limitation in this study was that it occurred only on Mondays through Fridays during the ten week period. On the weekends, the student was not observed eliciting a social

greeting and he was not encouraged to practice these behaviors. The student typically would regress over the weekend, and he would need to relearn the behavior at the beginning of the following week in order to return to the level of frequency that he exhibited in the desired and observed behavior by the end of the previous week. Therefore, if his parents or an educator required the student to exhibit the behavior on Saturday and Sunday, there may have been a lesser decline in results over time.

A sixth limitation that influenced the student's behavior was the change in settings over time. The student visited different settings over the ten week period so that he would be continuously introduced to unfamiliar people. There were some settings that he found very interesting and others that were of little or no interest to him. Although it was not studied systematically, it was observed by the raters that the student required more prompting in the settings that were not interesting to him. For example, it was observed that the student was more enthusiastic when he went to Wendy's and McDonalds and much less enthusiastic in settings such as CVS.

Last, the various times of the day during which the student was observed as well as the days on which he was observed may have influenced the results. The student was observed daily for ten weeks during two separate time periods. The first time period was between 11:00 a.m. and 1:00 p.m. during the school day. The teacher and teacher aide observed the student during this time period. The two ABA therapists observed the student after 4:00 p.m. each day. The results of observations during the school day did contrast at various times with observations made by the ABA therapists after school, because the student's performance usually was judged as being more effective later in the day. This pattern again may reflect variation in the student's

enthusiasm and/or alertness at different times of the day, or it may have reflected a stronger desire to perform consistently with expectations when working with the therapists after school rather than when working with the teacher and aide during the school day.

Implications for the Field

This study examined the use of a behavior technique to promote a spontaneous social greeting in an adolescent with autism. This was a ten week program and six criteria were explored in determining the effectiveness of Applied Behavior Analysis using Discrete Trials.

This program demonstrated Applied Behavior Analysis using Discrete Trials to be an effective program in teaching an autistic child to provide spontaneous social greetings, reflecting generally consistent performance of the target behaviors by the tenth week of training. The length of the study is important because it permitted the observation of positive behaviors near the end of the program despite variations and periods of regression during the course of training.

Self-stimulatory behaviors are commonly observed in autistic children. The data collected for this particular autistic adolescent indicated that this adolescent demonstrated a great deal of difficulty suppressing self-stimulatory behavior, but with additional prompting he was able to reduce the frequency of these behaviors by the tenth week. Although it was unclear whether the improvement was a result of learned behavior or was an increase in the development of some aspect of theory of mind, it is recommended that targeting the self-stimulation be prioritized in future discrete trials applications with students who demonstrate these behaviors.

Future Research

This study was designed to evaluate the effectiveness of a social skills training program provided to an adolescent with autism. This study observed the adolescent's ability to demonstrate behaviors associated with spontaneous social greetings. Future research could examine the effectiveness of this program with a larger number of adolescents diagnosed with Autism, and could examine the effectiveness of this type of social training program with individuals diagnosed with autism of various ages and functional levels. Results of such studies could provide new insights on how to refine curriculum and current social skills programs being used with children with autism. Second, future studies could examine the long-term effects of similar training programs by monitoring students' spontaneous greeting behaviors for weeks or for months after the initial training program time period.

Conclusion

This study examined the effectiveness of an educational program designed to help a student engage in spontaneous social greetings in various social settings. The student was taught the necessary skills in school and at home using Applied Behavior Analysis using Discrete Trials. He was taught how to apply the skills across multiple settings with unfamiliar people. The study documented the degree to which the skills being taught were applied in multiple settings over a ten week period while training was ongoing. Results suggest that Applied Behavior Analysis using Discrete Trials can be useful for increasing an autistic adolescent's spontaneous social greetings when taught by individuals with proper training.

The data examined in this study indicated that the student was able to demonstrated spontaneous social greetings consistently with others unfamiliar to him. He learned the skills and was able to show significant improvements by the tenth week of the study. The student demonstrated the ability to make appropriate social greetings after ten weeks of training. The student was initially provided with prompting in order to encourage him to engage successfully with others. However, he later exhibited this behavior without needing specific cues or prompts from any of the raters. The behavior checklist developed for this study was found to be an effective tool for monitoring adequacy of spontaneous social greeting behaviors and may be useful in future studies assessing the effectiveness of discrete trials training of spontaneous social greetings.

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Appendix 1.
Behavior Checklist
Name:
Setting:
Time of Day:
Date:

Behavior	Circle the description that most accurately characterizes Julian's behavior during his social encounters today		
When approached by an unknown person (store clerk, salesman, worker), Julian	2 made eye contact.		0 did not made eye contact.
When approached by an unknown person, Julian	2 acknowledged the person without prompting.	1 acknowledged the person with prompting.	0 did not occur with or without prompting
When approached by an unknown person, with or without prompting Julian	2 offered an adequate verbal response such as "Hello."	1 offered an inadequate verbal response such as repeating what the other person said.	0 offered no verbal response.
When offered a nonverbal greeting by an unknown person, such as a wave or a smile, Julian	2 responded reciprocally with a wave or a smile.		0 did not respond.
When approached by an unknown person, Julian	2 maintained an appropriate distance between him and the person.		0 did not maintain an appropriate distance between him and the person.
During his interaction, Julian	2 did not engage in self-stimulating behaviors.	1 engaged in self-stimulating behaviors but discontinued when prompted to do so.	0 engaged in self-stimulating behaviors but did not discontinue when prompted to do so.

*Julian will be taking daily trips to various settings (McDonalds, CVS, etc.) and expected to make an appropriate greeting with an un known person.

**Please note how the following terms should be interpreted:
Unknown person- defined as a salesman, clerk or worker.

Julian will be taking daily trips to various settings (McDonalds, CVS, etc.) and will be expected to offer a socially appropriate greeting when approaching or when approached by a service worker in one of these locations.

Socially appropriate greetings are broken down into the following distinct stages:

1. Acknowledging the presence of the other person by looking in the direction of the other person at least once and demonstrating body position cues (i.e., Julian's face and body are positioned in the direction of the unknown person, shoulders still and perpendicular to the floor demonstrating appropriate posture) that would be interpreted as a readiness to engage the other person in some form of social interaction.
2. Making eye contact by looking directly at the other person's eyes and sustaining a mutual gaze for at least 2 seconds.
3. Offering a socially appropriate greeting such as:
    a. A verbal greeting such as saying "Hello" or a verbal response consistent with the other person's greeting, such as saying "I'm fine thanks" if asked "How are you?"
    b. A nonverbal response consistent with the nonverbal greeting of another person, such as head nodding and smiling when the other person nods and smiles at Julian.
4. Maintaining a socially appropriate distance of approximately 2-3 feet between himself and the other person while engaging in a social greeting, ordering a product, or asking a question.
5. Avoiding engaging in socially inappropriate self-stimulating behaviors, such as waving his hands in the air, staring at various objects, or staring closely at his fingers for the duration of the social interaction.

When an adequate amount of time has elapsed (5-10 seconds) during which Julian could have engaged in the socially appropriate behaviors listed above but did not do so, a prompt should be offered to cue Julian to initiate the socially appropriate series of behavior listed above.

A prompt is defined as one of the four raters (teacher, teacher's aide, two Applied Behavior Analysis therapists) providing Julian reminders and/or commands to elicit the desired socially appropriate behavior, for example, telling Julian to say "hello" to a service worker after the service worker said hello and Julian did not respond within 5-10 seconds.