

Abstract

Title of Dissertation: TREATMENT EFFECTIVENESS IN PRESCHOOL
AUTISM—A LOOK AT AFFECTIVE VARIABLES

Elizabeth A. Tsakiris, Doctor of Philosophy, 2009

Dissertation directed by: Professor William Strein
Department of Counseling and Personnel Services

Autism now occurs in 1 out of 150 births in the United States (Centers for Disease Control, 2008). Increasing numbers and complexity of the disorder make the need for identifying effective interventions critical.

DSM-IVTR identifies core characteristics of autism as significant deficits in communication, social interaction, and symbolic play. Neither intellectual ability nor academic achievement, two variables frequently used for measuring intervention effectiveness, are included as diagnostic criteria. Yet IQ scores are often used as entry criteria for treatment studies (Tsakiris, 2000). Therefore, intervention effectiveness has utilized variables other than the primary deficits and cannot be applied to the wider range (and truer representation) of children with autism..

From 1980 to 1999, Applied Behavior Analysis (Lovaas, 1987) and the Developmental-Individual Differences Relationship model (Greenspan & Wieder, 1998) were associated with improvement for children with autism; they remain the foundation for most current interventions. While researchers have examined gains in language and academic skills for these models, few empirical studies have examined improvement in the core deficits for autism.

This study examined the core affect variables for 28 children with autism who had undergone a minimum of two years of intensive intervention. This study used a retrospective descriptive design to examine treatment effectiveness in development of social interaction, play, and communication competencies. Assessment instruments measured these skills in young children, incorporating both quantitative behavioral data and qualitative psychodynamic interpretation.

Results were analyzed to determine relationships between social interaction, communication, and play with the intervention. Parent interviews and record reviews were used to examine child characteristics that might differentiate the presence or lack of relationship to the selected therapies, including age at symptom onset and treatment initiation, self-stimulation levels, echolalia, motor planning and language skills, and biomedical factors.

No differences were seen between treatment programs on all outcome measures. The individual characteristics of the children played the more significant role in determining social interaction and communication improvements regardless of the child's intellectual functioning level. The results have important implications for determining which treatments may have better potential for addressing the core deficits of autism and identifying skill trajectories that warrant more attention.

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A LOOK AT AFFECTIVE VARIABLES

by

Elizabeth A. Tsakiris

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Advisory Committee

Professor William Strein: Chair
Professor George Macready
Professor Paul Power
Professor Hedwig Teglas
Dr. Marcia Smith

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Preface

Less than a year after its inception, this dissertation was transformed from a research project into a deeply personal journey, when my son Elias was diagnosed with autism. As a result, the work has spanned a decade of not only professional but also personal commitment to

Ravi	Lukas
Kevin	Collin
Cotton	Alexander
Jacob	Devon
Reid	Paulina
Tommy	Christian
Conrad	Connor
Adam	Steven
Jake	Shaheem
Jeffrey	John-Paul
Alex	Mary
David	Paul
Max	Christen
Matthew	Eve

and their families, who opened their homes and my eyes to seeing the heart of autism.

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Chapter I

Introduction

The topic of autism is a topic of contradictions. In 1987 it was noted to be the most studied of all childhood disorders (Rutter & Schopler, 1987), and still the least understood. More treatment interventions have been devised for autism than any other behavioral disturbance (with the possible exception of schizophrenia), and yet the 1992 *Handbook of Psychotherapy** claimed that most existing treatments at that time did not improve the overall functioning of individuals with autism to the point that they stop being autistic. In contrast, little over 20 years later, several current researchers and treatment providers claimed “full recovery” or close to such results for some of their autistic clients when treatment is intensive (more than 20 hours a week) and at or before the child reaches the age of 3 (Lovaas, 1987; Strain and Hoyson, 1988; Strain, Hoyson, & Jamieson, 1985).

Of all the diagnostic categories in the *Diagnostic Statistical Manual of Mental Disorders, Fourth Edition*, autism is associated with the most severe impairment in functioning, yet an autistic woman wrote her autobiography in 1993 that made the *New York Times* bestseller list (Williams, 1993)! Indeed, the spectrum of behaviors currently necessary for diagnosis is not limited by intelligence levels, and thus can include the severely mentally retarded as well as college graduate adults (DSM-IV TR, 2000). The current definition emphasizes not cognitive, but qualitative and quantitative impairment in social interaction and communication as the cardinal features of autism, as well as restricted and stereotypic forms of behavior and interest.

Other contradictions occur regarding autism’s prevalence. While the incidence rate

of autism has been historically considered to be low (one out of every 2,500 children), later international studies confirmed a much higher rate, ranging from 11 to 21 per 10,000 (Gillberg, 1990; Wing, 1989), even before the definition was officially broadened in the DSM- IV- TR in 2000. Even before the broadening of the DSM-IV definition, many clinicians began reporting an increase in the youngsters meeting the criteria for diagnosis, at both the mild and severe ends of the spectrum (Greenspan, 1992; Prizant, 1995). Peter Jensen, M.D., former Chief of Child and Adolescent Disorders Research Branch at the National Institute of Mental Health, claimed in 1996 that autism actually was occurring at a much higher rate than childhood cancer, although research funding to study autism was not even close to being comparable to that for the latter (Jensen, 1996). Research in 2004 (Autism Research Institute, 2004) estimated 40 in every 10,000 youngsters—that is, one out of every 250 children born are diagnosed with the disorder. The Center for Disease Control currently states the prevalence rate of 1 in 150.

Research over the last decade has finally brought some pieces that fit together into the jigsaw of autism, and dramatically altered the perspective of the public and professional world. In the areas of neurology and physiology, clear evidence is now available that autism is not a functional psychiatric disorder caused by maladaptive parenting, but instead, is clearly related to neurological and other associated organic and physiological abnormalities (Couchesne, 1983, 1994; Gillberg, 1990; Minshew, Goldstein, & Siegel, 1997; Rapin & Katzman, 1998; Schopler & Mesibov, 1987).

Furthermore, intervention programs that target these physiological bases for autism have at times met with positive changes in behaviors for many youngsters with diagnoses

on the autism spectrum. The advent of these neurological and physiological findings as possible contributory factors to the behaviors of autism also influenced the outcomes, as well as coordination/delivery models of treatment and traditional educational/therapeutic intervention programs. These have included Tomatis Auditory Training (Tomatis, 1990), neuro-feedback monitored with SPECT scan technology, high potency vitamin injections, gastro-intestinal disturbances, statins for yeast overgrowth, food allergy elimination diets, and even high-risk chelation protocols (*Defeat Autism Now*, 2004). Psychotropic medication as well as bio-medical treatments to address clinically abnormal blood tests for some children with autism have also resulted in improvement to varying degrees with some behaviors associated with autism for some children. The sometimes dramatic changes seen with these interventions- even if not for the total population of children with autism- lend support for the physiological vs. psychiatric nature of autism at its core level. The costs of many of these programs, however, are prohibitive for many families, not often covered by medical insurance, and of course, not necessarily a component of special education services in the public school system. Even when progress is made using these treatments, most youngsters continue to engage in and/or require specific intervention programs that are the traditional purview of education and psychology. For many families, such programs delivered by the public education system are the only ones their resources allow them to access. Such models focus on the characteristics of inappropriate behavior, communication/language development, traditional academic and functional life skills, and more recently play and social skills.

In the areas of language, the hallmark characteristic of echolalia (parroting back of

verbalization regardless of context or appropriateness) in verbal children with autism was previously viewed as meaningless and simply aberrant behavior to be ignored or modified. Research by Prizant and Wetherby (1983, 1990), with 1,009 videotapes of such echolalic language powerfully demonstrated that these odd verbal vocalizations had several clear communicative intents and meanings. By 1998, Prizant's theories were formalized for intervention purposes into looking at the Functions of Communication vs. just the dichotomy between verbal and nonverbal expression, and echolalic and perseverative language. Prizant's work was groundbreaking. *The language of autism, while not equivalent to typical/normal language, was nevertheless functional and purposeful.* Viewing it as having meaning in and of itself meant overhauling many standard special education treatment programs for autism. Namely, *the language "problem" in autism could no longer be viewed as a lack of language, but the lack of a mutually common communication system with the nonautistic world.*

Other odd autistic behaviors such as hand-flapping, head-banging, rocking, etc. were found to also have communicative intentions (Durand, 1990,1992; Guess & Carr, 1991; O'Neill, Horner, Albin, Storey, & Sprague, 1990; Wetherby & Prutting,1984) or else be clearly related to abnormalities in sensory processing and functioning, as well as vestibular disorders (Grandin, 1995; Guess & Carr, 1991; Kohen-Raz, Volmar, & Cohen, 1992; Wieder, 1992; Zero to Three Task Force, 1995). Although not empirical in nature, several books written by high functioning autistic adults (Grandin, 1986, 1995; Miedzianik, 1993; Williams, 1993, 1994), confirmed these hypotheses in their qualitative descriptions of their own sensory experiences in these areas.

The concept of autistic youngsters as being innately socially withdrawn was first challenged by Koegel, Dyer, & Bell in 1987 when they demonstrated that repeated failure in social situations for autistic youngsters (because of the nature of the autism handicap) served to increase social avoidance behaviors for the youngsters in their study, and in turn ended demanding social situations (which occurs naturally when a normal adult interacts and is frustrated with an autistic child), thus causing a vicious cycle of social avoidance. Their research demonstrated that an autistic child could indeed be motivated to interact more using a variety of shared-control and child-choice activities, and that the perceived withdrawal of autism may be more an artifact of the repeated frustrations he experiences from early on in life.

Prior to 1987, no intervention had ever claimed “curing” autism. Indeed, the simple finding that any treatment caused any change was usually the easy validation process for most interventions, and thus always guaranteed them to be superior to no intervention at all (Smith, 1993). More extensive and empirically based research looking at long-term outcomes for youngsters in a highly structured special education program versus those not enrolled in the program did show dramatic differences in rates of institutionalization (Schopler, 1987), but never even attempted to infer that their most successful youngsters had “recovered.”

In 1987 Lovaas challenged this idea when claims of “full recovery” were made using an intensive 40 hour a week behavioral treatment program for autistic youngsters at the age of three or younger (Lovaas, 1987). This treatment approach largely ignored the physiological findings discussed above (as well as outright labeling them useless), and

focused on eliminating aberrant behaviors while simultaneously teaching new skills in a rote, discrete trial format. To make matters more confusing, individual case studies began to show up in the literature during this time using an opposite approach involving interactive relationships with strong evidence of at least close to recovery status (Kahlmonson & Seligman, 1992; Greenspan & Wieder, 1998).

Although Lovaas's research drew sharp criticism from other professionals (Greenspan, 1992; Schopler, Short, & Mesibov, 1989), others in the field were also excited and encouraged by his work (Foxy, 1993; Kazdin, 1993; Mesibov, 1993; Mundy, 1993). This was in addition to the expected strong public support of parents who had long been searching for an "answer" to help their autistic child

However, what actually defines "recovery" from autism, or even "progress" in various intervention approaches? Lovaas used IQ scores as one such measure, as well as successful placement in regular education classrooms, and teacher and parent rating scales. Several years later, blind psychological assessments were undertaken on his "recovered" youngsters, using additional IQ tests, the Vineland Adaptive Behavior scales, as well as the Personality Inventory for Children (McEachin, Smith, & Lovaas, 1993). These measures were certainly more far-reaching in regards to the presence or absence of autism than merely determining the presence or absence of a self-stimulatory behavior, or completion of a designated task. The youngsters all fell into a "normal" category based on these test results. The small sample size and the fact that no instruments were utilized that specifically measured the more subtle aspects of social behavior and relatedness. Reviewers emphasized that the ability of an IQ store as well as a personality inventory to

truly measure the cardinal features of autism, i.e. the impairments in social and communicative interaction and the use of symbolic and imaginative play, regardless of a youngster's cognitive ability or adaptive behavior skills (Greenspan, 1992, 1995). Moreover, as reiterated previously, a low or high IQ score is not a differentiating criterion for a diagnosis of autism. Thus, it is equally inappropriate to use it as an exclusion criterion as was done in this study.

Measurement of these skills of social relating, particularly in younger children with autism, had traditionally been done in a parent/teacher checklist format, such as the Childhood Autism Rating Scale (Schopler, Reichler, & Renner, 1986) as well as the use of clinical qualitative observations. Several instruments have been developed to measure such skills in depth that demonstrate good reliability and validity. These include the Autism Diagnostic Interview and Observation Schedule- Revised (Lord, Risl, Lambrecht, Cook, Leventhal, DiLavore, et al. 2000), the Kiddie-Infant Descriptive Instrument for Emotional & Prizant, 1994), Gilliam Autism Rating Scale-Revised (Gilliam, 2006) To date, however, these instruments have been used only to compare children with autism to neuro-typical children s in their designated social, communication, and symbolic play skills, as opposed to measuring or comparing treatment effectiveness. Prior to 1990, only one instrument, the Play Observation Scale (Rogers, et al., 1986) has been used to gather empirical data regarding the effectiveness of a treatment method in these skill areas (Rogers & Lewis, 1989). Another study measured the amount of child versus parent communication (both verbal and nonverbal) during pre and post Natural Language Stimulation treatment using video-tapes that coded the presence of communicative

interaction into designated categories (Cafiero, 1994).

Other professionals, however, have argued that measuring of such interaction is limited in meaning unless one is able to look at the context and the developmental level of play in which it occurs (Greenspan & Wieder, 1998), as well as the continuity of flow of the interaction. The Functional Emotional Assessment Scale (Greenspan, 1992a) accounts for these components, and is based on observation of play and interactions with and autistic youngster by an outside observer. While Greenspan and his colleagues have used this scale in their individual case studies to validate the effectiveness of their relationship based therapy with autism for individual cases to date, there are no written studies using this instrument with alternate treatments.

Within the Lovaas study, all youngsters with severe mental retardation were excluded. This was done in an effort to make his groups as equivalent as possible on the cognition variable. Indeed, the Lovaas treatment research boasted increased IQ as one measure of the treatment's effectiveness. There are two problems with the exclusion of mentally retarded youngsters in such research. The first is that IQ tests administered to a child with autism under the age of five are not usually reliable, and are not predictive of later outcomes (Lord, Schopler, & Reveck, 1988; Lord & Schopler, 1989). A youngster's poor performance on such a test could be more related to lack of compliance, motivation, etc. as opposed to a lack of skill (Lincoln, Allen, & Kilman, 1995). However, the other, more relevant concern is that autism occurs frequently with varying degrees of mental retardation. Recent estimates suggest that at least 30% of autistic individuals have IQs within the mild to moderate range of mental retardation, 16% have scores in the severe

mental retardation range, and half have scores in the average range, with only 5% having scores in the above-average range (Rosenblatt, 1994). Thus, increased IQ scores should not be mistaken to be synonymous with decreased characteristics of autism, particularly given the range of intellectual abilities which autism encompasses.

Many research studies have shown differences between mentally retarded children and mentally retarded/autistic children in regards to the pattern of cognitive skills (Rutter, 1990). However, the most significant differences have been noted in the social interaction/communication and expression of emotional affect (Baron-Cohen, 1994; Mundy, Sigman, & Kasari, 1990, 1991). While it is clear that many youngsters with severe mental retardation as well as autism will not develop language skills, it is not clear that such a youngster does not have the capacity to develop reciprocal interaction and social-communication skills at a nonverbal level that the youngster with just mental retardation would develop with competent care taking. Unfortunately, it is the lack of these skills that work to handicap the autistic youngster who is also mentally retarded. This sets up a negative response cycle with the world around him that leaves him doubly disabled, with a much more dismal prognosis than his retarded peers. With the exception of the 1989 study by Rogers and Lewis, no study has attempted to evaluate increases in these skill areas with dual-diagnosis youngsters.

Since 1989 more interventions have been developed that have received widespread attention and support from the public. These usually consist of small group and single subject designs that again boast “success.” Verbal Behavior Analysis (Partington & Sundburg, 1998) took issue with Lovaas’s interpretation of Applied Behavior Analysis

going back to B. F. Skinner's original research and theories on language development and acquisition. They developed both strategies and a skill curriculum that emphasized an "established operation" for instruction as critical for learning vs. the elimination of inappropriate behaviors and the substitution of them as the first step in intervention. Major focus is on the development of communication skills within a reciprocal context.

Relationship Development Intervention (Gutstein, 2001) also entered the autism field during this time. Steven Gutstein expanded this viewpoint later in 2000 when he broke down the nonverbal social behaviors in discrete components that interfered with that of normal social development for youngsters with autism. Gutstein showed the "cycle of social avoidance" that both adult and child became inadvertently engaged in, despite their best intentions, and subsequently developed an intervention program to interfere with this cycle. His program is unique in that in the early stages there is not a focus on verbal or alternate systems of communication for various functions. Rather, emphasis is placed on experiences that emphasize the nonverbal aspects of relating. Gutstein noted the distinction between Instrumental and Experience Sharing Interactions in autism that is first seen in early development. He focused on the need for youngsters with autism to learn the experiences of unplanned results in interaction as the critical motivation for interaction—in contrast to the expectation of a predictable product of interaction based on meeting the function of the youngster's communication and following his lead (i.e. an instrumental interaction). Gutstein's curriculum and strategies focus on developing pleasure in experiential relationships as the key to social interaction, but do so in a behavioral breakdown of discrete skills to be mastered in "frameworks" or stages that are measured.

Other more recent approaches have tried to combine language and affective skill development simultaneously in a more overt manner. These include the Affect Based Language Curriculum (Greenspan & Lewis, 2002), the SCERTS -Enhancing Social Emotional Competence in Young Children with Autistic Spectrum Disorders (Prizant, 2005), Bondy & Sulzer-Azaroff's (2001) Pyramid Program Using Picture Exchange Symbols, the "I Laugh" program (Winner, 2002), and Carol Gray's Social Stories (1994).

Scrutiny of all of these programs however, reveals that they continue to have as their foundations the achievement of relationship, communication, or specific skills through either a behavioral based intervention or a more dynamically oriented and more subjective developmental relationship basis. Some of these curriculums combine these strategies in a more holistic manner as a means to achieve success for their clients. Nevertheless, the same constructs that the original Lovaas and Greenspan interventions emphasized as their main differences are still upheld as the indices of treatment for youngsters with autism. The foundations for these interventions, even when not explicitly indicated, still emphasize these two constructs, even as they connect them in more comprehensive strategies

The current DSM-IV-TR continues to place emphasis on social and communication skills, symbolic play, and aberrant behaviors (as opposed to IQ) as the primary features of autism. Despite the ever-increasing amount of interventions being developed, the lack of empirical studies regarding changes in these benchmark characteristics of autism that are observable and socially valid, regardless of the cognitive ability level of the autistic child himself continues to be striking. It becomes even more evident when one considers the

immense medical research base and curriculum development in the field in contrast to actual studies of intervention. Furthermore, the emphasis on obtaining given IQ scores as entry criteria for various treatment program studies in the past has made generalizability of results to the wider range (and truer representation) of children with autism limited. “Recovery” from autism for a retarded youngster may not mean significant IQ increases, but it should mean dramatic improvement in social interaction skills, communicative functions, and play levels, with a decrease in aberrant behavioral mannerisms.

Statement of Problem

There are no studies comparing treatment effectiveness between the current leading methodologies for autistic preschoolers. Furthermore, there are few studies in the literature that measure social-interactive and play skills as an outcome measure for treatment effectiveness in autism, as opposed to just looking at measures of cognitive and language competencies. As these skills lay the foundation for social-emotional competency and relationship capacity in the future, it is important to know how effective the leading treatment/education formats are in their acquisition, particularly given the high cost of these treatments to parents and school systems both financially as well as in invested hours of time. This knowledge is currently not available.

While isolating groups of youngsters into different groups and monitoring the effectiveness of each treatment using pre and post testing methods would be the ideal method to help answer this dilemma, most parents resist committing to a single line of

treatment for any lengthy time period until they have an idea of how effective it will be specifically for their child. In addition, as new methods of treatment and research gain public recognition, parents add and subtract from their present treatment regimes accordingly. The wide range of individual differences within the clinical population itself further exacerbates methodological problems because matching along isolated cognitive characteristics limits, in some regards, the generalizability of the results to a narrow portion of the very population such experiments would be designed to help. Thus, it is neither ethical, nor likely possible to create a true experimental design to compare the effectiveness of different treatment modalities at this point in time in the field of autism.

A retrospective study, based on youngsters who received the major treatment formats in isolation before the wider range of treatment options reached public awareness, would be valuable in exploring whether such differential effectiveness is present. While this study could not show conclusively causal differences in treatment effectiveness, it can provide valuable descriptive information regarding which treatments for which types of youngsters with autism appear to be related to changes in the core symptomatology of autism. These core symptoms, according to DSM-IV-TR, center on severe deficiencies in communicative and the social-emotional interactive skill arenas.

This study will add important information to this area with a retrospective descriptive design that examines the relationship between the two primary intensive treatment modalities used most frequently and the development of social/interactive/communication competencies.

The present study involved 28 children with autism from two different treatment

formats. Fourteen youngsters who had completed no less than two, and no more than three, years of intensive Lovaas treatment were identified, as well as fourteen who had completed Greenspan's Developmental Individual Relationship model at the same intensity level. The original study also had a control group of 15 additional children with autism in special education programs in a county school system in the Washington D.C. metro area, but the school system declined to continue participation with this research as the issues of what to fund for autism interventions through public funding arenas became more politically and legally controversial.

Because the dependent variables evaluated focused on social interaction skills that are not necessarily related to cognition, no pre-set IQ levels were held as entry criteria for this study. The social-interactive and communicative skills of the youngsters were measured using behavioral as well as formal measures using video-tapes of unstructured and structured play interactions with their primary caregivers. Behavioral monitoring involved coding of interactive sequences by initiator (child or parent), and the type of interaction (verbal, nonverbal) by trained graduate students in psychology/special education. In addition, more structured play sequences were rated using the Play Observation Scale (Rogers, Herbison, Lewis, Pantone, & Reis, 1988). A final semi-structured play sequence was evaluated by a group of practicing clinicians trained in the use of Greenspan's Functional Emotional Assessment Scale to determine the contextual/developmental level of the interaction. All raters (both professional and students) were unaware of which treatment the youngsters had received to help control for bias, and remain naive to the experimental questions.

The results were analyzed to determine if there was a relationship between levels of social/communicative interaction and play skills and the treatment received. In addition, subsequent analysis of parent interviews and record reviews of the 28 youngsters examined other variables that may have contributed to the existence/lack of existence of the relationship differentially. These included the age and the level of communication competence noted at the time the treatment was initiated.

Research Questions

Research Question 1

Are there differences between the treatment groups with and without accounting for:

- a) Age at Treatment Initiation.
- b) Average Number of Communication Levels Mastered on the Communication Matrix pretreatment.
- c) The combination of a and b.

Research Question 2

Are there differences between the treatment groups on the NLT, FEAS, and POS outcomes when each of the following pretreatment variables is accounted for:

- a) Biomedical Interventions (e.g., diets, nutritional supplements, exercises)
- b) Demonstration of Echolalia
- c) Use of Words/Sentences
- d) Presence of the Ability to Pull Others
- e) Child Lines Things Up

f) Overall Cognitive Ability Estimate

g) Number of Communication Functions Mastered

Research Question 3

To what degree do the assessments utilized in this study measure the same construct both within and across treatments?

Research Question 4

- a) Are there differences between treatment groups Estimated Communication Competency levels based on Rowland's Communication Matrix?
- b) Were critical functions and levels of Social Interaction mastered by subjects in the study?
- c) Are there differences between treatment groups in the mastery of the levels of Social Interaction when the covariates of Research Question 2 are accounted for?

Supplementary Analysis will investigate the correlations of the Vineland and CARS and the outcome measures. This will look at whether or not there is a relationship between a youngster's current adaptive behavior skills and his present rating on an autism checklist and the outcome measures that look at affective developmental levels in this study.

Chapter 2

Literature Review

Despite the fact that autism is associated with the most severe impairment in functioning of all the diagnostic categories of the *DSM-IV-TR*, it is interesting to note that it was not even listed as a mental disorder in the first two editions of the *Diagnostic and Statistical Manual of Mental Disorders*! It was first introduced in the third edition of the manual, close to 60 years after the first articles about the topic were written.

Definition/Diagnosis of Autism

Synopsis

Despite 60 years of documented occurrence, it is only within the last decade that a definitive diagnostic portrait of autism has emerged in the literature. Recent broadening of the definition in the *DSM-IV TR* (2000) has resulted in significantly increased numbers of youngsters having diagnoses that fall within the Autism Spectrum. Further expansion of the definition to encompass the wide range of style and functioning both intellectually and emotionally for individuals with autism was initially done in 1995 by the Zero to Three Task Force in their *Diagnostic Classification Manual 0-3* as well as more recently by Marian Sigman, Sarah Spence, and Ting Wang (2006) and others in the field (Klin, Lang, Cichetti, & Vokmar, 2000). All include more varying as well as more hopeful prognostic indicators. Current diagnostic indicators stress significant qualitative impairment in social relatedness, communication and language, as well as deficiencies in symbolic/imaginative

play as hallmark features, with onset prior to three years of age. Abnormalities in sensory processing and motor functioning, self-stimulatory behaviors, epilepsy, and many other medical disorders are also associated with the syndrome. In addition to a wide range of variations and differences in intellectual abilities from mental retardation to superior intelligence, all children with autism also individually demonstrate a jagged profile that is different from that found in any other clinical group. This usually involves severe weaknesses in tasks/verbal language comprehension requiring an understanding of social context and communicative competence, with strengths in abstract reasoning/visual abilities. The odd behaviors of autism that have been traditionally interpreted as a volitional “shutting out” of the world of human relationships, (or an emotionally based disorder), have now been reinterpreted by researchers to be related to critical differences in neurological substrates that cause/result in different social behaviors. The way in which children with autism show attachment and social responsiveness is not like neurotypical, or even mentally retarded children. They do however, demonstrate such traits, but not in a format we are familiar with. Rather, the behaviors are a manifestation of the severe disability of the brain damaged by autism, and corresponding inability to take into account the feelings and intentions of others as aspects of their behavior. This weakness is present in all individuals with autism, regardless of their intellectual capacity.

Expanded Discussion

The problem in coming up with a definitive diagnostic profile in the past was that children and adults with autism showed a wide variety of differences related to their

personalities, temperaments, and rates of developmental progress. This variation range spanned severely retarded individuals who were anti-social to gifted people with college degrees who had difficulty understanding social conventions and using communication as a social skill. In addition, every conceivable level of disability was between these two poles. Although much progress has been made in regard to definitive diagnosis as early as infancy (Zwaigenbaum, Bryson, Rogers, Roberts, Brian, & Szatmari, 2005), the behavioral and psychological trajectories such diagnosed children make appears to be becoming increasingly more varied, not less. Attribution of variation to individual child medical, psychological characteristics and treatment, or a combination of all of these factors is the most pressing issue in the field at this time.

In the past, any of these individuals may have been diagnosed with a wide variety of labels, including classical autism, infantile autism, Kanner's autism, atypical Pervasive Developmental Disorder, Pervasive Developmental Disorder, Developmentally Delayed, having "autistic like" features, high-functioning autism, or have been mistakenly identified as having a serious emotional disturbance or a reaction to a difficult life experience. Twenty years ago, and as recently as the last ten, there has not been consistent commonality of these labels between families, school personnel, physicians, and mental health professionals. As the prevalence of autism became greater and subsequently increasingly familiar to the general public, *DSM III* set about extensively revising the definition to be more sensitive and inclusive, but at the same time less specific, broadening the diagnosis to cover a wider range of individuals with subtle to severe characteristics (Cook, George, Gurman, & Weigel, 1993) that were commonly referred to as the *Autistic*

Spectrum Disorders or ASD in DSM-III.

The DSM-III's efforts were not without criticism. In his 1992 review of the literature, Szatmari of the McMaster University Department of Psychiatry concluded that as a diagnostic category, ASD appeared to have limited evidence of internal and external validity. He concluded that no data confirmed that the diagnostic criteria for ASD could be applied in a reliable fashion, but that evidence was present to indicate three subgroups of ASD on clinical grounds (Szatmari, 1992). These were a low-functioning atypical group, a high-functioning atypical group, and Asperger syndrome. Szatmari claimed these clinical differences were reasonably robust across studies, samples, and methods of analysis. However, the evidence that these distinctions had correspondingly similar prognoses with respect to etiology, clinical course and treatment, was only viewed as suggestive at best.

Szmatmari's groupings corresponded to a grouping made previously by Dr. Lorna Wing in her 1979 study of autistic individuals in Camberwell, England. While she made these groupings using statistical evidence, her terminology was meant to capture the "quality of the impairment" from a lay person's perspective in terms of a child's predominant behavior—even though each type of behavior might be shown by the same child in different situations and at different stages in development (Wing, 1979). Her categories were of the child's style of interaction, and were classified as Aloof, Passive, and Interactive, but Odd.

Wing held that as children matured, they could sometimes move from one grouping to another (Wing, 1979). For example, it is common for very young autistic children to behave like the Aloof child, but then with treatment and education to become more Passive.

Finally, under times of stress, or during a developmental regression, a youngster might return to the Aloof category.

Because of such criticisms, *DSM-IV* expanded the definition even more to include atypical autism, as well as a high-functioning autism known as Asperger's syndrome. The result was a diagnostic category that was more precise and definitively descriptive than the *DSM-III-R* for clinicians, yet still broad enough in its scope to encompass the wide range of variation in ability and behavior style noted by Szatmari and Wing, as well as other professionals and families. *DSM IV-R* categorized these disorders under the term *Pervasive Developmental Disorders* to include three subtypes—*Autistic Disorder* (the more severe type), *Asperger's Disorder*, and *Pervasive Developmental Disorder-Not Otherwise Specified* (PDD-NOS). The difference between these three was based solely on the number of criteria met for aberrances in the areas of Socialization, Communication, and Behavior. Children with the least number of symptoms were diagnosed as *PDD-NOS*, while the most severe youngsters were diagnosed as having *Autistic Disorder* and those with no delay in language and cognitive skills as *Asperger's*. Other disorders listed as *Pervasive Developmental Disorders* included *Rett Syndrome and Childhood Disintegrative Disorder*.

Indeed, one of the leading researchers in the field noted in 1990 that “the argument that ‘infantile autism’ be kept as a separate diagnostic designation, within the umbrella concept of ‘autistic spectrum disorders’ . . . does not make a lot of sense any more” (Gillberg, 1990, p.103). In his review he summarized research to note there were no differences in children with autistic behaviors with and without demonstrable neurological

dysfunction (Gillberg, 1990). He felt that considerable overlap had been documented between the Kanner autism (lower functioning) and higher functioning Asperger's syndrome. He also pointed out that the most severe (Kanner's) forms of autism did not have any unifying psychosocial or biological background, while in the Asperger syndrome cases, severe medical conditions like tuberous sclerosis and Fragile X were present. He recommended that it was now more appropriate to diagnose "autism," and then delineate the many additional characteristics of severity, unusual or specific clinical traits, associated medical conditions, and finally, cognitive levels. At a later date, this viewpoint was supported additional research which indicated challenges in social communication were universal in children and adults with autism—in spite of heterogeneity in cognitive profiles, language, or medical profiles (Tager, Flusberg, Joseph, & Folstein, 2001; Vokmar, Lord, Bailey, Schultz, & Klin, 2004).

Agreement on diagnostic criteria increased parallel to research on the core deficits of the disorder and the development of more standardized measures to measure the deficits, with comparison to core groups of normal children matched on developmental level (Sigman, Spence, & Wang, 2006). This culminated in the current criteria of *DSM-IV, Text Revision*, 2000 used today.

In the *DSM-IVTR* (2000), Autistic Disorders are now classified under the broad category of *Pervasive Developmental Disorders* with an increased amount of specificity in the type of diagnostic criteria that is noted below:

A. A total of six (or more) items from (1), (2), and (3), with at least two from (1), and one each from (2) and (3).

(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 interactions
- 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 (e.g. by a lack of showing, bringing, or pointing out objects of interest)
- d. lack of social or emotional reciprocity

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

- a. delay in, or total lack of the development of spoken language (not accompanied by an attempt to compensate through alternative modes of communication such as gesture or mime)
- b. in individuals with adequate speech, marked impairment in the ability to initiate or 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 (e.g. hand or finger flapping or twisting complex whole body movements)
- d. persistent preoccupation with parts of objects

B. Delays or abnormal functioning in at least one of the following areas with onset prior to age 3 years: (1) social interaction (2) language as used in social communication (3) symbolic or imaginative play. C. The disturbance is not better accounted for by Rett's Disorder or Childhood Disintegrative Disorder (DSM-IV-TR- 2000 pp.69-70).

Asperger's Disorder included the same characteristics as Autistic Disorder, but with no clinically significant delay in language or cognitive development, with the addition of an encompassing preoccupation with a restricted area of interest. For youngsters who do not meet all the criteria for Autistic Disorder, but are not Rett's or Childhood Disintegrative Disorder, the diagnosis of Pervasive Developmental Disorder-Not Otherwise Specified, is made.

Arguments continue about differential diagnosis due to the range of relationship and communication problems in children who share many of these features that have been traditionally described as “autistic.” In particular, the less severe forms of the Autistic Disorder, such as PDD-NOS are still considered by many to be ill-defined, particularly since some of these youngsters’ impairments in social relatedness and communicating are only relative. Indeed, many of these children demonstrate significant emotional attachment to their family members. Because of this evidence of some relative capacity for relating, despite other communication, motor and sensory difficulties as well as the rapid and uneven development during the early years of life, amenability to treatment (and thus prognosis) may not be as bleak as depicted for most youngsters with a traditional diagnosis of autism (Zero to Three Diagnostic Task Force, 1995; Mundy, Henderson, Inge, & Coman, 2007).

It is important to note that even before the *DSM-IV TR*, efforts were made to assist clinicians to differentiate better between the three groups (and particularly at an early age) to assist in treatments. The Zero to Three National Center for Clinical Infant Programs developed the conceptualization of *Multi-System Developmental Disorder* in their Diagnostic Classification of Mental Health and Developmental Disorders of Infancy and Early Childhood in 1995. This classification system viewed the various degrees of difficulties in relating as seen in young children with PDD-NOS on a continuum with a primary deficit in relating (Zero to Three Diagnostic Task Force, 1995). In this format, problems in relating are viewed as possibly secondary to motor and sensory processing deficits. The *MSDD* diagnosis proposed 3 types of categories of these youngsters, ranging

from those who were unrelated most of the time with severe motor planning difficulties to those who are more consistently related to others with the ability to use some basic motor gestures socially.

Although these three patterns are defined in much more detail in regards to motor and language skills, sensory processing, and relationship styles, the concept of three levels of an “autistic-like” disability is similar to that found by Wing in England in 1979, as well as Szatmari’s conceptualization. Like Wing, the Task Force also felt that children demonstrating these behaviors moved in and out of these patterns, based on maturation and functioning, as well as environmental stress. Because of this, Wing advocated that a youngster’s autistic style and intellectual ability needed to be continually assessed as he passed through various developmental stages and in the context of the current amount of stress and transition in his life (Cook et al., 1993). The *Diagnostic Classification: 0-3* manual (Zero to Three Diagnostic Task Force, 1995) advocated this same position with a similar rationale.

The National Institutes of Health is currently researching subtypes of autism, hypothesizing that there is a common phenomena to the disorder with extreme clinical variability for children ages 1 to 6 with developmental delays (National Institutes of Health Clinical Trials, 2006). Two distinct groups of children with and without regression are being identified for further subtype analysis that includes comprehensive medical as well as psychological work ups over a longitudinal time period. The study uses state of the art diagnosis with Autism Diagnostic Observation Scale and Autism Diagnostic Interview by Catherine Lord and colleagues (2000) that were not available at the time this study was

undertaken, and holds much promise for precise identification and treatment for the future of these youngsters.

There are several other associated features noted in the research on autism that are common. These include the following:

1. *Associated Medical Disorders*. Fragile X chromosome disorder, neurofibromatosis, tuberous sclerosis, and congenital rubella syndrome are all associated with an increased risk for autism or PDD-NOS (Gillberg, 1990; Muhle, Trentacoste, & Rapin, 2004) Other physiological aberrances are not common in all children with autism, but are still seen in children with autism with a higher frequency than a neurotypical population. These include:

- a) Gastro-intestinal disorders (Ashwood, Murch, Anthony, Pellicer, Torrente, & Thomson, 2003)
- b) Food and environmental allergies (Sicherer, 2000)
- c) Multiple ear infections in infancy (Konstantareas & Homatidis, 1987)
- d) Sleep and eating difficulties (Anders, 2003)

2. *Epilepsy*. Reports of seizures vary from 25 to 60% of autistic/PDD individuals, with increasing presence with and increase in age, particularly for autistic adolescent (Hiara, 2007). There are also a significant number of individuals with seizure activity on EEG which do not result in clinical seizures (Olsson, Steffenburg, & Gillberg, 1988).

3. *Attention Variation*. In normal children, attention is flexible and able to shift appropriately from one topic to another, and from low levels to focused levels. Autistic children flip between inattention and perseveration, with inadequate flexible attention. They have difficulty changing focus from one topic to another, and have difficulty choosing which stimuli to focus on (Cook et al., 1993) (Sigman, Spence, & Wang, 2006).

4. *Psychiatric Variables.* Obsessive Compulsive Disorders are frequently seen as children with autism age, as well as bipolar personality disorders. Heightened anxiety is also noted, although this may be a behavioral response by such individuals as they cope with a world that becomes increasingly more difficult for them to negotiate and interact with as they age (Lopez, Compton, Grant, & Breiling, 2008).

5. *Sensory Abnormalities.* Hypersensitivity and Hyposensitivity to various sensations are often present for individuals with autism, as well as under or over-arousal to both social and nonsocial stimuli and other environmental variables (Baranek, 2002). This may frequently be demonstrated through behaviors such as noncompliance, withdrawal, eloping or tantrums when in the presence of a noxious stimulus (such as the sound of a blender, certain tastes and smells, and possibly certain colors) (Cook et al., 1993). A frenetic increase of activity (such as spinning in circles) when placed in a room with loud music and talking could be indicative of a state of over arousal, as well as “shut down” response to the same stimuli of just sitting, rocking, and staring behaviors. As early as the mid-1990s, the *Diagnostic Classification: 0-3* (1995) noted over reactivity to tactile and certain features of auditory input, as well as under-reactivity to vestibular and proprioceptive experiences. As a result, such children will seek sensory experiences and inputs from others through touch, motion, pressure, etc., as well as self-stimulation in an attempt to regulate/modulate these heightened sensations (Sigman, Spence, & Wang, 2006; Zero to Three Task Force, 1995).

In general, youngsters with autism typically learn much more easily with visual than with auditory input based on research (Newsom & Simon, 1977) and self-report

(Grandin, 2006). They require gestures, demonstrations, and pictures to help them understand information. Visual weaknesses, however, have been noted in regards to stimulus over selectivity, or the tendency to exclude other relevant visual dimensions when viewing a real-life scene, or that in a picture, related to the inability to take context into account.

6. *Motor Functioning Abnormalities*. While in general most gross motor skills are intact for autistic individuals, abnormalities of posture and gait are relatively common in autistic children, particularly when they are requested to perform a motor task upon command (Cook et al., 1993). In contrast, they can be observed to spontaneously perform the same task on playground equipment without difficulty. Research by Kohen-Raz, Volmar, and Cohen (1992) has shown differences between the postural patterns of children with autism compared with those of normal youngsters, as well as mentally retarded children and in adults with vestibular disorders. These differences include jerky, rigid, and nonflexible coordination of heel and toe parts, conspicuous instability in situations that are stressful, as well as inconsistent directionality and lateral sway that is similar to that seen in normally developing toddlers (Kohen-Raz, Volmar, & Cohen, 1992). Other interesting differences noted by the researchers were the fact that autistic children showed a strong preference to use the lower sensory modalities (tactile, vibratory, gustatory, and olfactory) even when visual cues were available for balancing. Furthermore a paradoxical postural stress response was often observed. That is, the posture and stability of many autistic individuals *improved* when they were placed in difficult positions with their vision occluded and sensory input restricted! Differences in the level of motor control for fine

motor tasks as well as problems with fine and gross motor imitation are also common (Hughes, 1996; McDuffie, Yoder, & Stone, 2005).

7. Uneven Cognitive Profiles. Autistic children demonstrate a jagged profile that is different from that found in any other clinical group (Frith, 2003; Shah & Frith, 1993). In using the WISC-R, this pattern was found in autistic individuals with normal intelligence as well as in children with autism in Japan (Ohata, 1987). Despite individual variations and differences in intelligence level and cultural environments, the Ohata study, as well as work by Baron-Cohen (1994), suggests the worst performance can be seen on any task requiring a high degree of communicative competence, such as the WISC-R Comprehension subtest. For a verbal youngster, the Information subtest of the WISC-R usually has higher scores than Comprehension. Information questions involve a response of precise information on a topic where the client has knowledge, with no accounting for social context or more situational understanding. This test pattern is usually the opposite for mentally retarded children without autism.

Strongest test performance, however, is often seen on the Block Design subtest, as well as other nonverbal tasks, regardless of the level of intelligence. Bartak, Rutter, and Cox studied a population of both low- and high-functioning children in 1975 and noted this pattern. In another study using 10 high-functioning men with autism and no overt neurological problems, much poorer performance was noted on the word comprehension and picture arrangement subtest of the WAIS than the other subtests (Rumsey & Hamburger, 1988)

One explanation for this phenomenon is offered by Frith (1989), who holds that

traditional cognitive ability tests are purposely constructed so as to be as independent of social context as possible to equalize the task situation for individuals from different backgrounds and minimize the need for learned assumptions. The detached nature of a context-free test can prevent a normal person from revealing abilities which are commonly known as “street smarts,” “common sense,” or as Frith terms it “world intelligence” (Frith, 1989).

In her accounts, Frith (1989) postulates that this advantage is reversed for individuals with autism, who have the unique ability *not to take account of context*. As such, they tend to do well on tasks where a wider context is missing, and do poorly where context is important. As depicted in the popular movie *Rainman*, they may have excellent reading and math skills on paper and pencil problems, but in real life might be helpless “human calculators.” In general, the cognitive profile in autism involves selective deficits in complex abilities and integrity of simpler abilities in the domains where the deficits were demonstrated (Just, Cherkassky, Keller, & Minshew, 2004). The neurobiological explanation for this discrepancy will be noted later in this section of the Literature Review.

The cardinal features of autism, for both low- and high-functioning children center around language and communication, social relatedness, and abnormal use of toys as well as self-stimulatory behavior. Also included in this list is a severe restriction of imaginary/symbolic play. To some extent, these features are common in all individuals with autism, but differ in their degree of intensity (Frith, 1993; Gillberg, 1990). That is, one individual with autism may have no language skills, but clearly desire social company and be able to play with toys somewhat appropriately. Another child may use

language with a high-level vocabulary, but have interactions devoid of affective meaning and be obsessed with working a Rubix cube whenever the opportunity is available. While the intensity of the deficit in any of these areas may vary, the exact nature of the deficit area tends to be remarkably similar. This accounts for the current and continuing usage of the wide umbrella concept of “autistic disorders,” while continuing to differentiate the levels of functioning in critical areas. The use of this more encompassing definition has resulted in a much larger number of children being diagnosed than was previously done in the early 1980s—to the point that autism “must now be accepted as contributing relatively more cases to child psychiatry, pediatrics and developmental medicine than current programs have planned for (Gillberg, 1990, p. 105).

As these features have the most variation within the population, yet persist in their pervasiveness and specificity in identifying the autistic child, they are the most critical ones to target for treatment. Thus, they will be explored in more depth below.

Impairment in Social Relatedness

As early as 1943, Kanner focused on a basic impairment in relating as the definitive feature of autism: “an extreme aloneness that disregards, ignores, shuts out . . . almost anything from the outside” (Kanner, 1943, p. 247). Indeed, many children with autism of all levels of functioning appear at times to a larger or smaller degree, to be in their own world as well as behave as if they ignoring the existence of others. This perception of being oblivious to others and generally not emotionally expressive is based upon interpretation of autistic children’s behaviors. These include avoidance of eye contact, arching one’s back to

avoid physical affection, wandering away from caregivers with total unawareness as young children, climbing or knocking into other people as if they were pieces of furniture, and being unresponsive to having their name called as well as being likely to be off by themselves when around a group of normal peers. They also may not wave good-bye or hello, nod their head to mean “yes” or “no,” or even motion others to come toward them despite the fact that they may indeed want this (Smith, T., 1993).

Current research however, has dispelled some of these perceptions as the natural interpretations for the cause of such odd behaviors to the point that they should now be considered to be myths that are outdated. More importantly, they are detrimental to diagnosis and treatment. While the behaviors that impair social relatedness exist, they are not based upon an intentional “shutting out” of the world of human relationships, or an emotionally based disorder.

The first of these myths deals with the common misbelieve that autism can be seen from birth as an extreme lack of social responsiveness. In various studies done reviewing records of autistic children between 6 and 12 months of age, no abnormality of any kind was noted, and later often positive social responsiveness was commented on. In 1995 the Zero to Three Task Force pointed out that while the capacity to relate and attend begins in infancy, it may not be fully seen until five months. This is due to individual variations in regulating, comprehending, and responding to different types of auditory, visual, and tactile sensations as well as affects on the part of the infant, as well as the capacity of the parent to respond to these differences with the necessary levels of involvement (Zero to Three Task Force, 1995).

As early as 1989 Frith pointed out that there are many babies who at first seem quite indifferent to social contact, but develop responsiveness later as well as those who do the reverse. Rather, the critical features of impairment in social relatedness for autism begin to be most apparent and/or manifest themselves in toddlerhood, usually between 18 to 42 months.

Rebecca Landa (2007) and Sally Ozonoff (Ozonoff, Williams, & Landa, 2005) have specialized in this area and corroborate that while *symptoms* of risk can be determined at the age of 13 months with some reliability, they still do not definitively predict or are associated with a diagnosis of autism at the age of three. However, prediction for the same symptoms of risk when seen at age two are consistently associated with a diagnosis of autism, and even more so at the age of three.

There is also the myth of *avoidance of eye gaze* for children with autism as meaning the child is not interested in people. The more accurate interpretation of this behavior is that “eye gaze” is not used in communication. The child neither looks away at the right time, nor meets the gaze when would be expected. As one researcher put it, “the child looks equally little at the filing cabinet as the psychiatrist. However, it is the psychiatrist who complains” (Hermelin, 1970)!

When compared with normal children in tests using black boxes with curtains and peepholes to view both pictures and real people, the autistic children showed the same visual preference for looking at humans as well as the more interesting and more colorful card in a pair (Hermelin & O’Connor, 1970). However, with every display, the autistic children spent a much shorter time looking at each picture overall compared to the normal

children. They also had a much higher rate of non directed gazing where they did not look at the pictures than normal children. Current research (Joseph and Tanaka, 2003) suggests individuals with autism rely on a feature-based strategy to process faces as opposed to the typical configurative one, and also spend less time looking at the eyes on faces than other typical individuals in eye tracking studies (Klin et al., 1999).

Because eye gazing is an important part of communication for reading the emotional intent of the looks of others, the failure to enter in this particular exchange usually leads the normal person to complain, and thus explain this behavior as emotionally based avoidance as opposed to a difference /deficit in perceptual attention span (Frith, 1989).

Reframing the belief that children with autism *do not form attachments to their parents or other caregivers* and that they are *incapable of social responsiveness* is also important. The way in which these children show attachment and social responsiveness is not like neurotypical children but research suggests that they do indeed demonstrate these traits, albeit not in the format we traditionally look for.

This was shown when Marian Sigman and J. Ungerer (Sigman, Mundy, Sherman, & Ungerer, 1986) took autistic children between two and five years of age and compared them with mentally retarded children with autism of the same mental age using the traditional stranger reaction paradigm. This involves the mother leaving for a brief interval while a stranger stays with the child. For normal children, the effects of attachment are shown by a marked increase in the child's spontaneous interactions with his mother when she returns.

In the experiment however, no differences were found between the behavior of both groups in terms of the increased number of social responses when the mother returned (Sigman & Ungerer, 1984; Sigman, Mundy, Sherman, & Ungerer, 1986). Rather, the autistic youngsters demonstrated qualitatively different responses that were less physical in nature, but they were still the social responses seen before in earlier interactions with their mother.

It has also been stated that *autistic children do not express emotions*. Simple observation of their happy giggles or violent tantrums in a wide range of situations and environmental contexts by families and professionals argue against this dramatically. It is another question though, as to whether these expressions occur when they are expected to socially. Research with vocalizations of infants with and without autism shows that these youngsters express distinct emotional reactions—but in a manner that is unique and idiosyncratic to each one individually. In this study, parents of normal babies could not distinguish the vocalizations and emotions they listened to as belonging to their own child (Ricks & Wing, 1976). Each parent of an autistic child was able to recognize his own youngster with ease from the normal infants. All of the parents could identify the different situations (pleasure, fear, frustration, surprise, and greeting) that gave rise to the vocalizations of all the normal babies. None, however, could do it for the autistic ones. The parents of the autistic youngsters could identify the situation for their own autistic child by only listening to his responses. *They could not, however, do this for anyone else's autistic child*. This experiment strongly suggests that there are universal vocal expressions that can be readily interpreted, but that the autistic children did not use them. They did however,

have their own set of emotional vocalizations that were highly individualized, but nonetheless easily recognizable to their caregivers (Ricks & Wing, 1976).

The odd quality of the social interaction of young children with autism has also been hypothesized in multiple research studies to be related to difficulties in achieving shared or “joint” attention (Rogers, 1999; Sigman & Ruskin, 1999). This is a nonverbal behavior, which can and usually precedes language in normal children and later stimulates symbolic language, according to Mundy, Sigman, and Kasari in their 1990 study of nonverbal communication behaviors in typical children and children with autism.

First, a child can be seen alternating looking at a toy or desired object, and then his parent’s face (Mundy, Sigman, & Kasari, 1990). Young normal children then usually point to something to indicate that it is relevant not only to them, but also to the person they communicate with. The parent or partner usually responds by saying, “Yes, you have a dog just like that one,” as if the child, by pointing to a dog (and not to anything else), had wanted to make a statement. This is *shared* or *joint attention*. This pointing is done for no reason other than to share the child’s interest with someone else. Mutual comprehension is achieved at this preverbal stage and both partners show delight, with eventually the normal child extending the toy toward the partner’s face. Eventually, the normal child will also turn his head and eyes in the direction a parent/partner is pointing—including left, right, and behind the child. This will culminate in normal developmental sequence with the reaching for toys out of reach and making eye contact with his partner, and eventually the child pointing to toys that are out of reach.

These activities are often missing in children with autism before intervention, and

the deficit has been seen in videotapes from as early as the age of 5 to 12 months (Maestroevet et al., 2002). It has, in fact, been shown that they never even exhibit this proto-declarative pointing (Baron-Cohen, Tager-Flusberg, & Cohen, 1993). When a child with autism points at an object, it is only because he/she wants it, *not because he is sharing his interest in it* (Frith, 1993). On the surface, the mere act of pointing by the normal child looks as if the child is giving information about the location of an object. In reality, it is not the location of the object, but rather the singling out of it for the target for the other person's mental state. A child with autism will indicate he wants a broken toy mended, but won't point out a toy for its own sake. He does not share the content of his mind with his parent, and the parent can not share in the child's mental state without this.

A group of colleagues at the Medical Research Council's Cognitive Development Unit in London (1993) hypothesize this ability is related to a cognitive mechanism that is innate, with a unique brain substrate. The main component of this function is the ability to think about thoughts, or to imagine another individual's state of mind. This is considered to be a second-order of representation (Wimmer & Perner, 1983). The first order of representation in development consists of the visible world of bodies and events. The second is the invisible one of mental events and the invisible thoughts/intents of others. Both levels need to be kept in mind and kept separate from each other to understand and interact with the world.

In real life, we are constantly guessing and monitoring what other people are thinking and feeling at an automatic level. Frith (1993) hypothesize that this ability fails to develop in the normal way for autistic children. This leaves them unable to conceptualize

the mental states of others, i.e., they can't infer intent and/or emotion in the verbal and nonverbal communication of other people, and thus can't empathize with the mental/emotional state of others and is referred to as the development of a Theory of Mind (Baron-Cohen, Tager-Flusberg, & Cohen, 1993). This also may account for the inability or extreme difficulty such children have with pretend/symbolic play. They don't imitate feeding a doll with a spoon, but rather just twiddle and hit the spoon on the table repetitively (Frith, 1993; Rogers 1999).

These theories are supported from a somewhat different perspective by Stanley Greenspan, in his *Infancy and Early Childhood* and *The Practice of Clinical Assessment and Intervention with Emotional and Developmental Challenges* (1992b). Dr. Greenspan has developed a Functional Emotional Assessment Scale for Infancy and Early Childhood in which selected associated motor, sensory, language, and cognitive capacities are specified in a developmental sequence of acquisition in stages of interaction. By 9 months, the infant is usually initiating and responding to social gestures. By 13 months, on this scale, more complex organization of emotional and behaviors—chains of interaction—are noted. These involve stringing together circles of communication around different intentions such as love, protest, and exploration. By 18 months, the child should be able to elaborate interactive sequences to convey themes. Thus, he would be demonstrating the idea of symbolic thinking noted by Baron-Cohen and colleagues. This includes imitation of language, delayed searching, and imitating others as part of dealing with the emotional patterns of dependency, assertiveness, anger, etc. This is the stage where youngsters with autism patterns of interaction usually demonstrate problems (Greenspan, 1992b). The

timing of this breakdown in symbolic thinking and the ability to take account of another's intent or state of mind is consistent with the reported age of onset of many cases of autism, usually between 18 and 36-42 months.

Supporting evidence for these theories are founded in the observations that some children with autism can adeptly handle certain gestures for the purpose of social interaction that have an instrumental purpose. Such gestures are designed to make someone else do something immediately (Attwood, Frith, & Hermelin, 1988). These include putting one's finger over one's lips to mean "quiet," pointing up to direct someone to "look up," pushing someone to tell them to "go away," and moving one's fingers/hands towards oneself to indicate "come here." Normal, autistic, and even severely retarded youngsters all use these gestures. They transmit bare information.

Another type of information is seen in expressive gestures used in intentional communication that has to be evaluated by the listener (Attwood et al., 1988). For example, the message to "go away" is rarely as simple as the hand gestures described above. Rather, we always look to see whether it contains an apology, a challenge, or an open attack and infer this from facial expression, vocal tone, and body posture. When we comprehend only the bare information without the subtle intentionality, we do not understand the intent of the person communicating. As such, we have no room for compromise, flexibility, and, most importantly, interaction. This is precisely the predicament that occurs for the youngster with autism.

There are certain expressive gestures which correspond with intentional communication: covering one's face to indicate embarrassment, holding out one's hand to

communicate intentions of goodwill, placing an arm around another's shoulder to acknowledge friendship, and patting or stroking someone on the head or face to provide consolation (Attwood et al., 1988). In studies involving observations of normal, retarded, and youngsters with autism, none of the autistic youngsters ever demonstrated these gestures, while all of the normal and all of the retarded children did!.

In their most famous experiment, Baron-Cohen, Leslie, & Frith (1988) presented children with a story in which a character named Sally places a marble in a basket and leaves the room (this was done using dolls). A second character named Anne comes in while she's gone and moves the marble from the basket into a box. When asked where Sally would look for the marble on her return, even retarded kids realized she would think it was still where she left it. But all of the autistic children consistently said she would look in the box. They couldn't distinguish between the situation and Sally's likely perception of it. They could not take Sally's belief into account. These theorists argue that the impairment in social interaction is due to the fact that the mind damaged by autism is totally objective by nature—that is, it can not take into account feelings and intentions as an aspect of the behavior of others, regardless of the intellectual capacity.

Impairment in Speech/Language Communication Skills

The expressive language impairment of autism is so severe that some researchers have estimated that adequate functional speech to meet daily ongoing communication needs will never be achieved by half of all individuals with autism (Alpert & Roger-Warren, 1985). Mutism in autism has been estimated to range between 25 and 61%

(Beukelman & Mirenda, 1992). Other work by Dawson and Adams in 1984 noted that the preschool child with autism generally has severely impaired or no language (along with the other characteristics noted previously in this paper) and that these deficits can coexist with adequate Piagetian object permanence and means-end comprehension. Some children with autism actually learn the shapes and letters of the alphabet, as well as basic reading and writing skills, but are still not speaking by the age of six (Hart, 1988). This is not true for most cases of mental retardation.

Dr. Warren Fay and A. L. Schuler, in their 1980 book entitled *Emerging Language in Autistic Children*, offered a helpful delineation between the terms speech, language, and communication that is useful for a framework in understanding those with autistic characteristics. *Speech* is the making of spoken or audible sounds (Fay & Schuler, 1980). When understandable and in the form of familiar words, these are speech. When just sounds, they are vocalizations. Parrots can imitate human sounds, but their words are only mimicking human noise. In the same way, just because humans produce words, it does not necessarily guarantee there will be a pattern or purpose to their use. *Echolalia* refers to repeating or echoing of words/phrases. This is basically an “instant replay” of words, with no apparent reason, intent, or meaning to the listener. As such, it isn’t functional speech. The research of Barry Prizant (1981, 1983, 1984) and Prizant, Wetherby Rubin, Laurent, & Rydell, 2005) over the last decade has provided conclusive evidence that echolalia, while not functional speech, does indeed have a function. It is not “meaningless” for individuals with autism, but it is without meaning to neurotypical listeners. His studies showed how both immediate and delayed echolalia in multiple samples of speech of individuals with

autism had communicative intent and behavioral meaning when observed with scrutiny over varying time periods and environments.

Echolalia behavior is indication that the speaker cannot access their own vocabulary to select the right words and connect them to form an original message. They can't custom make statements to fit new situations in a spontaneous manner. Thus, they repeat phrases in a random manner, hoping that one will communicate intention or desire. For some children, this means they use a standard phrase to ask for a snack. They cannot request a specific item, but use the echolalia phrase every time they are thirsty or hungry, no matter how nonsensical it may sound to the listener. (For example, child with autism might say "open" every time they are hungry, referring to the opening of refrigerator, even if the desired food is a cookie in the cupboard (Hart, 1993). Another type of echolalic language is known as *idioglossia*—the use of real words in a nonsensical pattern (green cat cookies) or just a string of vocal sounds ("tica dee") that is used for self-oral motor stimulation (Fay and Schuler, 1980). Despite its lack of meaning, most therapists still consider echolalia and idioglossia to be the best prognostic indicators of the ability to learn language.

Wendy Stone and Paul Yoder (2001) in their research that looked at predicting spoken language in children with autism, define language as a code of arbitrary symbols "whereby ideas about the world are conveyed for purposes of communication." Spoken language is the verbal form of such a code. Such a system of sharing information is found in mammals, birds, and certain insects and develops as a result of instinct that results in sounds or movements that send signals to others through involuntary reflexes.

Communication includes possibilities beyond the mere definitions of words, such as

recognition and understanding (Fay & Schuler, 1980). It takes into account moods and shades of meaning such as irony, sarcasm and humor, both in the verbal and nonverbal sense (Hart, 1993) as well as a multitude of gestural, facial, movement and other nonverbal behaviors. Children with autism who develop speech usually continue to demonstrate clear deficits in communication in this “total” sense. They may speak with a monotone voice, use words and phrases out of context, and have difficulty with pronouns, give intermittent eye contact, lack appropriate facial expressions or violate personal space. Their speech, though coherent, may involve the use of only single words (holophrastic), use only essential words (telegraphic), or use only descriptive to refer to objects (referential) (Fay, 1988). For some, similar to the use of gestures noted by Attwood, Frith, and Hermelin (1988), language is generally used to regulate the behavior of others, *not to attract or direct others’ attention in a true communicative sense* (Cafiero, 1995).

For individuals with Asperger’s disorder, spoken language is usually more than adequate, and often with superior vocabulary. However, challenges are seen in the pragmatics and communication because of the inability to use language and nonverbal communication in the same way as neurotypical individuals—despite the fact that they “sound” the same as them (Landa, 2000).

Most current theorists agree that there is a connection between the ability to use some type of verbal or gestural communication system and aberrant/inappropriate behavior for not only children with autism, but also typical individuals (Carr & Durrand, 1985; Donnellan, Miranda, Mesaros, & Fassenbender, 1984; Smith, M., 1990). These theorists hold that when a communication system fails for a child with autism, they find out that

grabbing, tantruming, or self-abusive behaviors become more effective for meeting their needs and bring about quicker results than attempting to negotiate verbally. Unfortunately, because the violence and bizarre behaviors can not be ignored, they get responded to even more effectively than words, and thus are reinforced into habits that are hard to change. Such behaviors/habits although maladaptive, are communicative in intent

The advent of technology has expanded communication options for many individuals with autism who are nonverbal with devices for typing, use of pictures symbols, and voice output. Recent research (Germisbacher & Goldsmith, 2003) suggests there is a dyspraxic subtype of individuals with autism who may not acquire spoken language, but may acquire written/keyboard language using technology

Self-Stimulatory Behaviors/Severe Restriction of Imaginary/Symbolic Play

The abnormal play of autistic youngsters with toys in regards to symbolic and imaginary play has already been noted. When compared to subjects matched on mental age, children with autism displayed considerable deficiencies in these areas in studies by Wing and her colleagues (1977), Ungerer and Sigman (1981), and Pierce-Jordan and Lifter (2005). As noted earlier, the deficit is hypothesized to be related to severe disabilities in the symbolic use of language and thought (Ricks & Wing, 1976; McHale, Simeonsson, Marcus, & Olley, 1980) as well as joint attention (Sullivan, Marvin, Garrett-Mayer, Bouman, & Landa, 2007).

However, the motor aspects of the play demonstrated by many children with autism are also unique, and tend to have a wide range starting with repetitive, stereotyped activities

that provide auditory, visual or other sensory stimulation (Lovaas, Newsom, & Hickman, 1987). These might involve endlessly spinning the wheels of an upside down truck, or banging a block or spinning a stuffed animal. On the other range of the spectrum is the more purposeful, yet still abnormal behavior of lining up objects into neat rows over and over again, and a fascination and need to repeat such fine motor acts of precision.

Other children with autism demonstrate self-stimulatory motor behaviors, which include flapping the hands from the wrists in front of the eyes, rocking the body back and forth, spinning in circles, and gazing intently at spinning objects for extended periods of time (Smith, T., 1993; Jansiewicz et al., 2006).

The Zero to Three Task Force (1995) placed these motoric/sensory processing deviations on a continuum of severity in their classification system for Multi-system Developmental Disorder noted earlier. In the first and most severe level, youngsters were constantly seeking sensory experiences through their bodies with touch, pressure, motion, and even staring behaviors—much more than they demonstrated interest in experiencing objects (Zero to Three Task Force, 1995). The Task Force hypothesized that these youngsters have the most difficulty with motor planning, and are unable to sequence movements to effectively manipulate toys, build, or do puzzles, etc. They frequently run into others or step on other children due to their lack of awareness of their body position in space. They crave vestibular and proprioceptive experiences. At the same time, they are over reactive to tactile and certain features of auditory input.

The second level involves more organized seeking of sensation and tactile input, with a greater sense of body position in space (Zero to Three Task Force, 1995). That is,

despite intact motor skills (and even prowess in these areas) many of these youngsters are always stepping on or into objects/people. These youngsters can do simple sequences, as well as learn other motor-planning tasks if practiced over and over, and play somewhat functionally with toys. They are prone to getting locked into sequences of rigid order when doing fine motor tasks, and become preoccupied with sorting, and other repetitive fine motor tasks, etc. Finally, children in the last category still show a larger tendency to overreact and get excited, but demonstrate more functional ability to manipulate objects and recall/learn motor sequences more easily than the latter group (Zero to Three Task Force, 1995).

History of Autism

Contrary to popular knowledge, autism was first accounted for in published form not just by Leo Kanner in 1943, but also by Hans Asperger in 1944. These publications contained detailed case descriptions and also offered the first theoretical attempts to explain the disorder. Both believed that a fundamental disturbance was present at birth which gave rise to highly characteristic problems.

Kanner's 1943 paper became the most quoted in the whole literature on autism. In it he described 11 children with the following common characteristics: autistic aloneness, an obsessive insistence on sameness, and islets of ability (Kanner, 1943). The insistence on sameness behaviors ranged from repetitive movements, utterances, and thoughts, to elaborate routines of actions, words, or thoughts without purpose. Finally they included the pursuit of an extremely narrow topic of interest, to the exclusion of all else.

Asperger (1944), whose work was largely ignored until recently, included a much larger range of individual abilities in his work. He used cases that showed severe organic damage and those that shaded into normality, and thus broadened the basis for diagnosis (Asperger, 1944). Asperger sought to relate autistic behavior to normal variations of personality and intelligence, and descriptively delineated some of the contrasting behaviors noted earlier in this paper. “The failure to be integrated in a social group is the most conspicuous feature, but this . . . is compensated for by a particular originality of thought and experiences (Asperger, 1944). Asperger, like Kanner, urged that there was some deep disturbance of contact at some deep level of affect and/or instinct.

Both gentlemen paid attention to the peculiarities of communication and the difficulties in social adaptation, as well as movement stereotypy, and a very scattered patchy pattern of intellectual achievements with occasional feats of intellectual prowess in narrow areas (Frith, 1989).

It is speculated that misdiagnosis of autism (including accurate and inaccurate labeling) was rampant before the 1970s (Gillberg, 1990). There was often confusion with schizophrenia (usually now distinguishable because of a much later age of onset), and sometimes cases of concomitant, even severe, mental retardation were likely identified. Current studies clinically have made it clear that a number of identifiable medical conditions can occur in conjunction with autism, as noted earlier in this paper. These include Fragile X syndrome, tuberous sclerosis, neurofibromatosis, rubella embryopathy, and in girls, Rett’s syndrome. Although each occurred in less than 5-10% of autism cases, Coleman and Gillberg (1985) noted at that time that together they made up a substantial

proportion of all cases being referred in the 1980s. An exhaustive medical study, particularly with younger children, is usually now a routine part of a diagnosis within the autism spectrum disorder. One can only speculate as to the inappropriate treatment and prognosis given for youngsters with the above medical disorders that must have occurred in the past as a result of this lack of knowledge.

In the 1960s Bruno Bettelheim provided a detailed and influential description of psychoanalytic treatment with autistic children that became the major thought of the decade, and unfortunately the cause of much unnecessary parental guilt that still prevails. Bettelheim (1967) saw mothers of autistic children as extremely cold individuals who treated their children like specimens in a science laboratory. He coined the term “refrigerator mother” and claimed these women harbor “murderous impulses” toward their children (Bettelheim, 1967). Autism is developed by the offspring of these mothers as a defense against their horrible situation—that is, they withdraw from the world as much as possible into a solitary state to avoid feeling their mother’s rejection. The mother’s conflicts might be unconscious on her part, and she might not be able to be aware of them without psychotherapy for herself (Frith, 1989).

How did Bettelheim come to this conclusion? One hypothesis lies in the previously presumed association between the disorder and high social class. Kanner (1943) had noted that all but three of the eleven cases he described in his paper had family members who had appeared in *Who’s Who or Men of Science*. And a study done in Middlesex noted that as many as 60% of 15 Kanner’s type autistic children could be found in the two upper social classes, as opposed to 31% of the 20 non-Kanner’s type cases (Frith, 1989). Bettelheim’s

myth of the refrigerator mother easily fit the career-oriented, intellectual emotionally detached woman of the high social classes.

Research in 1979 by Schopler, Andrews, and Strupp put the issue to rest when they reviewed all available studies and concluded that the reported association was an artifact. Namely, parents of high social classes might be more knowledgeable about autism, thus causing a referral bias (Schopler et al., 1979). In addition, the increased occurrence of mental retardation in poor socio-economic circumstances may have overshadowed autism when it was a concomitant feature. In better economic circumstances, mental retardation is seen less frequently, and thus autism might also be recognized more clearly because it is not confounded by an additional handicap.

By the 1980s however, Bettelheim's proposal was largely refuted by accounts in which cognitive or language dysfunction began to be noted as the essential feature of autism. This change in orientation was partially due to the advent of the "cognitive movement" of neuropsychology and the scientific technology now available for assessing children's cognitive and language abilities. In addition, more studies became available comparing children with and without autism on various IQ and other tests that came to establish significant group differences emerging between groups (Hobson, 1991). One of the most important of these was a survey done by Rutter in 1983 regarding the field of cognition in autism. Rutter concluded that cognitive deficits underlie many of the important handicaps of children with autism, and thus were not secondary to its other features (Rutter, 1983). He claimed that the social impairment seen in autism was related to a basic cognitive deficit in dealing with social and emotional cues. He believed there

existed a specific difficulty in dealing with stimuli that carried emotional/social “meaning,” based on the existing data. The studies done by Uta Frith and her colleagues (1994) as well as Peter Hobson (1991) supported these speculations.

Most clinicians, however, continued to hold onto the belief that autism was purely a functional, and not an organic disorder, because there was no direct evidence of brain abnormality. Gillberg, in his 1990 overview, listed 22 various associated biological factors with autism and their corresponding research studies conducted from 1971 to 1990. One of the most important of these was Gillberg’s own 1984 research that epilepsy appears, almost seemingly out of the blue, in about one-third of autistic adolescents. Slowly, but surely the evidence of organic involvement began to filter down to clinicians and eventually the public. These included abnormal nystagmus, EEG abnormalities, inability to establish handedness, increased cell-density in postmortem examinations of autistic patients, aberrant plasma and cerebrospinal fluid opioid dynamic (Vargus et al., 2005) and increased levels of urinary peptides in children with autism—to name a few (Schopler & Mesibov, 1987).

All that remained was to determine the direct evidence of the brain abnormality. Finally, Eric Courchesne was the first to provide such evidence in the *New England Journal of Medicine* in 1983. His research team used MRI scans to make detailed pictures of the brains of 18 autistic individuals, none of whom were retarded, compared with the images of 12 normal people (Courchesne, Young-Courchesne, Hesserinck, & Jenigan, 1983). The part of the middle cerebellum composed of two sections or lobules was 25% smaller, on average, than in the normal people for 14 of the autistic subjects. His research

was based on previous findings that abnormally low numbers of an important type of nerve cell, the Purkinje cell, were found in the cerebellums of autistic individuals whose brains were autopsied. He hypothesized that such a reduction in cells would cause the brain structure not to develop to its normal size.

By 1994, Courchesne and colleagues were able to state that “seventeen different quantitative MRI, PET, and autopsy studies from nine different independent laboratories in four different countries involving 271 autistic subjects have found abnormalities of the cerebellum in infantile autism.” Margaret Bauman (1996, 2003, 2005) corroborated and furthered this research area studying the brains of brains of deceased individuals with autism. She consistently observed abnormal features that included the following:

- 1) reduced numbers of Purkinje cells
- 2) small tightly packed neurons in the entorhinal cortex
- 3) tightly packed neurons in the medially placed nuclei of the amygdala.

Both researchers hypothesized a pathway from decreased cerebella tissue to an inability to shift attention in an interaction (Courchesne et al., 1994) as well as modulate language processing and motor planning (Bauman, 2005). This abnormality is related to the ability to focus attention on only one aspect of an object, person, or experience—excluding any other characteristics they may have. Thus, memory is more formed for concrete, static, and predictable experiences. Transient and variable experiences such as social, auditory, and communicative events are recalled in a more fragmented manner known as stimulus overselectivity. In turn, this inability to shift attention causes impaired caretaker-child interactions, and subsequent global verbal and nonverbal communication impairments that

result from an inability to cognitively process the multifaceted aspects of communication.

Thus, for the child with autism, information about the world is experienced in fragments that are verbal, facial, gestural, and emotional. They are however, without the same meaning that occurs for typical children because the child cannot rapidly shift attention to encode in his memory the various elements of an experience (or interaction) as a single unit (Cafiero, 1995).

The role of genetic factors has also been confirmed in the last decade (Dawson & Watling, 2000; Sigman et al., 2006). Twenty years ago physicians told parents with one child with autism that they would not likely have another. Today, recurrence risk in siblings is estimated at 6 to 25% (Rutter et. al., 1999) and 60-90% for monozygotic twins (Bailey, Palmer, Woodward, & Smalley, 1997), and maybe even higher when the broadest definition of an autism diagnosis is utilized. Autism is now considered to be one of the most inheritable of all the complex neuropsychiatric syndromes, and involves multiple genes with various models where varying numbers of genes interact (Sigman, Spence, & Wang, 2006).

At present, distinguishing biological, medical and neurological abnormalities according to their time of origin and their consequences for development dominates research in the field at this time. Also of note is the fact that in the process of identifying abnormal brain developments, the study of autism has been closely involved with the research on neurotypical brain development for the infant and young child, as well as normal psychological development and relatedness.

Prevalence of Autism

Before the 1980s, the frequency of autism was thought to be somewhere in the range of 4 to 6 per 10,000 children. As research began to slowly expand the concept of autism to include both low- and high-functioning individuals however, these estimations began to change. Wing's studies in England, and Gillberg's studies in Sweden found that 21 per 10,000 youngsters/teenagers had the combination of social, language, and behavioral impairments associated with "autistic-type" patterns and mental retardation (Gillberg, 1989). By 1990, however, the same population in Gothenberg, Sweden, had shown an increase in autism. The highest prevalence was noted in the 5 to 7 age group, with 11.6 noted in the most recent study of youngsters in the 4 to 14 year old age range (Gillberg, 1990).

The gradual broadening of the diagnosis of autism was originally seen as a possible cause for the increase in diagnosis prior to the mid 1990s, particularly since evidence continued to come in from Gillberg's 1990 studies in Sweden and Wing's 1989 studies in England that Asperger's syndrome (high-functioning autism) tended to be 3 to 5 time more common than the more severe forms. When mild to severe cases of autism were included during those years, the incidence went up to 10 or 11 per 10,000 (Gillberg, 1990). In the 1994 conference on autism held at the National Institutes of Health, additional epidemiological studies in both Canada and Japan confirmed that the rate of autism was indeed close 10 per 10,000 when the full range of mild to severe cases are included (Prizant, 1995).

Prevalence refers to the estimated amount of people managing a diagnosis at the

present time. Current prevalence rates in 2007 from the Centers for Disease Control's multi-site surveillance study, indicated autism is now affecting 1 in 150 live births. The United States Department of Education and other agencies confirm diagnoses are growing at a rate of 10-17% per year! Furthermore, this general incidence rate is consistent worldwide (World Health Organization, 2003). This incidence count of autism refers to the annual diagnosis rate, or how many are being diagnosed with the disorder a year. The rate is higher than childhood cancer, blindness, or Down syndrome.

Overall, the same excess of boys to girls was noted in both the conservative and liberal estimates of prevalence over the past decade—that is, autism is four times more prevalent in boys than girls. There are some fascinating differences between the presence of the disorder in males and females. In a 1982 study, 384 boys and 91 girls with autism were studied, ages 3 to 8 (Lord, Schopler, & Rebecki, 1988). All of these children were seen between 1975 and 1980, and included not just severe, but also mild cases of autism. The 4:1 ratio of boys to girls was 5:1 at the high end of the ability range and 3:1 at the lower end. On the average, however, on almost every ability tested, girls with autism were much more seriously impaired than the boys with autism. These included not just assessments of language and perception, but also simple daily living skills. In terms of play, affect, and ability to relate to people, the girls were as poor as, but not worse than the boys. The study suggested that the critical aspects of autism might be relatively independent of intellectual abilities and acquired skills—with girls having more severe additional problems.

By and large, youngsters with autism and mental retardation appear to have higher rates of organicity, and lower IQ, than those with less retardation (Szatmari, 1992, Itzcak &

Zachor, 2007). Most of these children are also female. However, *no* differences have been found in the number of pregnancy and birth complications was found in the mothers of retarded and non-retarded populations of children with autism (Szatmari,1992). In non-retarded populations of children with autism studied in other literature reviews by Szatmari in 1992, differences within groups have been minimal with similarities noted only in a higher incidence of males and later age of onset.

Treatment Approaches

Tristan Smith (1993) has noted that with the possible exception of schizophrenia, more interventions have been devised for autism than any other kinds of emotional/behavioral disturbances. The need to determine effective treatments is driven by both the severity and chronicity of autism through one's lifetime. The importance of differential diagnosis of autism from mental retardation (without autism), as well as concomitant diagnosis when appropriate, is critical in regards to determining effective teaching strategies and interventions as they are not the same across these populations. Most parents prefer a diagnosis of autism over mental retardation, despite the fact that the overall prognosis for the later is generally considered to be less favorable (Gillberg, 1984; Knobloch & Pasamanick, 1975; Rutter, Greenfeld, & Lockyer, 1967; Schopler & Mesibov, 1983).

Perhaps the fact that many children with autism have a relatively normal early history in infancy, as well as no physical anomalies when young that would lead the average onlooker to suspect a disability drives parents and professionals alike to search for

a “miracle cure” and never give up hope of finding it. At the same time, this desire makes the general public easy prey to highly questionable treatments that have even included engaging in water contact dolphins (Smith, T., 1993).

There are several problems inherent in studying the effectiveness of various treatment programs. The first is the heterogeneity and wide variation among autistic individuals as a group. An effective treatment for language skills with a youngster demonstrating echolalic speech may not be effective for another youngster who vocalizes non-speech sounds. This makes the word of mouth approach to treatment effectiveness risky. That is, “This worked for my kid, try it with yours!” while attempting to be helpful, often promotes discouragement and frustration unless coupled with this knowledge and reality of the diversity of children with autism. The next is the fact that in general, most current treatments do not “cure” autism—few researchers claim that their subjects stopped being autistic. Rather, they focus on changing some of the behaviors associated with autism in the areas of language, self-help skills, self-stimulatory behavior, social skills, etc. Even proponents of the behavioral approach, who claim that using their methods can lead to recovery for some children, have still not been able to determine a “pivotal behavior,” that if changed, would be the key to start the cycle of changing all autistic behaviors in a youngster (Lovaas & Smith, 1989). In general, finding that a specific treatment is superior to no treatment, even on a short-term basis, has been enough to validate an intervention for the average parent who is desperate for anything that “works.” This is true even if the information is only by word of mouth from one parent’s experiences to another as opposed to any controlled studies, and even if it is only effective for reducing or increasing one

aspect of many, many behaviors within the autistic spectrum (Tsakiris, 2000).

On the other hand, parental persistence has been a driving force in organizing and disseminating the large amount of anecdotal treatment data as well as more scientific approaches to interventions. Much of this work at the grassroots level was piloted by Dr. Bernard Rimland, a psychologist and parent of a child with autism. In 1964 he published *Infantile Autism*, which was instrumental in breaking the stronghold that psychoanalytic treatments had over the field for both professionals and laymen. He challenged the traditional treatment paradigms that did not include parent participation in treatment. In 1965 he founded the National Society for Autistic Children, which later became the current Autism Society of America. In addition to his own research involving various therapies that will be described later, he has been a leader in collecting not only formal, but informal data from parents since 1967 regarding treatment effectiveness and harmfulness for their youngsters. This collection of informal and anecdotal data in turn has helped spearhead new research efforts in areas that might not have been considered valid by more traditional practitioners in the field.

The following sections will briefly describe the dominant therapies for autism that are currently in use, and their documented effectiveness/harmfulness. This will be followed by a more in-depth analysis of the Applied Behavior Analysis model and Developmental Individual-Difference Relationship model, the major focus of this research study.

Psycho-analytic Treatments

Although the popularity of these treatments has dropped sharply since the demise of

Bettelheim's theories and the more definitive evidence of an organic base to the etiology of autism, many concepts of the theory were incorporated into other relationship therapies in the 1980s. In many parts of Europe, it is still the dominant treatment (Smith, T., 1993).

One of these spin-offs was "Holding Therapy" that was depicted in *Life* magazine in 1987 (Welch, 1987). This treatment was based on the concept that autism was a failure of mother and child to "bond." Unlike the traditional psychoanalytic model, this strategy did not necessarily imply deliberate and overt rejection on the part of the mother at a conscious level, but rather a more unconscious conflict or "mismatch" between the mother's actions/behaviors and child's perceptions of them (Tinbergen & Tinbergen, 1983). Treatment involved the mother forcibly holding the child to end his feelings of rage and terror, particularly when he was in the midst of a tantrum. Such holding would then send a message to the child of the mother's true availability and presence for him, and eventually cause "the autistic defense . . . to crumble" (Welch, 1987). While the *Life* magazine article suggested dramatic improvement for one particular youngster, no formal research studies of any kind were done with the treatment, and its leading practitioner, Martha Welch, wrote only one article about it that was largely descriptive in nature.

More anecdotal information, that included many dramatic descriptions on negative outcomes and questionable practices of this treatment came forward when in 1993 Catherine Maurice described her experiences directly with Dr. Welch and her treatment methods in *Let Me Hear Your Voice*. Ms. Maurice's book describes her own struggles and successes with the treatment of her own two autistic children, and cites not only the ineffectiveness of this modality for the youngster of her own and others, but also the

detrimental psychological effects to her own self-esteem that she feels it caused (Maurice, 1993).

Other variations of this model included humanistic play therapy that emphasized “unconditional positive regard” from a therapist, while excluding parental involvement (Axline, 1965; Des Lauriers & Carlson, 1969). Similar theories of “authentic valuing” were proposed by McGee and Gonzalez (1990) in their “gentle teaching” approach. This emphasized teaching children that social interactions are rewarding, in order that bonding can occur between the children and therapist (McGee & Gonzalez, 1990).

Using both a made for TV movie and novel format, Barry Neil Kaufman developed and promoted “Options” therapy for his own autistic son whom he claims is now cured. The Kaufmans stressed providing nonstop (often 24-hour residential) individualized, loving attention for most of a child’s waking hours, with an emphasis on “joining” the child in his self-stimulatory activities— even if bizarre—in an effort to establish connection with him/her (Kaufman, 1976). They continue to offer training in these techniques in their home today.

While isolated cases of some successes are reported from all of these methods anecdotally and in individual case studies there is not a strong research base for any of them. In addition, many families have give negative reports of such interventions (Maurice, 1993).

Pharmacological and Biomedical Approaches

These treatments are based upon medical/psychiatric research studies between neurotypical children and children with autism. There is a strong research base that

suggests that children with autism have imbalanced and/or excessive amounts of dopamine and serotonin when compared to normal controls. While it is unlikely that a reduction in serotonin would affect the basis of autism, there is research indicating that decrease does result in behavioral improvement (Rutter, 1983). An excess of endogenous opioids has also been found in the cerebrospinal fluid of many autistic youngsters (Vargus et al., 2005). When excessive amounts of dopamine are injected into animals, they demonstrate stereotypic movements quite similar to those displayed by individuals with autism. Excess production of endogenous opioids is strongly associated with self-injurious behaviors, such as head-banging, skin picking, and self-mutilation. Apparently self-injurious behavior causes even more release of the opioids, which in turn can produce not a feeling of pain, but of euphoria. Thus, SIBs (Self-Injurious Behaviors) can start a vicious biochemical cycle than reinforces itself (Gillberg, 1989; Panskepp, Lensing, Leboyer, & Bouvard, 1991; Ratey, 1989; Schopler & Mesibov, 1987). Other research has noted a high level of urinary peptides in children with autism that is strongly related to high level as casein (milk protein) and gluten in the diet. Vitamin B6 and zinc deficiency as well as excess copper have also been documented within children with autism (Coleman & Gillberg, 1985).

Pharmological and biomedical approaches based upon these theories focus on decreasing certain behaviors as evidence of their effectiveness. These include aggression against self and others, hyperactivity/temper tantrums, irritability and withdrawal, short attention span, and stereotypy. When these behaviors are decreased, the child with autism is thus more able to focus energy on appropriate interactions and learning.

Serotonin levels have been successfully managed with use of Fenfluramine and

Clonidine. Both drugs seem to cause significant reductions in aggression, hyperactivity, and irritability. In addition, Clonidine has also helped with inattention problems according to two studies. These are newer drugs, which seem to be an improvement over Haloperidol, the neuroleptic drug previously utilized with the population which had many side effects, including tardive dyskinesia (Cook, 1996; Geller, Ritvo, Freeman, & Yuwiler, 1982; Gordon, State, Nelson, Hamburger, & Rappaport, 1993; Handen, 1993). Conflicting results, however, are reported in the Autism Society of America's parent ratings for the drugs' effectiveness, with a better to worse ratio of behavioral effects for Clonidine for 118 cases of 2.7:1, and 1.5:1 for Fenfluramine for a sample of 401 cases. This data was collected using Parent Rating scales for a wide variety of drugs and nutrients from over 8700 parents since 1967 (Autism Research Institute, 1994).

Naloxone and Naltrexone block excretion of opioids, and have also been reported in a study to show significant decreases in self-injurious behaviors as well as increased play and improved affect (Campbell, Overall, Small, Soukol, Spinon, & Adams, 1989; Panskepp, Lensing, Leboyer, Bourvard, 1991). The ASA parent rating scale confirmed these results with 41% of the 111 families using Naltrexone reporting behavioral improvement (Autism Research Institute, 1994).

The use of antidepressants such as Imipramine and Fluoxetine (Prozac), as well as anti-anxiety medications such as Busperione has begun to receive attention in decreasing self-injurious behavior, anxiety, agitation, and emotional lability (Cook & Leventhal, 1995; Markowitz, 1990). Overall, the use of traditional stimulant medications such as Ritalin, with the population has been generally discouraged as it has had at times a puzzling, but

strong tendency to increase maladaptive behaviors of hyperactivity and inattention for children with autism (Campbell, Kafantaris, Malone, Kowalick, & Locascito, 1991; Posey & McDougle, 2000; Sloman, 1991). Currently research is underway through NIH (2007) looking at methylphenidate, which small studies have shown some success in select populations of children with autism.

The most promising treatments in psychopharmacology for the future are the SSRIs and the atypical antipsychotics (Risperidone & Fluvoxamine) as well as medications with novel mechanisms of action (Posey & McDougle, 2000). The core features of the syndrome are not generally amenable to modification with psychotropic medications in isolation. That is, the course of the primary social and communicative impairments remains the same. However, psychopharmacological interventions can make a child with autism more amenable to treatment and education by significantly reducing symptomatology that interferes with learning and relating. Specific problems related to autism, such as anxiety, irritability, hyperactivity, impulsivity, obsessive compulsive tendencies and inattention have been demonstrated to be amenable, and at times dramatically so, to medical intervention on a case by case basis (Hellings, 2000; Posey & McDougle, 2000).

Bernard Rimland is considered the founder of the biomedical research frontier and treatment movement that currently studies biochemical and immunological vulnerabilities as well as environmental factors associated with autism. In 1995, he brought together Dr. Sidney Baker from the Harvard School of Medicine and a host other medical professionals from respected universities and clinics to form Defeat Autism Now (DAN), which is also supported by the Autism Research Institute. The research studies and treatment protocols

promoted by this organization are too numerous to detail in this document. They include studies of gut flora, glutathione, mercury, chelation, essential fatty acids, specific food allergies, Group B strep, yeast overgrowth, gastro-intestinal disorder, all of which have corresponding treatment regimes involving medical and nutritional supplementation as well as special elimination diets and injection regimes (DAN Conference Syllabus, 2004; Levy & Hyman, 2005). Most are viewed as controversial by the American Academy of Pediatrics and mainstream medicine, although others are beginning to gain more widespread acceptance and consideration (Levy & Hyman, 2005).

Significant behavior changes in some young children with autism were noted when they were placed on a strict diet free of milk and gluten products (Knivsberg, Lind, & Nodland, 1991; Simpson & Anderson, 2000). The diet is based on the fact that gluten and casein have opiod characteristics discussed previously that some children with autism can not completely digest due to “leaky guts” that pass into the blood stream and urine. Some parents have corroborated such changes, and indeed some have indicated their children are “cured” as a result of the diet (Lewis & Seroussi, 2004). The National Institutes of Health agrees there may be a subset of children with autism with gastro-intestinal issues that respond to such diets, but note that general it does not alleviate symptoms of autism for most children (NIH presentation, 2007).

Bernard Rimland also claimed that, in a significant proportion of children and adults with autism, noteworthy improvement was seen when Vitamin B6 was given in large amounts simultaneously with moderate amounts of magnesium and another B vitamins in his study with 191 children (Rimland, 1987; Rimland, Calloway, & Dreyfuss, 1978). The

Autism Society of America parent rating study with a sample of 2050 confirmed this, noting a 9.9:1 better to worse ratio of behavioral effects, with 46% reporting behavioral improvement (Autism Research Institute, 1994). Another study supports increased alertness, reduced negativism and reduced self-mutilation and emotional outbursts with 15 of 44 subjects using this same therapy, that ended three weeks after treatment was terminated (Lelord, Muh, & Barthelemy, 1981). At the same time however, four youngsters in the study showed an increase in symptomatology. Critics cited a lack of double-blind controlled studies, with questionable criteria for improvement in both studies noted above making a strong recommendation for their use questionable (Sloman, 1991).

Proponents of the biomedical movement have argued extensively over the past decade that mercury (in the form of thimerisol) that was used in measles/mumps/rubella vaccination for children was associated with the advent of the behavioral manifestations of autism in many children, as demonstrated by high levels of mercury in urine and hair studies. The public outcry led the American Academy of Pediatrics, various Public Health Agencies, and vaccine manufactures to recommend removal and or reduction of thimerisol from immunizations in July 1999. Since 2001, thimerisol has not been used in routine recommended immunizations with the exception of some influenza vaccines. Despite this, the rate of autism has continued to increase.

Thousands of cases of autism have been brought to the vaccine council to seek recompense for damage attributed to these vaccinations. After close to a year of testimony in the Autism Omnibus hearings filed on behalf of over 2,000 families, the special masters judge ruled that there was not sufficient scientific evidence to support the association of the

disorder with the vaccines at this time (Vedantam, 2009). However, the possibility that thimerisol may have aggravated a predisposing disorder (such as mitochondrial disease) to present with autism was not ruled out, and indeed one family was awarded monies for such damage (Rudy, 2008).

Today most psychiatrists, physicians, and biomedical researcher, despite controversial positions at times, are all in general agreement that there is no “one size fits all” psychopharmacological or biomedical regime for autism because the population itself actually has more diverse than common characteristics, even though their common features are striking (Cook, 1996; Gualteri, 1992; DAN Conference Syllabus, Spring 2004).

The advent of neuro-imaging and biochemistry since 2000 has provided a new impetus in all forms of medical interventions for children with autism, as specific areas of the brain that are abnormal (with biomedical correlates) are now able to be determined with increasing accuracy to help elucidate subtypes in autism (Bauman, 2005, Chagani, 2000, Frith, 2003; Minshew, Goldstein, & Siegel, 1997). This in turn enables medicine to pinpoint medications and biomedical interventions with more precision as opposed to a trial and error approach that has many risks.

Sensory Integration Approaches

Individuals with autism have difficulty processing sensory input from the environment and/or translating such input into effective physical action and language communication, and indeed self-report their experiences with these challenges (Grandin, 1995; O’Neil & Jones, 1997). Their accounts describe over-aroused or under-aroused by

normal levels of stimulation they receive from the environment and how this in turn impacts social interaction, attention, and learning. Temple Grandin, a Ph.D. animal scientist notes that deep pressure to the skin, joints, and muscles has increased speech, affection and eye contact in some children with autism, as well as decreased stereotypical and self-injurious behaviors (Grandin, 2000; Sacks, 1994). Her accounts are particularly interesting, as she was diagnosed as autistic at an early age, and based her theories on her own experiences both past and present in coping with autism. Similar sensory experiences of comfort have also been reported by Donna Williams, another high-functioning autistic woman, in her books *Nobody, Nowhere* and *Somebody, Somewhere* (Williams, 1993, 1995).

Coping with such sensory challenges often leads to patterns of maladaptive behavior for young children with autism that becomes engrained and resistant to interventions. Tristan Smith (1993) described the sensory issues for individuals with autism succinctly when he stated, “Their lack of optimal arousal levels leads them to engage in self-stimulatory behaviors in order to modulate their arousal levels, and this in turn prevents them from accurately perceiving and responding to environmental events.” (Smith, T., 1993).

Sensory integration theory holds that since the vestibular, tactile, and kinesthetic systems start to develop first after birth (as opposed to other systems), their dysfunction and arrest in early development may cause the sensory abnormalities noted in autism (Ayres, 1988). Although there was no empirical data to support the use of such therapy several leaders in the field of special education, including Itard, Seguin, Montessori, Frostig, and

others advocated sensory-motor therapies (Spitz, 1986)

Ayres (1972, 1979) was the first to document her use of it with clients with autism to stimulate their skin and vestibular system to increase their responsiveness. This included brushing parts of their bodies, spinning them from hammocks or on special chairs/wheels, as well as balance promoting exercises (Ayres, 1972). Other treatment approaches have included activities that stimulate and desensitize the skin and other various systems such as massage, music therapy, and spinning and swinging activities. Many of these are done concurrently with language or other types of instruction. Some of the types of massage and vestibular stimulation used in sensory integration treatments in autism are the kinds that are observed to happen naturally when parents are soothing their children with rocking, rubbing, and touching (Tiogo, 1992).

Until recently however, there was no research that confirmed the presence of such neurological underpinnings medically, let alone scientific studies showing treatment impact. No one argued with the fact that children with autism experienced unusual sensory reactivity, but treatment protocols were looked at skeptically as having no empirical support. A meta-analysis of sensory integration treatments across a variety of clinical populations was conducted by Kavale and Mattson in 1983 across several target behaviors. No evidence of any benefits for sensory integration treatment was seen in any situation (Kavale & Mattson, 1983). At a 1994 conference, Dr. Gina Green, Director of Research at the New England Center for Autism, stated firmly however, that sensory integration had no scientific documentation of results (Pavlidis, 1995).

Dr. Barry Prizant, a leading speech-language researcher in the field of autism,

stated a different viewpoint during this time period in support of the families who felt sensory integration did benefit their children with autism. He strongly voiced the opinion that a lack of scientific research data should not negate the accumulated clinical experiences noted by many good observers of behavioral change (both parents and professionals). While there was not formal data, many professionals and parents did observe that sensory integration therapy, when applied systematically, did motivate youngsters to communicate and seemed to leave them more attentive (Wieder, 1995). It was not clear however, if the effects were long term in nature or if they disappeared if treatment is discontinued (Prizant, 1995).

Georgia Degangi, Ph.D and Ronald Berk, Ph.D combined their skills as clinical psychologists and occupational therapists to develop the DeGangi-Berk Test of Sensory Integration (1983) for 3 to 5 year olds to quantify overall sensory integration concerns more clinically using the subdomains of Postural Control, Reflex Integration, and Bilateral Motor Integration. But true medical verification of the existence of sensory issues occurred in 2005 when Miller and his colleagues conducted a novel research project that examined autonomic sympathetic nervous system reactions using electrodermal activity measures of amplitude with children rated as having severe hypersensitivity to stimuli on standardized checklists with a control group who did not. Extreme difference in amplitudes, decreased habituation, combined with more frequent responding was apparent for the groups rated as hypersensitive. Medical support for occupational therapy interventions to address these issues was also recently corroborated suggesting that cognitive activity has a degree of plasticity that seems to mediated with sensory and motor activity (McKenzie et al., 2003)

in neuro-imaging studies. Over the past decade, more developmental psychologists have teamed together with occupational therapists to develop standardized checklists and assessments to determine baselines and measure progress with more reliability (DeGangi, 2000; Schaaf & Miller, 2005)

As of 1983, there was only one controlled study on the effects of sensory integration and this had inconclusive results (Reilly, Nelson, & Bundy, 1983). Since that time, the number of controlled research studies of treatment efficacy has increased (Baranek, 2002) with more attention being paid to the scientific rigor lacking in the past.

In 1996, Temple Grandin requested the National Institutes of Health to fund more research regarding the sensory problems of children with autism. In response, the Sensory Processing Disorders Scientific Workgroup was formed in 2004 with leaders in developmental psychology that is currently exploring these issues measuring central metabolic rates with the use of magnetic spectroscopy as well as dopamine/serotonin receptors that are associated with sensory perception and reactivity.

Auditory Integration Therapy was developed from noticing that many individuals with autism were hypersensitive to sound. The treatment involves 10 hours of listening to music played through a device that filters out sounds to which an individual is hypersensitive. This over sensitivity is determined first through an audiogram that determines the over acute frequency thresholds. In a controlled pilot study involving the treatment and a placebo (just listening to music), the experimental group showed a decrease in behavioral and auditory problems (Rimland & Edelson, 1991). T. Smith (1993) was critical of the study because the groups were not equivalent in terms of their pre-treatment

level of behavioral problems, as well as whether a trained clinician's observation (the measure of hypersensitive hearing) could be shown to be reliable or valid. Nevertheless, one woman claims her daughter, Georgianna, was cured by this treatment in her book *Sound of a Miracle* (Stehli, 1991). She founded the Georgianna Foundation which supports research in this area and provides information to parents. There are nine other research studies regarding Auditory Integration Therapy for children with autism that demonstrate mixed results (Baranek, 2005).

Behavioral Treatment—The Lovaas Method

Synopsis

The lack of success of the psychodynamic therapies in remediating and treating autism from 1955 through 1970 set the stage for the behavioral model of viewing autism as a learning disorder, instead of a disease, and changed the focus of treatment from curing autism to skill acquisition and elimination of aberrant behaviors. Ovar Lovaas emerged as the leader in this arena, with a variety of studies from 1961 through 1979 where he successfully taught imitative language, decreased self-injurious behaviors, and increased appropriate behaviors using the behavioral techniques of discreet trial training, aversive conditioning, and multiple response recording. It was not until his 1987 study using children younger than 40 months of age with autism and without severe mental retardation, that Lovaas claimed his methods resulted in total “recovery” for some of his subjects. The treatment in this study involved intensive in home one to one behavioral therapy for 40 hours a week for two years.

Although criticized for being biased in his selection of subjects, using an inadequate control group and inappropriate outcome measures (Baer, 1993, Greenspan, 1992b, Schopler et al., 1989), Lovaas's research was the most thorough methodology and design to have ever been conducted in the history of autism treatment. Follow-up long term studies by McEachin, Smith, and Lovaas in 1993 continued to provide support for the effectiveness, durability, and generalizability of their treatment program. Lovaas himself has remained dogmatic that his treatment can not be effective without the same intensive 40 hour home based format, as well as the use of no additional therapies or treatments. His project is currently being replicated in four different states at the present time. While Lovaas has stated that he can not guarantee his program will be effective in curing every autistic youngster, he has developed a significant support from parents in the public sector who fight hard legal battles with school systems and insurance companies to obtain such intense treatment in the hope that their youngsters too, can recover from autism. Questions remain, however, about how truly "normal" functioning Lovaas's subjects were on a long term basis in real life situations involving social relatedness and peer interactions, even though these areas fell into normal ranges on psychometric assessments.

As of the year 2000, well over 75 research studies were published regarding ABA treatment programs that included not only single case studies, but also multiple baseline studies, and comparison groups (but not with other treatment programs) (Tsakiris, 2000). In general, these studies identify specific behavioral or learning goals for intervention with baseline rates, apply the traditional ABA treatment model towards them and then measure progress and generalization, as opposed to ameliorating the condition of autism in the

broader sense. By setting such specific intervention targets, the behaviors and learning characteristics associated with autism were often considerably reduced/modified to a degree that impacted school and family in more recent studies and literature reviews looking at implementation of ABA programs according to Lovaas's original model (Butter, Mulick, & Metz 2006; Cohen, Amerind-Dickens, & Smith, 2006; Green et al., 2002; Howard, Sparkman, Cohen, Green, & Stanislaw, 2005; Kasari, 2002; Remington et al., 2007; Smith et al., 2000; Stahmer & Ingersoll, 2004).

Expanded Discussion

Ferster (1961) was the first to present a theoretical construct about the overt symptomatology of children with autism within the behavioral framework. He proposed that the behavior problems of children with autism were based on a general deficiency in acquired reinforcers. In 1962, he conducted several studies with this population of children in controlled environments where they were taught such simple tasks as pulling levers or matching to sample for reinforcers that were significant or functional to them. Ferster and DeMyer held that the behavior of these children could be explained by basic learning theory, and thus rearranging environmental consequences could help teach them to comply with certain aspects of reality (Ferster & Demyer, 1962). Several small case studies began to appear in the literature using mild punishment as well as extinction to decrease self-injurious behaviors successfully, as well as to train basic imitation and beginning language skills (Hewitt, 1965; Metz, 1965; Wolf, Risley, & Mees, 1964). All of the studies, however, presented no data on whether treatment effects were enduring across time and various

settings. The studies' significance however, lay more in the kinds of questions they began to ask about children with autism, as well as the methodology and design of studies about them.

Prior to this time, treatment for autism was focused on identifying and or curing it, within the traditional medical model of disease. Various studies (Brown, 1960; Havelkova, 1968; Kanner & Eisenberg, 1955; Rutter, 1966) were beginning to show that psychodynamic therapies were not effective in remediating autism. Indeed, the outlook for the disability was growing increasingly pessimistic. If the disease model had been able to provide any effective treatment paradigm, it is likely that the behavioral model would never have come to surface (Lovaas, 1979).

The failure of medicine and psychiatry, combined with the advent of behaviorism set the stage for viewing autism as learning disorder instead of a disease. Perhaps more importantly, however, it set the stage for research to focus on treating not the "disease of autism," but rather the behaviors of autism and their many manifestations. Without this change in focus, it is unlikely that many children and adults with autism would have even had the opportunity to make the gains in social skills, functional living capacity, and basic self-help and language that they can acquire in today's therapeutic and educational systems. Institutionalization would have been the more likely outcome. Regardless of whether behavioral methods were later used to teach these skills, it is apparent that the behaviorists changed the focus of treatment from curing autism to skills acquisition.

This simple shift in focus revitalized the field, giving optimism to families and the professionals dealing with them because the bigger problem of autism was now broken

down into much smaller manageable conceptual problems of skills and behaviors. The public could not see a cure, but they could see when an autistic child learned to feed himself or say a word, and feel a corresponding sense of accomplishment. In a sense, the small successes provided by the initial behavioral studies, were what was needed to motivate treatment professionals and families again with goals they could achieve, even when a “cure” was not in sight.

Ovar Lovaas claims that his interest in the behavioral treatment of children with autism goes back to his childhood in Norway. When his country was occupied by Nazi Germany, he began to wonder if Hitler’s destructive actions, and those of his followers, were caused by genetics or the environment. In an interview in the Fall 1994 issue of the *Advocate*, Dr. Lovaas discussed how the German culture had been premier in Europe in recognizing and rewarding art and science. Yet only a decade later it was perpetrating horrid acts of genocide and destruction to human beings. From his perspective, Lovaas felt this example offers evidence of how even a normal person can be highly affectionate in one environment, and horrendously cruel in another. Man’s adaptability allows him to acquire new skills easily, but these will be lost if the environment does not maintain them (Lovaas, 1993).

Lovaas’s original research interest was in the area of linguistics and behaviorism. In the late 1950s and early 1960s, he studied the effects of verbal control over nonverbal behavior, based on the theories of Whorf, Kanner, and Eisenberg (Whorf, 1956) that a person’s language influences what they perceive and think about their environment, and thus behave in it. His initial studies investigated reinforcing verbally aggressive statements

in an attempt to increase nonverbal aggressive behavior. They pointed out the considerable variation of verbal control of statements across children due to a wide variety of reinforcement history. Meichenbaum and Goodman (1971) were later to use these studies to develop the foundation for cognitive behavior therapy. Lovaas, however, continued to stick to a learning based interpretation of the verbal-nonverbal interactions, and began to be interested in gaining experimental control over verbal/nonverbal behavior in real-life environments (Lovaas, 1993).

It is with this orientation that Lovaas began his treatment research at UCLA in 1961 looking for youngsters who were at an age when they should be talking, but were still nonverbal. His initial plan was to build language in these youngsters under controlled conditions and then observe any concurrent changes in social, emotional, and intellectual behaviors. In searching for these subjects, he was referred to a local clinic for children with autism, and has never stopped working with the autistic population since. At that time, his team institutionalized 20 children at UCLA's Neuropsychiatric Institute for a year of intensive study and behavioral treatment. His initial efforts involved studying patterns of self-injury, because these behaviors were so prevalent among the nonverbal population. Lovaas reasoned that unless these behaviors were first controlled, no learning of language could proceed. Using single-subject designs, Lovaas concluded that social attention and demonstrations of affection occurring during self-injurious behavior episodes actually accelerated it, while withholding attention and teaching alternate behaviors lowered it (Lovaas, Freitag, Gold, & Kassorla, 1965).

Later, he expanded his research to larger group designs and experimented with the

use of contingent aversives using some of the most severely self-injurious clients in state hospitals to replicate his single case findings while suppressing self-injury with aversives. One of these studies was reported in *Life* magazine, and was a shock to the general public as it was the first time the use of aversives as treatment was publicized. In this 1965 study, Lovaas placed autistic children barefoot on an electric grid and applied electric shocks to their feet until they ran into their caretaker's arms. This was defined as an attempt to teach social behavior. Lovaas hypothesized that if stress was induced in the children, and then they were taught to reduce this stress by approaching attending adults, the children might begin to associate the adults with the reduction of painful events, and thus become more "attached." The intervention did not produce generalized and widespread therapeutic benefits across other behaviors, but it did increase attachment to others without any ill side-effects (Lovaas, Schaeffer, and Simmons, 1965). While many considered this treatment as "off the wall" (Schopler, 1987), Lovaas did not come to attempt the use of aversives as an impulsive hunch. Rather, he logically deduced that self-injury might be a learned operant response, based on his previous work (Lovaas, 1979). Using the same framework, he began to hypothesize that giving the child with autism more attention and affection in an effort to gain his attachment might actually serve to teach him to avoid it. Thus, inducing stress and the perception of attachment as release from stress might reverse the learning process. Although he conducted many other studies, Lovaas's use of aversives was to give him a controversial reputation in the field for many years to come, even after he publicly acknowledged his theories regarding aversives as mistaken (Lovaas, Schaeffer, & Simmons, 1965; Lovaas, Brehm, Kinsbourne, & Reichler, 1971). Later studies by Carr,

Newsom, and Binkoff in 1976 forced Lovaas to expand some of his original theories when they demonstrated that in certain instances, removing social attention (with time-out procedures) as recommended by Lovaas, had actually increased self-destructive behavior in their sample of autistic youngsters. In this regard, the behaviors served more of the function of escaping from a demand (Carr, Newsom, & Binkoff, 1976).

Lovaas's other studies during this time period challenged beliefs about the potential of youngsters with autism dramatically. Self-stimulatory behaviors, such as rocking, hand-flapping, gazing, etc. were reconceptualized to also be operant, and maintained by the sensory-perceptual reinforcement that the behaviors generate themselves (Epstein, Taubman, & Lovaas, 1987). The theory of "stimulus overselectivity" was also developed by Lovaas and his colleagues. This research suggests that children with autism have difficulty in responding to more than one stimulus cue at a time. They respond to only a very small portion of the total stimulus context presented. In 1973, Schriebman and Lovaas suggested that stimulus overselectivity might be one of the major contributing factors as to why children with autism fail to demonstrate appropriate social behavior and social responses, as well as acquire speech (Lovaas, Schriebman, Koegel, & Rehm, 1971).

Drawing upon the idea that imitative behavior could be conceptualized within learning theory, Metz demonstrated in 1965 how one could use reinforcement procedures to teach autistic children to imitate nonverbal actions. If imitation behaviors could be taught, Lovaas theorized that maybe more complex behaviors, such as language could also be taught. The idea of teaching language this way was novel at the time, as current theory emphasized language development as being learned observationally in a social context, as

well as Chomsky's theories of language acquisition. Lovaas's 1966 study demonstrated how mute autistic children could acquire imitative speech of sounds and words (Lovaas, Berberich, Perloff, & Schaeffer, 1966) with dramatic success. Using principals of operant learning and food as reinforcers, Lovaas was further able to break up the complex task of language acquisition into tiny components until he was having success teaching some children not just nouns, but time concepts, prepositions, grammar, semantics and even more abstract language (Lovaas, 1977). Videotapes were made of his methods that are still available today and are considered classic in the behavioral, psychological, and speech-language literature. One of the largest achievements of the behavioral model is its success in building language in previously mute and echolalic children.

Language skill development however, did not prove to be the key for facilitating overall improvement in other behaviors that were not treated. So Lovaas was not content to stop with this achievement, but instead continued to observe and study the nature of autistic behaviors. He redefined imitation as the establishment of a discrimination, whereby the child's response resembled its stimulus—the model's response (Lovaas, 1977). For most learning to occur, a youngster has to learn how to behave (i.e., behavioral topographies) as well as discriminate the conditions that govern the occurrence or nonoccurrence of a given behavior (i.e., when to behave). Lovaas, Koegel, Simmons, and Long conducted extended clinical observations of 20 children with autism from 1964 to 1973. They concluded that these children failed to learn by observing others in the same way that normal children do (Lovaas et al., 1973). Another Lovaas team corroborated this result using 15 children with autism (ages 5 to 16) and 15 normal (ages 1 to 6) children. In this study, children observed

a teacher teach another youngster how to play with a variety of functional toys such as a dump truck, a phone, bucket and shovel, and toy corral. Candy was given as a reinforcer if one of the children in the study then imitated/performed the modeled play task (i.e., putting the toy horse in the corral). Prior testing to the modeling showed that none of the children in the study were performing the modeled play task before they saw it demonstrated.

All of the normal children acquired information through observation only progressively with their chronological age. For the children with autism however, age was not a factor in this learning. The majority responded similarly to the youngest group of normal children, and some of them, even after over 1,000 modeling and observational trials, did not imitate the performed task. The authors suggested that children with autism can not learn new behavior through observation only, without intensive training in doing so. For neurotypical children, complex behavioral patterns and responses are learned by observational techniques on a daily basis. Children with autism, however, do not learn in this manner and thus could be expected to have a much lower level of functioning (Varni, Lovaas, Koegel, & Everett, 1979). Again, these studies were significant because previous research (Baer, Peterson, & Sherman, 1967; Hewett, 1965; Metz, 1965) had suggested that the deficit in observational learning was largely due to motivational factors, and thus, more volitional in nature. Indeed, Lovaas himself had originally had this hypothesis (Lovaas, Freitag, Nelson, & Whalen, 1967).

Lovaas's willingness to change his hypotheses as well again acknowledge his mistakes (as he did in discussing contingent aversives) were all part of his determination to find the answer to the many questions about autism. Now, it was clear to him that not only

did children with autism need to only learn a behavior more directly, but they also needed to learn to discriminate when to use the behavior. Lovaas hypothesized that this failure to learn by observation resulted in the many behaviors of these children that make them appear oblivious to the world of relationships to outside observers. They needed to be taught to discriminate first, and then learn to imitate a desired response more directly, as observation alone does not work for them. But if they could be taught to imitate language, than maybe they could also build other complex behaviors that normal child learn from observation in a similar process of discrimination /imitation.

The 1964-1973 treatment study mentioned earlier set about testing this theory using 20 autistic children. The program involved several stages of treatment. The first focused on reducing the frequency of self-destructive and self-stimulatory behavior using contingent reinforcement withdrawal (time-out), contingent aversive stimulation (slap or shock), while simultaneously reinforcing appropriate incompatible behavior, like sitting quietly. Next, simple behaviors were demanded from the children by a therapist, such as “Look at me.” Finally, once these were achieved, a heavy emphasis—80%—was placed on language training as the central part of the program, using the methods described earlier. Ongoing facilitation of the acquisition of other self-help and social skills such as dressing, good table manners, etc. using nonverbal imitation was also emphasized. Reinforcers utilized were based on their value to any given child in the study (Lovaas et al., 1973). The methods of *multiple response recording* and *discrimination learning through discreet trials* were critical to this and Lovaas’s most famous 1987 study. As this research study will be evaluating youngsters who have been in such a treatment program, they will be described

in some detail to insure their understanding.

In multiple response recording, selected behaviors, both normal and pathological, are defined for an observer who records their frequency and duration. In both Lovaas 1973 and 1987 studies, this was done with a button-panel, which in turn was coupled to a computer tape so calculation of the frequency, duration, and interaction of the various behaviors of the various behaviors would occur automatically. In current Lovaas therapy, this data is now taken directly by the individual behaviorist working with the child. In his 1973 and 1987 studies, this data was taken by outside observers for five categories of behaviors: echolalia, appropriate language, self-stimulatory behaviors, social nonverbal behavior, and appropriate play. These behaviors were described in precise detail, with specific instructions for the raters that were 3 single-spaced pages in length! For example, in recording usage of echolalic speech, the observer would depress the button for the duration of the child's speech until he paused, and not for every word or phrase. Similar definitions for compliance, or demand behavior were also precisely defined. Data was taken in this manner on a wide variety of carefully defined behaviors in each of the five categories, and always in the presence of the adult stimulus. Later generalization was assessed using unfamiliar adults with the same tasks (Lovaas et al., 1973).

A discreet trial is defined as a behavioral sequence which maximizes learning. It begins with a *stimulus* (tutor asks a specific question and/or presents specific material). This Sd (in Lovaas shorthand) is distinct from any other Sd in all verbal and nonverbal aspects because of the stimulus overselectivity problem in autism. The next step in the sequence proceeds to a *response opportunity* (child is given a few moments to respond),

and may involve the use of a prompt which the tutor has chosen to exert temporary control over a behavior so that it can occur correctly and be reinforced. Lovaas advocates using the least intensive prompt necessary to get the child to respond appropriately. Prompts may involve voice inflection, giving the child part of a correct verbal response, gestures, modeling, positioning stimuli in a manner to induce correct selection response, as well as actual physical hand over hand approaches. The behavioral sequence ends with a *consequence* (the tutor's consequence will depend on the child's response). The consequence is designed to increase the likelihood that the child will respond appropriately to the stimulus (Behavioral Intervention Associates, 1995)

Lovaas has developed several hundred discrete trial drills detailed in his *The Me Book* series, published by the Pro-Ed company. These follow a sequential format beginning with basic attending skills (sitting down, eye contact, etc.). Many of these early skills can take weeks or months to acquire, according to his research studies. Once these are acquired, the youngster is advanced slowly through receptive language for various nouns and body parts to multiple discrimination. These in turn are followed by the expressive language skills of verbal imitation and eventually descriptive and finally conversational language. Conceptual development, play, and socialization skills are at the more advanced drill level (Lovaas, Ackerman, Alexander, Firestone, & Perkins, 1980). Sample sheets of the most elementary drills, to the more advanced ones are attached in the Appendix A

The 1973 study provided the format of these drills for one year at a one to one level (2,000+ hours per child). The children were treated in 4 separate groups, and some were treated again several years after treatment, which allowed for within and between subject

replication of treatment effects. The first group of youngsters were given a year of treatment with monthly multiple response recordings before they were placed in a state hospital. Two years after treatment was completed follow-up measures were completed and treatment reinstated briefly. The second group of youngsters was already hospitalized, and progress was measured at 3-month levels during treatment. Follow-up measures were conducted 3 years later. The third group was seen as outpatients, and was measured only before and after one year of treatment. 1 year after they had terminated therapy, follow-up measures were again taken. The fourth group was also outpatient, with before and after treatment follow up measures. Parents were involved in the third and fourth groups, and they eventually took over the treatment of their own youngsters while the authors consulted and trained them (Lovaas et al., 1973).

In summary, the major results of the study noted improvement for all of the youngsters involved, although the degree and pace of these gains varied considerably between subjects. Inappropriate self-stimulatory behaviors and echolalia decreased for all subjects, with appropriate play and social behavior increasing. For some of the children, it took close to eight months into treatment before spontaneous social interaction occurred. At the same time, all of the groups who did not return to their parents showed severe regression. After another short treatment period however, they could again acquire their previous skills. All follow up measures recorded one to four years after the treatment showed that the large differences between groups of youngsters was most likely related to the post-treatment environment (home vs. institution), with youngsters in home environments with ongoing parent follow-up of skill training as having the highest scores.

In addition IQs on the Stanford Binet and adaptive/social skill scores on the Vineland were also improved after a year of treatment when looked at on an individual basis. Although no analyses of the statistical significance of these gains were reported, the authors stated that the mean social quotient on the Vineland before treatment was 48 (with a standard deviation of 20) and after treatment was 71 (with a standard deviation of 27). With regard to IQ scores, most of the children were initially untestable, and by the end of treatment were functioning in the Mild to Moderate mental retardation level (Lovaas et al., 1973). Whether or not these gains are truly significant however, is difficult to interpret. The largest range of score changes was seen in this group of 15 untestable youngsters, who were obviously given zero as their baseline score. To what extent this score increase reflected the elimination of the interfering attending behaviors so the youngster could even complete the tasks versus actual new acquisition of knowledge would be up for discussion. The importance however, of the increase in the children's availability for instructional and assessment purposes however, can not be disputed. The smallest gains were seen in youngsters scoring in the 40 to 50 IQ range, with gains moving into the 50 to 60 range. This group involved 4 youngsters. Finally, there was one youngster with a before treatment IQ of 80, and an after treatment IQ of close to 100 (Lovaas et al., 1973).

Despite some methodological concerns, this study was a landmark in the field in that it was one of the first to examine generalization of treatment effects over situations and time, as well as conducted treatment in a controlled setting with a high degree of precision. Great efforts were undertaken to insure unbiased and reliable rating by trained observers, as well as supplement behavioral measures of change with traditional standardized test

instruments. Criticisms by reviewers focused on the fact that no accounting was done of the effect of other treatments that may have been occurring simultaneously with the Lovaas program or during the time of treatment termination. While extensive effort went into shaping procedures to obtain inter-rater agreement (two sessions of feedback, retraining, and group discussions of disagreement) one would have to wonder as to what factors made the agreement poor initially to require such training, particularly given the specificity of the behavioral definitions of the variables being measured. It is interesting that the focus was not on changing the behavioral definitions, to foster more agreement, but instead on continuing to retrain observers until this agreement was obtained. Replicating this study and method of data collection would be difficult if the problem with rating agreement was as difficult as the author's discussed (Lovaas et al., 1973). Conclusions implying a causal relationship between post-treatment environments and treatment generalization appeared to be too judgmental, and did not account for the individual differences in the youngsters and their living situations as part of this function or sort out the variance accounted for by these factors. In particular, the Lovaas team's article implied that there was a particular "type" of parent who would be more successful in working with their autistic children. The team intimated that more "gentle" parents who were unwilling to use strong consequences such as food and spankings and show their anger and love with equal emotional strength and responsiveness would not do well with their children with autism (Lovaas et al., 1973). Further emphasis was given to the fact that such parents must be able to deny the medical model of "illness" in regards to their children, and thus "deny the child the "need" to be sick, and, instead give him some responsibility" (Lovaas et al., 1973, p.159). Finally, the

team noted that all parents must be willing to commit a major part of their lives to these children in implementing contingent management throughout the day, this meant “virtually ruling out any professional or extensive social interest on the mother’s part, requires a stable family structure, etc.” (Lovaas et al., 1973, p. 159). Indeed, the team actually recommended state hospital/institutional placement for several of the youngsters in this study whose families had economic strains, divorce, and “serious commitments and personal difficulties” (Lovaas et al. 1973, p.150). While it is not explicitly stated, it is easily inferred that these families were from lower socio-economic backgrounds or single parent homes where financial obligations prohibited better care and treatments for their children. Such statements would later come back to haunt the behaviorists devoted to this approach.

Lovaas set out to improve on many of the methodological/treatment errors when designing his next major intervention effort, the Young Autism Project. Given the much better rate of improvement for youngsters in home settings and the questions about treatment/stimulus generalizability, he moved treatment away from the hospital or clinic setting and into children’s home and everyday environment in the school and community. After noticing that the youngest children in the 1973 study had made the most progress, he then proceeded to set an age cap on youngsters entering the new program-less than 40 months if mute, and less than 46 months if echolalic. To solve the problem of too much heterogeneity in subjects, in addition to a diagnosis of autism from an PhD. psychologist and medical doctor, the youngsters were required to obtain a prorated mental age of 11 months or more at the chronological age of 30 months based on the Bayley, Cattell, Stanford-Binet, and/or Gesell Infant Development Scale administered by supervised

clinical psychologists. This number became known as the Prorated Mental Age (PMA). This criterion alone excluded 15% of the referrals to the program. To help control for the variability in treatment intensity and duration, subjects were assigned to one of two groups. The first was an intensive treatment experimental group (n=19) who received more than 40 hours of one to one treatment per week. The second was a minimal treatment Control Group 1 (n=19) that received 10 hours or less of the same treatment. All groups received treatment for two or more years. A second Control Group of youngsters receiving treatment, but not by the Young Autism Project was also selected using the same criteria as for the other groups that came from the same agency that had diagnosed 95% of the other youngsters in the study. This group of 21 subjects was selected from a larger group of 62 youngsters who were already participating in a 5 year study that would be published by Freeman, Ritvo, Needleman, and Yokota in 1985 (Lovaas, 1987).

Like the previous studies, behavioral observations were scored for Self-Stimulatory behaviors, Appropriate Toy play, Recognizable Words, and Abnormal Speech. This time however, the ratings were based on videotaped recording of the child's free-play behavior in a playroom equipped with early-childhood toys. A naive observer scored all tapes after being trained to agree with two experienced observers at levels between 85 and 100% for the various categories. Finally, a parent rating variable using an ordinal scale for 8 different measures of pathology was added as a measure, and computed to give a Sum Pathology. This also helped to ensure an average sample of autistic children in regards to the types of behaviors noted in the literature, albeit on a post-hoc basis (Lovaas, 1987). Parent involvement was much more than this however. All parents were required to work as part

of the treatment team throughout the intervention, and received extensive training so that, in effect, treatment could take place for almost all of the subjects' waking hours. This effort was based on Lovaas's continued hypotheses about the severe deficits in children with autism had in observational learning compared to normal children, and their need to have information repeated using distinct stimulus without interfering prompts. This had to be conducted in structured learning settings in order to make the discriminations necessary to learn and change behavior. The home environments, and the members in it, were thus the ones who had to be the most significant piece of the discrimination stimulus, in order to foster the most efficient generalization.

Treatment was again separated into stages of first reducing self-stimulatory and aggressive behaviors with the use of teaching of appropriate behaviors and contingent aversives (saying a loud "no" and/or slapping a youngster firmly on the thigh) (Lovaas, 1987). This was followed with building compliance, and then to teaching imitation, receptive language, and the beginnings of appropriate toy play, as well as extending treatment into the family. The second year focused on interactive play with peers, expressive and early abstract language, and extension of treatment to the community and various normal preschool groups. Finally, the third year emphasized the teaching of appropriate and varied expression of emotion, pre-academic skills, and observational learning—the ability to learn by observing other children learn. It is interesting to note that often Lovaas had to withhold information about a child's autism diagnosis in order to ensure his subject's educational placement was with normal preschool youngsters as their first educational group experience.

A MANOVA was used to form comparisons between Groups on the intake variables of PMA, chronological age at diagnosis and chronological age at treatment onset, the Sum Pathology score, and finally the four behavior ratings noted earlier. Other than a 6 month older age range for the control groups, no significant *F* ratios were noted on any of the variables.

At post treatment follow-up two and a half years later (whenever the subjects would have ordinarily completed first grade) however, the experimental group was significantly higher than the control groups in regards to IQ ($p < .01$) and level of educational placement ($p < .001$) (Lovaas, 1987). The two control groups did not differ significantly at intake or at follow-up. The experimental group gained an average of 30 IQ points over Control Group 1 subjects, with 12 obtaining normal range functioning in contrast to the two at program initiation. In addition, the number of subjects in the experimental group functioning within the moderate to severe range of mental retardation dropped from 10 to 3. Two years later, these scores were still stable. In contrast, the IQ and MA of the two control groups remained virtually unchanged between intake and follow-up, which was also consistent with the results of the concurrent study done by Freeman and his colleagues (Freeman et al., 1985). All of the IQ testing was done by naive Ph.D. students using both verbal and nonverbal tests, based on the needs and levels of the individual children when they were between the ages of six and seven.

Lovaas used an Analysis of Variance to determine if there was a relationship between the behavioral variables measured (Recognizable words, Toy play, Self-stimulation, Abnormal Speech, and Recognizable Words) and the Sum pathology (based on

parent ratings), and outcome (Lovaas, 1987) For both the PMA was significantly related to outcome in both groups, as was abnormal speech for Control Group 1 (Lovaas, 1987). The six month average difference in chronological age between the experimental and control groups was not related to outcome, and Lovaas hypothesized that this was related to the very young age of all subjects at the onset of treatment.

To test the idea that use of contingent aversives was/was not related to treatment outcomes, a within-subjects control procedure was done with 4 students in the experimental and Control Group 1 (Lovaas, 1987). Using a within subjects replication design across subjects, situation, and behaviors, the contingent aversive component was not present during baseline measuring of inappropriate behaviors as well as play and language. The lack of the aversive component did not allow the subjects to make as many gains consistently, and thus the experimental intervention again included the use of contingent aversives.

Lovaas concluded that 47% of his experimental group achieved normal intellectual and educational functioning, with normal-range IQ scores and successful first grade performance in public schools (Lovaas, 1987). He referred to this group as “fully recovered”—a term that was to invite the criticism of many renowned researchers and practitioners in the field, as well as a cultlike following of parents who seized upon his findings as “the cure.” Titles in popular magazines about his study began to appear with names like “Saving Grace” and “Autism: A Defeatable Horror” (Schreibman & Koegel, 1975). This was in sharp contrast to only 2% of the control group who achieved this level of functioning. Lovaas himself, however, cautioned that 40% of his experimental groups,

although they made substantial progress in all variables measured, were mildly retarded and assigned to special classes for the language delayed, as were 45% of the control groups. Finally, there was a third group of 10% who made minimal gains and were classified as profoundly retarded and assigned to classes for the autistic/retarded, while 53% of the control groups fell into this category at post treatment (Lovaas, 1987).

Leading researchers in the field however, were skeptical about the results (Greenspan, 1992b; Mesibov, 1993; Schopler, Short, & Mesibov, 1989) setting off a Lovaas/Schopler debate in the literature that was vicious and personal in undertone for scholarly journals. The letters and journal articles responding to each other did not miss an opportunity to get in personal “digs” from both sides. At another level, they also reflected the same powerful emotionality and passion that these youngsters elicit from their caregivers in their attempts to help them that was noted earlier in this paper.

Major criticisms around methodological measures issues centered in three areas: bias in selection of subjects, inappropriate outcome measures, and an inadequate control group (Foxy, 1993; Greenspan 1992a; Mesibov, 1993; Mundy, 1993; Schopler et al., 1989). These three areas will be examined briefly in the paragraphs to follow.

Bias in selection of subjects

Schopler and colleagues (1989) felt strongly that Lovaas’s subjects were skewed toward relatively high-functioning youngsters. They took issue with the use of the “prorated mental age” (PMA) in the selection criteria of the subjects, since most other researchers in studies of autism had always used the more traditional ratio IQ. They viewed

the PMA as giving the appearance of lower functioning than the ratio IQ. A PMA of 11 months was equivalent to a ratio IQ of 37. According to Schopler and colleagues (1989), this criterion excluded many subjects who “had intellectual functioning higher than the profoundly retarded range” (Schopler et al., 1989, p.163). Lovaas claimed that youngsters who scored a PMA of less than 11 months (scores within the profoundly retarded range according to his formula) did not have high agreement for the diagnosis of autism from two or more independent examiners, and thus were excluded from the study (15% of his actual referrals) (Lovaas, 1987). Lovaas claimed that only this group (the profoundly retarded) was excluded, while Schopler felt that the use of the PMA actually excluded even some youngsters whose functioning may have been in the moderate range.

When Schopler applied Lovaas’s PMA formula to the children in Schopler’s TEACH program in North Carolina, he found that a much larger portion of Schopler’s clients, 27% of his sample, would have been excluded using this criteria. In addition, Lovaas, himself had noted a mean PMA of 18.8 for his treatment group, which actually translates to a ratio IQ of 63, “considerably higher than that for any random sample of children with autism” (Schopler et al., 1989, p.163), as well as any of the epidemiological studies noted earlier in this paper where youngsters mean IQs tended to center around 45-55 (DeMyer, Borton, Alpern, Kimberlan, Allen, Yang, & Steele, 1974; Lotter, 1966). Lovaas reported his mean IQ for this group as a deviation IQ (49), despite the fact that this deviation number is considerably lower than most of the ratio IQs noted above.

This estimate was also further inflated because the tests Lovaas used (Bayley, Binet, & Cattell) tended to yield low scores for autistic children (Lord & Schopler, 1988;

Short & Marcus, 1986). Therefore Lovaas's relatively high ratio IQ of 63 may actually be an underestimate of his subjects' functioning. More fuel to this argument was added later when Lovaas acknowledged that he had optimized children's performance on pre-treatment IQ tests by first training and reinforcing compliance behaviors during testing, and thus not using standard test administration procedures that had been done in other studies (Lovaas, Smith, & McEachin, 1989).

Interpreting Lovaas's mean PMA is difficult without more information regarding the range of the subjects' PMA, and the number of subjects scoring at various score levels. Therefore, justifying his population of autistic youngsters in his sample as covering both the low- and high-functioning children of autism requires different descriptive data regarding his subjects than Lovaas made available. Many children with autism are simply untestable, and thus their low scores may have been from resistance as opposed to lack of ability (or a functioning level in the severely mentally retarded range). If the Lovaas's sample was skewed to include only the most "testable" youngsters, than indeed his experimental results may be up for question because his original population would have been better able to benefit from any type of treatment, not just Lovaas's, than those who were "untestable." Finally, if his sample truly was higher functioning, than the results suggest that his treatment method worked for his youngsters who had the highest chance of succeeding anyway, as opposed to other studies which utilized a more wider range of abilities within their samples.

Criticism was also directed at the inclusion of children at ages of 40-46 months only if they demonstrated echolalia (Schopler et al., 1989). As noted earlier in this paper as

well as by Lovaas (1981), this is a characteristic of children with autism who tend to have a better prognosis. In their letter to the *Autism Research Review International*, Lovaas and McEachin (1987) stated that this criterion was intended to produce a sample that would likely make progress more quickly, but justified its use post-hoc by claiming that no greater improvement was shown for the echolalic children by their data analysis. Thus, critics hailed that a group of youngsters with relatively good prognosis was selected, but they were not truly representative of children with autism as a whole (Schopler et al., 1989).

Lovaas, Smith, and McEachin (1989) countered these remarks by stating the PMA was selected because both ratio and deviation scores could be determined from it, and cited comparable deviation IQs to those of the subjects Lovaas claimed to be an “average” sample of youngsters with autism from numerous other studies (Freeman et al., 1985; Gillberg, 1984; Rutter & Lockyer, 1967).

The authors further attacked Schopler’s other criticisms in this area by noting similar flaw areas in the studies of Schopler and his team members (Lovaas et al., 1989). They alleged that Schopler had used mostly deviation IQs in his studies, but treated them as ratio IQs to in fact overestimate the numbers of children that would have been excluded by the Young Autism Project study. They also noted that Schopler had never presented any evidence to show his own samples of children with autism were comparable to other studies (Lovaas et al., 1989). Lovaas and his team noted their rationale of exclusion of youngsters with low PMA to be that previous studies had shown that it was difficult to differentiate children with autism with such low IQs from profoundly retarded children (Wing, 1979, 1989). Finally, the Lovaas team cited that their training of youngsters to

comply with test-taking requests (such as sitting in a chair) as well as frequent noncontingent reinforcement to create a positive relationship between the subject and the examiner, would have served to make *higher* IQ scores than would have been obtained without such procedures. Thus, the Lovaas's subjects IQs might actually be overestimates, as opposed to underestimates (as accused by Schopler). The Lovaas team viewed their IQ scores as conservative, as opposed to seeing them indicative of the higher functioning bias argued by their critics. Several years later, comments were also made by Mundy (1993) that the measures used in the Young Autism Project, may not be able to give a complete picture of the cognitive, social-emotional, and adaptive outcomes of the children in the intervention protocol.

Inadequate Control Group

Lovaas original experimental treatment group was made up of those children who not only met the criteria, but also who had the availability of student trainers for the 40 hour week behavioral treatment (Lovaas et al., 1987). That is, the youngsters who applied to enter the study first were assigned to the treatment group because the largest numbers of student trainers were available at that time. While other youngsters did enter the treatment group later, it was only when the correct number of student trainers were available. Thus, the control groups consisted of youngsters who met the criteria, but for whom no therapists could be found, or there were only enough to provide a much less intense form of the treatment (10 hours per week). In the Fall 1994 issue of *The Advocate*, Lovaas claimed this was done because no parent would voluntarily allow his child to be put in a group where he

would receive little or no treatment, and thus there had to be a wait-list control group in addition to the first come, first serve group. Baer (1993) also felt that the quasi-random procedures had produced an essentially functional random split, because the child's status as a best or worst potential case (even if able to be detected by the clinician) would not have affected the availability of the resources at the moment the child was available for assignment.

But Lovaas had previously stated in the 1979 study that parents with restrictions of divorce, maternal employment, personal and financial problems, etc. were counseled to hospital/group home and institutional placements. As all of the families in the Young Autism Project treatment group received and engaged in the 40 hour week program, selection could not possibly be random in regards to the many personal and family variables that could restrict one's abilities to participate in such an intense program, even though Lovaas claims SES means almost identical to the national average, with a correlation between SES and treatment outcome of $r=.13$. Again, the issue here is probably not the range or mean SES, but the lack of information regarding the precise numbers of families in each SES category and descriptions of their life circumstances. Schopler suggests that Lovaas's own inconsistencies between the reports on his work in 1978 and 1987 appears to be more post-hoc analysis in nature than true randomly controlled clinical trial (Schopler et al., 1989). Lovaas, Smith, and McEachin (1989) again refuted these statements from a post-hoc angle, noting that only 2 of the 21 families offered the intensive treatment dropped out of the study, even though "many" were headed by single parents or had medical/psychological stressors in one of the parents. Because parents were able from the

beginning to attend to their other family needs while student therapists worked with the child in the home, Lovaas concluded that for this reason, parents experienced the treatment as a relief, rather an additional stressor, and thus did not drop out (Lovaas et al., 1989).

Schopler also felt that no control was done for the effects of attention as being a covariable responsible for treatment success. This could have been affected by using students untrained in behavioral techniques, but still spending time interacting with the youngsters (Schopler et al., 1989). Lovaas sharply replied to this by noting that if mere “attention” were enough to “cure” an autistic youngster, the child’s parents and teachers would have succeeded long ago, and thus they had ruled out the possibility that mere attention could be a factor in treatment at the onset of the study (Lovaas et al., 1987).

Inappropriate Outcome Measures

Lovaas claims for “recovery” were based on the youngster’s placement in a normal classroom and results of IQ measures (Lovaas et al., 1987). Although he stated that school personnel described the youngsters as indistinguishable from their friends, no formal data, instruments, or even behavioral observations were used to document this fact (Schopler et al., 1989). Classroom placement is also influenced by the school system policy and attitude towards mainstreaming and inclusion of handicapped youngsters, as well as advocacy efforts by parents and treatment staff (Schopler et al., 1989). Thus, a state that emphasizes more mainstreaming will most likely have more autistic children in their first grade classes, as will youngsters who have student therapists with time and energy to advocate for them—making use of placement alone as an outcome measure ineffective as a measure of

behavior treatment effectiveness (Schopler et al., 1989).

Because the Young Autism Project always terminated services prior to first grade for children who had successfully adjusted to normal preschool classes, they felt the youngsters had entered normal first grade on their own merits (Lovaas et al., 1989).

Use of IQ outcome measures might also reflect improvement in compliance, rather than true gains in cognitive functioning (Schopler et al., 1989), particularly when using standardized administration procedures. This accusation was originally countered when Lovaas and McEachin (1987) revealed that they had not used standardized test administration behaviors (as noted earlier). However, because strict adherence to standardized procedures was followed at follow-up, the Lovaas team insisted that the improved functioning was valid (Lovaas et al., 1989).

Five years later however, McEachin, Smith, and Lovaas (1993) released a study that was to provide even more support for not only the effectiveness of their treatment program, but also its durability and generalizability. At the time of this follow-up study, the mean age of the experimental group of children was 13, ranging from 9 to 19. This study had two parts. The first was to examine whether subjects in the treatment group had maintained their treatment gains by comparing them with the Control group 1 from Lovaas's original 1987 study (the group that had received 10 hours or less of Lovaas treatment a week) on standardized tests of intellectual and adaptive functioning, and then contrasting the group and their current and past performance with each other using the WISC-R, Vineland Adaptive Behavior Scales, and the Personality Inventory for Children. The second part involved the nine subjects who had achieved the best outcome at the end

of the original Young Autism Project. These were the youngsters who were classified as normal functioning (based upon class placement and IQ) at age 7. This was done using the same standardized tests as the previous group, as well as a Clinical Rating Scale of two items scored from 0 to 3 regarding likely areas of difficulty for children with autism that was developed by Dr. Lovaas (McEachin, Smith, & Lovaas, 1993).

For the first part, 47% (the same number as in the earlier study) were continuing to attend regular education classes, and continued to have a statistically significant higher mean IQ (84.5 versus 54.9) than the control groups. While 11 subjects in the experimental group (58%) continued to have an IQ of at least 80, only three of the control group did as well or similar to the results of the original study, as well as indicating that the gains in intellectual functioning noted in the original study had been maintained (McEachin et al., 1993).

The experimental group also earned a mean score of 72 on the Vineland (*SD* of 15), while the control group's average was 48, with significantly higher Maladaptive Behavior score levels. The groups did not differ on their mean T scores for the Personality Inventory, with the experimental group earning a score of 62 and the control group a score of 65 (T scores above 60 are indicative of possible/mild deviance, and those above 70 indicate a clinically significant problem). The most reliable difference between the groups occurred on the Psychosis Scale, where the experimental subjects had a mean of 78 and the control a mean of 104 (McEachin et al., 1993). The authors claim that this extreme difference in scores was the result of the deviant score of one subject in the best outcome group (76), while the other best outcome subjects had only two scores in the deviance range, and five

were clearly in the normal range. This same subject also had nine other elevated scales on the PIC, in contrast to the other subjects usually having only one elevated scale. Further nonparametric statistics were used to compare the best-outcome subjects with a nonclinical comparison group (because of different SDs). A significant difference was seen between the two groups, in regards to the best outcome subjects showing more deviance, but most of this deviance came solely from the single subject described earlier.

Given the small number of subjects in the best outcome group, the occurrence of two with deviance scores and one with clinically significant scores was brushed over too lightly by the authors. While this is not meant to detract from the progress of the other subjects, claiming an entire group be “recovered” when three of the youngsters still had such deviant scores would probably have been better explained by looking at the differences in these youngsters before, during, and post treatment more descriptively. Such an analysis, as opposed to detracting from the Lovaas theories, would have provided useful information to the field as to whether certain differences in learning style, caregiver variables, sensory abnormalities, etc. also played factors in treatment outcome. By not examining this further, the authors actually detracted from the results of their study regarding progress in social interaction—perhaps the characteristic of most concern to parents, and more important than IQ. Instead, they unwittingly provided support for the comments made by one of Lovaas’s earlier colleagues, Laura Schriebman. She has stated repeatedly that in her extensive experiences children with autism, no matter how much progress they made, always retained a quality of qualitative oddness about them socially and emotionally as they grow older into adulthood (Fishman, 1995).

Stronger and more convincing results of the McEachin et al. (1993) study were seen in the second part of the study dealing with the best outcome group, who now had a mean age of 12. They were compared with a nonclinical group of youngsters. Full-scale IQs for the best-outcome group ranged from 99 to 136, with Verbal IQs evenly distributed from 80 to 125, and 88 to 136 on the Performance Scales. Vineland scores were all within the average range on the Composite Scale, although 3 of the 9 best-outcome youngsters did have marginal scores on the subscales. These same 3 youngsters also scored in the Clinically Significant range for Maladaptive Behavior, while the other 6 subjects scored in the nonclinical range (McEachin et al., 1993).

On the parent completed Personality Inventory, all best outcome subjects scored in the normal range across all scales, as well as had valid profiles based on the three validity scales of this test. Only one youngster had any scores in the clinically significant range, and had been moved to a special education classroom for youngsters with language delays (McEachin et al., 1993). Finally, on Lovaas's own Clinical Rating Scale, the mean score was 8.8, with a standard deviation of 12, while the nonclinical control group had scores between zero and five. All of the deviance in the best-outcome experimental group's scores (according to the authors), appeared to come from the same subject who had the borderline Vineland scores noted earlier (McEachin et al., 1993). The study supported Lovaas's 1987 original suppositions that only the most intensive form of treatment (40 hours a week) of the experimental group would result in success, and that less intense forms (the 10-hours-a-week control group) would be ineffective, long after treatment had actually ended.

This long term study was meticulous in its use of blind evaluators, efforts to insure

a wide range of assessments, efforts to use nonclinical control groups, as well as follow-up efforts to locate several children who had moved out of the area. Schopler did not write any additional articles to comment about the study after this follow-up. Even Mesibov, who had criticized Lovaas's work earlier with Schopler, acknowledged that the results were encouraging. He did, however, continue to express concerns about the representativeness and comparability of the sample group, as well as the lack of higher functioning clients in the control group (Mesibov, 1993).

Allan Kazdin (1993), a leader in the area of psychological research design and evaluation, lauded the study for its long term nature, the testing of an intensive form of treatment and the comparison of alternative, less intense versions of it, as well as the use of standardized instruments. Most importantly, he noted the focus on a population with severe problems, and felt that even if the sample was not truly representative, this did not detract from the significance of Lovaas's results. Indeed, Kazdin (1993) stated:

the significance of a demonstration in the treatment of autistic disorder does not require that all cases are effectively treated or that even a major segment of a representative group is effectively treated. The question of interest is whether any children with significant impairment can be treated in a way to show reliable and important changes. (p. 378)

Along with other leaders in the field, he recommended replication of the project, using a larger sample of cases to permit better evaluation of variance as well as patient/treatment interactions in addition to just the main effects of the intervention (Foxx, 1993; Kazdin, 1993; Lovaas, 1993). Baer (1993), agreed that Lovaas's results, even with quasi-random assignment, were still convincing, seeing them as "reliable, correct, and exceptionally important" (Baer, 1993, p.374).

Remaining criticism focused on the conclusion of the treatment as having effected a

“cure” (Greenspan, 1992a; Mesibov, 1993; Mundy, 1993; Prizant, 1995). Mundy (1993), in particular, noted the differences between high-functioning individuals with autism and “normal” youngsters, pointing out that the latter group usually does display adequate performance on standardized intellectual and adaptive behavioral tests. Mundy focused on the subtleties of cognitive functioning in this population, including poor performance on tasks that require more flexibility of thought processes or operational thought processes, including some of those noted earlier by the British “theory of mind” researchers (Mundy, 1993).

In breaking down the score of the Personality Inventory for each subject, Mundy (1993) noted extremely elevated Intellectual Screening Scale score for 4 of the 7 best outcome subjects—a scale that is sensitive to cognitive disturbance or thought process anomalies. Mundy felt additional measures of odd thought processes, the degree of obsession of various thoughts, as well as worries and depressed moods needed to be accounted for and measured in the best outcome youngsters, because high-functioning individuals with autism are prone to experience symptoms of social and emotional disturbance at a more internal, versus an external level. He felt that the both the PIC and VABS measured the external nature of such issues, not the internal ones. Multi-informants were suggested to improve reliability, as well as a diagnostic interview with each child (Mundy, 1993).

Mesibov (1993) cited concerns along similar lines, and felt that while the best-outcome youngsters’ results’ were impressive; they were still far short of “normal” functioning. Like Mundy, he noted the need to measure conceptual ability and social

communication, as well as students' social interactions, and friendships.

Lovaas, however, continued to insist that these youngsters were “recovered,” and compared his best-outcome subjects to subjects in studies by Lord and Schopler (1989), Ozonoff, Pennington, and Rogers (1991), Dykens, Volkmar, and Glick (1991), and Yirmiya, Sigman, Kasari, and Mundy (1992) (Smith, McEachin, & Lovaas, 1993). These were all studies involving high-functioning individuals with autism. The Lovaas team argued that there was no need to use other measures of “normality,” since more standard clinical measures told the same thing (Smith, McEachin, & Lovaas, 1993).

Two small research studies have been done examining the economic and psychological burdens associated with the Lovaas treatment for autism. Hobbs, Blalock, and Chambliss (1995) surveyed 12 mothers and 10 fathers of youngsters who were involved in the Lovaas program in Pennsylvania, whose children were diagnosed at 34 months of age, and whose current age was at a mean of 56 months. They utilized a self-report questionnaire and surveyed expenses incurred. The price of the initial consultation ranged from no cost to \$1500, with an average of \$300. Attendance at the three day clinic workshop recommended by Lovaas was \$2000 plus airfare, with expenses ranging from \$200 per day to \$100 per hour for each of three days. The average number of therapists hired per family was 5, with a mean salary of \$7.60 per hour for a mean of 29.5 hours per week. In addition, monitoring as recommended by the Lovaas staff averaged every 3.8 weeks, at expenses ranging from \$60 to \$260 an hour. The average monthly cost of providing therapy for the children in this study was \$1,237, and not reimbursable through insurance coverage. Given these costs, it is not surprising that 47% of the families surveyed

were in the \$80,000 and above income bracket, and the average annual family income in the study was \$67,500. Insurance coverage was provided however, for speech, occupational and physical therapy, feeding and swallowing therapy, and sensory integration which many of the youngsters received in addition to Lovaas. Special education services, of course, were free.

The parents in the study reported being able to spend only 0-3 hours together per week, which is one-third of the average for parents of children without autism. Women in the study reported being involved in the treatment of their autistic child 83% of the time, with fathers reporting only 20% of their time being involved (Hobbs et al., 1995) Corresponding to this, 67% of the mothers were unemployed, and 25% employed part time, while only 8% worked full time. Of the fathers 78% reported the treatment had caused the siblings of their autistic child to compete for attention, and 83% of the mothers also reported this. Interestingly, levels of stress for either parent did not decrease when they utilized more support systems such as parents, friends, therapy groups, parent groups, coworkers etc. The study also noted that the mean amount of time each family had spent researching autism was 555 hours.

In another study examining five families, Chambliss and Doughty (1995) found similar results. They noted that the average number of hours mothers spent with their child with autism was 12 on a weekday (11 in therapy) and 16 on a weekend, while for fathers it was 9 and 12 respectively, with 1 hour per day on therapy. Similar to the other study, the mean number of therapists per family was 5, at a mean cost of \$7.50 per hour, at 5.5 hours per day. All five families, however, were optimistic about the Lovaas treatment.

While many of his colleagues have expanded upon Lovaas's original treatment methods, Lovaas himself continues to be adamant in his methodology, changing very little from his original 1987 format. He acknowledges there is a type of child with autism with a visual learning style, who if he doesn't start imitating language within in the first 3 months of treatment, usually does not do well in the program. In an interview in the fall 1994 issue of *The Advocate*, Lovaas stated that he was now focusing efforts at determining what revisions are necessary to make treatment effective for such youngsters.

Although extremely difficult to implement from a staff, training, and monetary perspective, replication sites and studies were set up in Wisconsin, New Jersey (Rutgers), Massachusetts, and the Washington metropolitan area. Replication did not occur without site supervisors spending 6 months in direct, intensive training with Dr. Lovaas himself at the UCLA site. In addition, Lovaas's graduate students began setting up private tutoring agencies across the country that specialized in his techniques, and conducted home training as well as provide therapists for interested families, who usually were on wait lists for inclusion in the free research site replications. Within the state of Maryland alone, there were more than 50 families conducting intensive (40 hour week) Lovaas treatment within their homes in 1999, and many more using the program at 20 or less hours a week due to cost issues. Between 1993 and 1998, there were twelve successful law suits against various school systems in the United States that effected payment for these programs under the Individuals with Disabilities in Education Act, as well as also successful insurance appeals (FIAT Newsletter, 1996).

Well over 75 research studies have been published using ABA interventions prior

to 2000 that include individual case studies, multiple baseline designs and even some comparison groups with and without treatment (but not with different treatment approaches) (Tsakiirs, 2000). These studies all targeted specific behaviors and learning “targets” in isolation or in cohorts of skills and show clear improvement from baseline to outcome data on the identified areas. With the exception of a 2006 study referring to “learning recovery” (Butter, Mulick, & Metz, 2006), the studies have not postulated “recovery” from autism as was done in Lovaas’s original work, but rather emphasized improvement in specific learning and behaviors that impact school placement and interaction with others.

More recent research studies and literature reviews continue to examine implementation of the model Lovaas developed using more rigorous designs and measurement criteria to better determine outcomes and treatment effectiveness (Baker & Feinfeld, 2003; Cohen, Amerind-Dickens, & Smith, 2006; Green, Brennan, & Fein, 2002; Howard et al., 2006; Kasari, 2002; Sallows & Graupner, 2005; Smith et al., 2000).

Neo-Behavioral Treatments

Modifications to Lovaas/Influence of Linguistic Factors

Synopsis

Not all of Lovaas’s colleagues support his “dogmatism” regarding a purely operant form of behavior treatment without variations. Indeed, two researchers who originally

conducted research with Lovaas expanded his theories with their own studies, with a particular focus on motivating children with autism without the presence of tangible reinforcers. This led Robert and Lynn Koegel (1987) to successfully demonstrate the use of a more natural method of learning language that was not unlike that of normal children, using play materials and tasks selected by the autistic youngster himself, as opposed to dictated by the therapist. Laura Schriebman focused on other social aspects of language development, as well as “social validity” of autism research, trying to see if the general public could perceive improvement in the overall flow of interaction between parents and their autistic children (Schreibman, 1988). Other leaders in the field looked at analyzing the “communicative intent” of the many maladaptive and self-stimulatory behaviors of autism, as opposed to viewing them as merely inappropriate and in need of elimination through extinction, punishment and other operant techniques. All the neo-behaviorists emphasized a less mechanistic and more humane approach to the autistic child, while operating within the behavioral model to try to obtain a happier, spontaneous, and enthusiastic autistic child in addition to one that merely acquired skills.

In 1995, Andrew Bondy and Lori Frost emphasized the need for an alternate means of communication as primary to learning any communicative behaviors if a child was not verbal, and developed the Picture Communication System (PECS), part of their Pyramid Program of instruction. In *Verbal Behavior Analysis* (1989), Jack Michaels and his colleagues also focused on language/communication behaviors as the foundational skill for all learning using “errorless teaching” as opposed to discrete trials. . Using both sign and verbal language, they embedded communication and language in an expanded curriculum

that encompassed many other skill areas and was taught in environmental context referred to as the NET- Natural Environment Teaching.

Expanded Discussion

Both Robert Koegel and Laura Schriebman were involved initially with Lovaas in many of his early studies to study stimulus overselectivity in autism, selective responding to multiple sensory input, as well as in the use of his traditional behavioral methodology and its effectiveness. In particular, Koegel was one of the authors of the initial 1973 study of the effectiveness of behavioral therapy at the UCLA clinic (Lovaas et al., 1973). These colleagues eventually left Lovaas to establish practices and clinics of their own to expand and modify many of Lovaas's original treatment schemes. While still considered to be behavioral in their orientation, both researchers focused on the acquisition of improved social behaviors, spontaneity, as well as motivation for learning for autistic youngsters through the use of techniques that took advantage of more naturalistic environmental, social, and language components outside of the rigid format prescribed by Lovaas. Along with the speech language experts to be described later, they became the bridge between the behavioral and relationship therapies that will be reviewed later in this section, and an important link between the two seemingly opposite camps.

As early as 1977, Koegel was concerned that the development of behavioral programs in autism was far ahead of the corresponding ability to produce enduring change outside of the therapy setting, and wanted to help develop a "technology of behavioral persistence" (Atthowe, 1968, as cited in Koegel & Rincover, 1977). Together with Arnold

Rincover, he demonstrated the need for maintenance procedures to be built into treatments by thinning reinforcement schedules within the treatment setting as well as using periodic noncontingent reinforcers in the settings outside therapy (Koegel & Rincover, 1977). This was done using multiple trials in both therapy and nontherapy settings using the traditional behavioral (analog) method in treatment, and then an experimental method involving more random (less discriminating) reinforcement.

Koegel was still concerned however, about the overall lack of motivation to learn that was present in most autistic children, without the presence of tangible reinforcers. Drawing from the more traditional theories of learning and motivation, in 1979 he hypothesized with Andy Egel that task avoidance and motivation might be impaired because of repeated experiences of failure. This means that autistic youngsters' own difficulties in learning make them fail more to start with. Furthermore, their own attempts at learning are unrecognizable, so they go unrewarded or minimally rewarded as a natural consequence in their environment (Koegel & Egel, 1979). In a 1983 study, he was able to demonstrate some of this theory in teaching speech to nonverbal autistic youngsters. In this regard, autistic children could be viewed from a motivational aspect as being quite similar to normal children. Results indicated that when any observable attempt to verbalize was reinforced, as opposed to a more strictly defined successive approximation effort (no matter what the amount of effort the child made), the youngsters achieved higher percentages of correct verbal responding and progressed more rapidly, as well as were rated as happier, better behaved, more interested, and more enthusiastic than under the traditional method (O'Dell, Dunlap, & Koegel, 1983). The use of subjective terms such as "happier" and

“enthusiastic” was not usually seen in the Lovaas line of behavioral literature as observable, definable behaviors, and was indicative of the different tact Koegel’s treatment approaches began to take.

In keeping with the idea of taking some of the “control” out of the traditional behavioral method, Koegel began to investigate the effects of shared control and the use of child-preferred (as opposed to therapist chosen) activities on the motivation of autistic children. Koegel’s 1987 research study used a reversal design alternating arbitrary adult chosen activities with those activities chosen by the child (sometimes needing an adult prompt to do so). Koegel demonstrated significant decreases in the active social avoidance behaviors of gaze aversion, eye closing, turning head/face away, or moving away in the child-preferred condition for 10 autistic youngsters without the use of any punishments/redirections for these negative behaviors (Koegel et al., 1987). According to the authors, perhaps repeated exposure to failure in social situations (due to the very nature of the autism handicap) served to increase social avoidance behaviors, and these in turn were negatively reinforced even more by the ending of demanding social situations (which would occur naturally when a normal adult interacts and is frustrated with an autistic child). In turn, the child then gets exposed to less and less reinforcing social interactions, causing a vicious cycle where the social avoidance behaviors are highly resistant to extinction (Koegel et al., 1987).

Koegel’s next step was to extend this observation to the domain of language. In 1984, Wetherby and Prutting had observed that autistic children frequently initiated communication with adults in free-play settings, as opposed to more structured activities.

Because this report was inconsistent with the other literature about spontaneous interaction skills in autism at that time, it was largely ignored. The authors had hypothesized that the discrepancy might be due to the use of a nondirective adult in the study, which allowed the children opportunities to engage in child-preferred, as opposed to adult determined activities. The similarity between this discovery with language and Koegel's with socially avoidant behavior was obvious, and Koegel, together with his wife, Lynn, took the next steps to forge this link in two studies in 1990 and 1992 (Koegel & Koegel, 1990; Koegel, Koegel, & Surrat, 1992).

The concept of the Natural Language Paradigm emerged from the 1987 study by the Koegels and their colleagues. Unlike Lovaas, Koegel again began to draw from the theories of language acquisition for normal children regarding factors about the use of familiar objects and activities, variation and turn-taking, and sharing materials and tasks. The term Natural Language Paradigm is thus derived from the natural, in vivo method by which normal children learn their expressive and receptive verbal skills (Koegel, O'Dell, & Koegel, 1987). The Koegels' Natural Language Paradigm methodology involved reinforcing speech through child preferred structured play routines, as well as reinforcing all communicative attempts with the preferred stimulus items chosen by the child in such activities. This study involved a multiple baseline with baseline conditions for a traditional Lovaas model of behavioral language teaching involving instructions, prompts, and reinforcers for correct responses. This was alternated with a natural language condition where the child selected the play/stimulus items as described above for a total of close to 3 months of treatment for two children of similar functioning autism levels. Not only did the

NLP method result in more imitative utterances (from 4 to 20 times more than the traditional method) and more generalization to spontaneous utterances during the interaction, but also found more generalization of clinical gains outside of the clinical setting into the home (Koegel, O'Dell, & Koegel, 1987).

A later study conducted in 1992 also found that use of the NLP when compared with the traditional behavioral method resulted not only in more correct target behavior, but a considerable decrease in disruptive behaviors as well over 14 months of treatment (Koegel et al., 1992). The Koegel's more recent work (1990) focused on teaching autistic students to reduce levels of stereotypic behavior and generalize this to other settings through the use of self-management techniques (Koegel & Koegel, 1990). These ideas again emerged from the Koegels continued interest in getting autistic clients to be more self-motivated.

Laura Schriebman began working with Robert Koegel in 1976 after many years of research with autistic clients with a wide variety of topics that included stimulus overselectivity to social stimuli, elimination of echolalic responding, teaching use of extra stimulus responses, and acquisition and generalization of appropriate spontaneous speech (Schriebman, 1988). Like Koegel, she shared in interest in the social aspects of language development in autism. After their professional allegiance, she began to be convinced of the importance of the proper training and motivating of parents as part of the treatment team as well as what factors would influence this outcome successfully. She delineated these concerns in a thought provoking 1983 article entitled "Are We Forgetting the Parent in Parent Training?" in *The Behavior Therapist*. She reasoned that too much focus had been

placed on what to teach and how to teach it, versus ensuring that training would have a positive rather than a negative impact on the parents and the entire family unit. “No matter how effective a parent training program may be, if the parents perceive it as too effortful, too stressful on family life, or ineffective, they will be disinclined to use it (Schreibman, 1988, p. 133).

While research had clearly proven the effectiveness of parent training/treatment options over direct clinic treatment for autistic children (Lovaas, 1987; Koegel, Schreibman, Britten, Burke, & O’Neill, 1982), Schreibman used the same parents involved in the above studies to examine parent confidence and treatment preference, with shocking results. Despite the increased improvement in their children, the parent training programs were rated less preferred, and neither treatment option resulted in parents feeling neither competent nor confident in their abilities to help their child (Schreibman, 1983).

While Koegel was looking at how happy and enthusiastic children became during different treatment approaches, Schriebman analyzed videotapes of parents doing both NLP type strategies as well as the traditional model to rate these same characteristics in the parents of these children. She was one of the first to emphasize this type of “social validation” of improvement for behavioral clients (Schriebman, 1988). This means that for improvement to be socially valid, it must be able to be seen not just in terms of test scores/test responses using behavioral methods, but also by an independent outside observer from everyday life (a nonprofessional neighbor). Such a “John Q. Public” observer would not be focusing solely on the fact that a child with autism correctly performed a task, but the overall quality of the interaction in terms of the presence/absence

of tension in the parent/child interaction, the attitude of the parent and the child, their interest and motivation—in short, the overall “flow” of the interaction even within the constraints of the strictly behavioral intervention. Schriebman and her colleagues felt that if such qualities could be attributed to videotapes, than social validation of the treatment effectiveness was occurring, and subsequently making it more marketable and appealing to potential consumers (Schreibman, Koegel, Mills, & Burke, 1981).

Schreibman and Koegle together developed another expansion of the principals of Applied Behavior Analysis called Pivotal Response Training (PRT). They identified two pivotal behaviors—motivation and responsiveness to multiple cues—that affected a wide range of behaviors in children with autism and considered them to be to a wide area of functioning (Schreibman & Ingersoll, 2005). Given this, positive changes in motivation and multiple cue responding were hypothesized to have widespread effects on other behaviors, and thus increase generalization of new skills as well as the motivation of children to learn them (Schreibman & Koegel, 2005).

Lynn Kern Koegel and her husband Robert also founded the Autism Research Center at the Graduate School of Education at the University of California in Santa Barbara. Lynn Koegel stresses the use of “focused interventions” in autism that are specific to individual children selecting responses that will be “pivotal” towards success in given skill areas in her 2004 book *Overcoming Autism and Positive Behavioral Support* (1996).

Within the teaching area, the ultimate goal of these researchers is to get youngsters with autism to manage their own behavior, just as normal kids do. They continue their research endeavors in these areas with ever increasing precision and individualization

(Scherer & Schriebman, 2005). Even when progress is made in this area, however, Schriebman continues to feel that there will always be something odd or eccentric about children with autism when they become adults, and takes issue with Lovaas's claims of "cures" in this regard (Fishman, 1995).

Another spin-off from the analog methods of Lovaas was the Functional Analysis of Behavior. As opposed to looking at many of the maladaptive and self-stimulatory behaviors of autism as learned behaviors to be extinguished/eliminated through operant techniques, several leaders in the field began proposing that these behaviors were functional and purposeful in nature, that is, they had "communicative intent" and were used by autistic children because they were unable to learn more traditional methods of getting their needs met through language, gestures, eye gaze, etc. (Carr & Durand, 1985; Durand, 1992; O'Neill, Horner, Albin, Storey, & Sprague, 1990; Smith, M., 1984, 1987, 1990). These authors took contest with Lovaas's simple theory of learned behavior that was "perceptually reinforced." Previous studies looking at the pre-linguistic communicative behaviors of normal infants as well as those of older handicapped children had noted striking similarities in behaviors used to signal, self-regulate/calm, reference joint attention, as well as regulate the behavior of others (Ogletree, Wetherby, & Westling, 1992; Guess & Carr, 1991; Wetherby & Prutting, 1984).

Functional Analysis of Behavior involves using extensive observations, interviews and diagnostic teaching situations to determine what purpose the behavior of concern serves. It separates these purposes into five general categories of Escape/Avoid, Get/Obtain, Sensory, Attention, and Withdrawal (Durand, 1994). The youngster is then

taught more appropriately communicative means to get these needs met through a wide variety of techniques that include the use of picture symbols, voice activated switches and even structured scheduling times for self-stimulatory activities. The point of Functional Analysis is to first give the youngster a means to communicate his needs effectively (as opposed to maladaptively) and successfully have them met, as opposed to predetermining the need as inappropriate. Once the youngster gains success in this regard and no longer uses the maladaptive behavior as frequently, new behaviors are shaped gradually to involve delaying gratification, wait-time, and alternate choice.

Practitioners in the field seized upon this method and the literature began to acquire several case studies of effectiveness even before the year 2000 (Carr & McDowell, 1980; Carr, Newsom, & Binkoff, 1976; Smith, M., 1987).

The concept of “communicative intent” continues to highlight the lack of appropriate language development as one of the central problems of autism. Koegel’s Natural Language Paradigm and Carr and Durand’s ideas served to link the world of speech-language pathology to that of behaviorism. It was these speech-language experts however, that began to question the rigidity of the behavioral methodology for autism in general, even with modifications, and refocused interest on more relationship based approaches.

Andrew Bondy felt Lovaas’s insistence on verbal language development was too limiting on many children with autism, and prevented them from participation and interaction with the world at large when they were not taught other ways to communicate. As a result, he developed the Picture Communication System (PECS) with Lori Frost, a

speech language pathologist in 1985. The PECS program uses iconic symbols that children could give to others or point to them to show what they wanted and express other needs. These were then expanded into sentence strips and longer sequences so that the pictures themselves served as a language, and in some cases led to the development of verbal speech. Today, no autism treatment professional is without this library of symbols and the software to create novel ones with such programs as Boardmaker and Writing with Symbols, regardless of the type of therapy/interventions they advocate.

Another outgrowth from Lovaas's original ABA and discrete trial methodology were studies of the analysis of verbal behavior conducted by Jack Michael in 1984. He promoted a theory of "Verbal Behavior" using B. F. Skinner's behavioral theories of language acquisition and development first cited in 1957 that expanded Lovaas's methodologies. Once again, the switch to focus on communication (as opposed to discrete skills in isolation) led behavioral interventions in a different direction. Partington and Sundberg (1998) developed an assessment and curriculum of Basic Language and Learning skills (The ABLLS) that were taught using the methodology of Verbal Behavior Analysis, inspired by Jack Michael's original research. Partington and Sundberg (1998) argued that rather than having the goal of having a child "learn" skills to obtain reinforcers, the goal of behavioral treatment should be to have the child enjoy "learning" etc. more than the reinforcers, and furthermore be reinforced by the adult interaction. The argument was made that ABA was inadvertently teaching children with autism to be rewarded for working and learning with the "escape" of the reinforcers—that is the reinforcers were given after work times, preventing learning and the interactional social process imbedded in it., from

becoming reinforcing in and of itself. VB works on “establishing operations” (or making the learning interaction) as the foundation of all learning that must become the primary reinforcer. Communication skills are taught in discrete skill areas not based solely on language vocabulary (labels) but on a hierarchy of developmental/linguistic progression and functions drawn from research in speech language and the behavioral literature. This includes using the “natural environment” as the teaching arenas (similar to the Koegels’ theories) as well as more structured sessions. As opposed to using the PECS system, sign language is taught simultaneously with vocalization for youngsters who are nonverbal, and is viewed as the gestural nonverbal communicative sequence that has power neurologically to “jump start” verbal communication. Other skills areas are also defined and taught in tangent. Within any instructional time period, teachers shift from a skill category area to the other as opposed to the ABA rigid repetition format.

The other tenet of VB was “errorless teaching,” a series of fading prompts that are presented in a hierarchy to ensure the child was successful every time a learning task was presented, so not to impact the reinforcement that the work/interaction sequence was trying to establish in the first place.

Developmental/Linguistic Treatment Approaches

Synopsis

The developmental-linguistic theorists stress the close link between language/communication skills and social-emotional competence, and emphasize

methodology in the treatment of autism that focuses not on the amount of language (i.e., words), but the rate of reciprocity and nature of the attempts at communication within a natural learning/social situation. Barry Prizant conducted groundbreaking research in 1983 and 1984 (Prizant & Rydell, 1984) in this regard when he proved that both immediate and delayed echolalia served specific communication functions and purposes that could be reliably categorized. Prior to his research, these echo behaviors of autistic children were considered meaningless, and reflective of how the autistic child lived in a world of his own. Along with other theorists, Dr. Prizant hypothesized that children with autism have a gestalt style of learning where memory is episodic and not organized conceptually for retrieval based upon meaning. Amy Wetherby and Dr. Prizant and the Hanen Center in Canada have developed creative strategies for understanding both the verbal and nonverbal communication of children with autism, and subsequently treating their communication challenges. Both SCERTS and Hanen Models emphasize creating a need for communication through interaction that ends successfully within a social realm, using both verbal and nonverbal means.

Expanded Discussion

Until the 1980s, most of the literature on early development was fragmented with separate lines of research on various categories of development—i.e., affective skills, motor development, attachment issues, visual/auditory awareness, and of course, language and social-emotional progress. While parental comments, professional observations, and clinical intuition suggested close links between the development of communicative

capacity/language in the early years and the growth of socio-emotional competence, few research attempts integrated the two. Dr. Barry Prizant and Dr. Amy Wetherby were the first to formally research this connection, using both normal and delayed infants and toddlers. They attempted to look at the impact of emerging language and communicative skill on a child's socio-emotional well-being, as well as the effects of emotional/behavioral regulation, emotional arousal, the development of a sense of self, and the establishment of relationships upon language acquisition and communicative attempts and intentions (Prizant & Wetherby, 1990). In regards to autism, Prizant argued that what autistic children couldn't do in the areas of language/communication was well documented, and that this was a product orientation (Prizant, 1983). Such a "deficit checklist" orientation provided no help in understanding the process of language acquisition to plan intervention programs, or a more process oriented approach.

Prizant first outlined his views of language acquisition/communicative behaviors in autism in 1983. In his article in the *Journal of Speech and Hearing Disorders*, Prizant was the first to demonstrate that echolalia, both immediate and delayed, were actually communicative attempts, as opposed to just bizarre language occurrences (Prizant, 1983). After analyzing videotapes of 1,009 echoic utterances of four autistic children, he determined seven functional purposes that immediate echolalia served. In the Interactive category, they were used as turn-taking attempts, declarative attempts to label and point out objects/ actions/locations, to indicate affirmation of a prior statement said to them, and finally to request objects or actions from others. In Non-Interactive category, these involved rehearsal used as a processing aid (when it was followed by utterance or action

indicating comprehension), self-regulation of tension and behavioral/emotional states, and expression of high levels of fear, pain, anxiety, etc.

Similar intents were found for delayed echolalia (echoing of phrases after some delay or lapse of time) (Prizant & Rydell, 1984). While previous researchers felt such jargon to be meaningless, Prizant and Rydell showed not only that delayed echolalia served the same functional purposes as immediate echolalia, but that it also had even more intentional functions. These included attempts to direct the acts of others, attempts to complete familiar routines initiated by others, attempts to protest the actions of others, and even attempts to maintain interactions.

While Dr. Prizant clearly acknowledged that not all echolalia was interactive in intent, his research was seminal in that it clearly indicated echolalia to be communicative expressions, and thus quite forcefully challenged the stereotype of the autistic child who lived in “a world of his own” (Prizant, 1983). Rather, the person with autism was one whose communicative attempts were not conducive to successful communication, as opposed to the fact that he/she desired none. Over and over again in his research throughout the 1980s and 1990s, Prizant emphasized that the problems in autism were not centralized in a lack of language, but the lack of a mutually common communication system with the world at large. Thus, teaching mere words (as Lovaas advocated) was not the issue, teaching effective communication (even if this meant skills that were not language based skills at first) was. Such competencies included attention, the ability to shift focus, perception of listener needs, reciprocity, as well as more accurate expressive vocalizations and gestures (Prizant & Rydell, 1984). This was supported by the well-known observations

that many extremely high-functioning autistic individuals had unusually proficient vocabularies and linguistic capacities, but their interactive communication abilities were far below this level. In addition, Temple Grandin (1986) and Donna Williams (1993), two high-functioning autistic adults describe this lack of comparable communication systems, as well as the frustration and difficulty it caused them in their writings.

To explain the difference in autistic communication, Prizant drew from research regarding normal stages of language development. The first of these was a *gestalt style* of language acquisition and cognitive processing where multiword utterances are learned as memorized forms or whole units, and appear to be the result of many combined cognitive/linguistic processes at an automatic level (Prizant, 1983). That is, the speaker is not aware of their internal semantic-syntactic structure as he thinks these thoughts or speaks with language. In a gestalt mode of cognitive processing, events, words, emotions, situations, etc. are retained/recalled with relatively little analysis—both at a verbal language and nonverbal level.

An *analytic style* of cognitive processing involves memory of specific occurrences, feelings, events, etc. in a manner where the event, etc. is recalled as a whole and then analyzed and segmented into meaningful components based upon prior experiences (Prizant, 1983). In this mode of thinking, anything irrelevant is redundant and given little attention when new and important information is presented (Prizant, 1983).

In normal language development, children use an analytic mode of language acquisition involving the production of clearly articulated single words to reference the objects/people in the world around them. This theory of an analytic mode for learning

language was noted in the late 1970s and early 1980s by Nelson and Peters (as cited in Prizant, 1983). They acquire multiple language by combining elements into longer utterances based upon the learning and application of productive rules. This makes language flexible, and insures understanding of meaning and the internal structure of utterances right from the start. Most children rely on this approach as their main means of learning language, but also incorporate elements of a gestalt style. This is evident when one hears them repeat songs, sentences, etc., with little appreciation of their internal structure or specific meaning. This concept does not only apply to the use of words, but can be heard in vocalizations where youngsters make sound patterns as if they are talking in sentences, commonly known as the babbling stage. It is interesting to note that youngsters learning a second language much later in life, actually use more of a gestalt style at first because it allows them to participate in social discourse and actually use a new language long before a child can create any sentences in the language himself (Fillmore, 1979). Any adult that has ever studied a second language has been taught with standard social discourse sentences to ensure conversation at first, long before teaching of isolated vocabulary occurs. Thus, the two styles are not mutually exclusive, but rather compliment each other for effect learning of communication, as well as thinking styles.

Prizant (1983) posits that autistic children possess a largely gestalt style of cognitive processing and language acquisition. From a thinking standpoint, an autistic child has an episodic memory for specific occurrences or events that is not organized conceptually into long-term memory for retrieval based upon principals of meaning, even when language and semantics are not involved. This “holistic style” of processing involves

static, spatially organized stimuli, with recognition accomplished without analysis because it is not based on meaning or association (Prior, 1979). Several studies using EEGs and dichotic listening task support this right-hemisphere processing preference/dominance (Dawson, Warrenburg, & Fuller, 1982; Wetherby, Koegel, & Mendel, 1981), as does Courchesne and colleagues 1994 research about left-hemisphere problems based on his neurological examinations. This accounts for the much stronger skills seen in autistic youngsters involving recognition and reproduction of musical and visual-spatial patterns, puzzles, block-designs, etc. that was noted earlier in this paper.

With language, such a style means that basic units of words, phrases, clauses, etc., all co-occur as units during one time period, with rigid specificity to the objects, events, situation, and people in the original context in which they occur (Prizant & Wetherby, 1990). Thus the autistic child may not only use the same echolaic sentence, “stop it!” correctly when playing with his mother in his living room on the same chair with the same car, but also incorrectly whenever he attempts intentional communication. That is, he repeats it when he wants her to play, when he wants, milk, when he’s bored, etc., and robbing the speech unit of its meaning specificity for the listener. Just as learning a second language is difficult for an adult, converting to an analytic style is slow and painful for a youngster with autism, because we expect he should be able to process analytically automatically, just as we do. While he continues to learn about his world and increase his general knowledge (even if in an episodic manner), this usually exceeds his linguistic growth. This parallel is not true for mentally retarded youngsters, whose knowledge level and language abilities tend to be similar. As he gets older, the gap becomes larger, language

communication becomes more frustrating, and failure and social rejection increases. Thus, socio-emotional growth through interactive relationships also gets thwarted, with the motivation to maintain relationships that are only frustrating and disappointing becoming less and less for the autistic child. Obviously, those who do acquire more analytic language ability function better in the world, but the inability to apply this knowledge/skill to a wide variety of contexts (as well as determine the differences between them) usually is limited, and adversely affects the potential for intimacy (Prizant and Wetherby, 1990).

Because Prizant's strategies in treatment are incorporated within the relationship approach researched in this study, they are described below in some detail. Prizant advocates a treatment approach with a focus not on teaching language per se, but on learning to engage in activities where language is mapped and taught as part of the teaching activity (Prizant, 1995). "Language is social control . . . and thus the amount of language is not the issue . . . rather a focus needs to be on the rate of reciprocity and communicative attempts" (Prizant, 1995). Thus, the routines of social interaction become just as important, if not more important, than the language being taught. In sharp contrast to the Lovaas approach where the adult initiates a command/request based on a stimulus (and only later is the child taught to initiate), Prizant advocates getting the child to initiate interaction as early as possible, even if this involves setting up situations that are potentially frustrating if necessary for this to do so. Videotapes of his actual sessions with autistic youngsters demonstrate this tactic by presenting the child with a favorite jigsaw puzzle, and hiding the final piece, so the child will initiate dismay, concern, etc. and subsequently encouraging communication of these needs/feelings vocally, gesturally,

with words, etc. through modeling, mirroring, or interpreting these feelings to the child with initially a maximum of nonverbal and eventually more verbal expressions (Prizant, 1995). Such an approach focuses on not viewing the symptoms of autism as behaviors to be eliminated, but taking the child's interest level/preferred activity (the puzzle), and creating a need for communication (leaving out the piece) that must involve interaction or at least end with an interaction to ensure a successful resolution (the finding of the piece with or through the use the adult). This basic principal/format is integrated and expanded within the most natural learning/social situation (a milieu activity) within all aspects of Wetherby's and Prizant's treatment approaches. Paralleling Prizant's work in America was the development of the Hanen Method in Canada which embraced the same theoretical constructs of SCERTS. The Hanen center has developed parent-friendly manuals and books that empower parents with tools to teach their youngsters to communicate with and without professional support. *More Than Words* (Sussman, 1999) is one of best known publications of the center.

Because of their relevance and use in the relationship therapies studied in this paper, some of these treatment strategies are described specifically below so the reader will clearly understand the contrast of such methodology to the Lovaas approach. The Hanen Program and Wetherby's and Prizant's methodology includes the following tenets:

1. Initially focus on helping child achieve state of behavioral regulation through use of visual, matching tasks, or sensory activities that appear to help the child organize his world. (In contrast to outright rejecting these as being "autistic behaviors" according to Lovaas theory.)

2. Set up situations to induce communicative intent, then teach a way to make intent functional.

3. Teach youngsters to communicate for a wide variety of purposes, not just to label or request an object, but to get an adult's attention, to express sadness, etc. Place more emphasis on communicative skills in social realm first. For example, teach a child to call another person by name before teaching them to request a toy, because recognizing people by name makes a youngster more socially acceptable, and builds more opportunities for successful interaction in the natural situations of daily life. A child who can say "Mom!" when he sees his mother will get more natural positive consequences even if he does this 50 times a day, than will one who is taught first to say "Milk!" whenever he wants it.

4. When you can't get words to come, teach the child to physically manipulate to request a social routine. As in above example, if a child wants milk, but can't say that or "Mom!" teach him to pull his mom's arm to get her interaction. If this is not possible, teach him to point to her.

5. Teach the youngster to communicate for the purposes of getting joint attention. This involves having a child who is interested in a balloon on the couch, point to the balloon to get the adult to look at it too, or a child who is "stimming" on sunlight pattern to point to the light rays to get another adult to look at it too. This corresponds to the recent 1990 study by Sigman and Mundy where the amount of time a youngster communicated for the purposes of gaining joint attention (verbal or nonverbal) was actually more predictive of later language abilities than the age at which words first appeared.

6. Supplement a wide variety of visual cues--the actual objects, pictures, Picture Communication Symbols, even written words, to any interaction to encourage success.

7. Give child a picture symbol schedule for activity of lesson, for activities of household to help him predict past/future events, as well as to teach symbol turn-taking, and for any other activities that involve a temporal organization scheme. A gestalt style of processing makes the world unpredictable and frightening, leaving the child no sense of control. This

helps give the of the lack of analytic processing skills (Wetherby & Prizant, 1992).

Most of Prizant's research efforts have involved the communicative intents and acquisition patterns of autistic styles of language using his SCERTS (Social Communication Emotional Regulation and Transactional Support,) mode (Prizant et al., 2006). He has documented several single case studies in both written and video format that evidence dramatic improvement in the use of language, the use of more appropriate communication skills, and, for higher-functioning autistic youngsters, an increase in the use of symbolic language. All of these case studies also show relationship improvement and social-emotional progress in even the lowest functioning youngsters, with some generalization of skills to varying degrees in different situations. The amount of progress, just as in the Lovaas studies, appears to be determined by the intensity of the treatment (duration/amount per week), the involvement of parents, and finally the age at which treatment is begun (the earlier, the better rate of progress) (Prizant, 1983, 1995). He is currently conducting treatment protocols with youngsters less than 2 years of age at the University of Boston, as well as other studies with Amy Wetherby regarding the efficacy of their approach.

Relationship-Based Therapies—The Developmentalist-Structuralist Model

Synopsis

Just as beliefs about autism began to undergo radical change during the 1980s, so did the overall views of normal infant and child development as a result of the increased integration of child and clinical psychology and the theories of developmental scholars. As

opposed to viewing gross motor skills, cognition/ attachment, speech/language skills, temperament, etc. as linear entities with their unique course of separate development, researchers such as Sameroff and Chandler (1975), Kendall, Lerner, & Craighead (1984), and Kagan (1982) offered a transactional model of development along multiple as opposed to single lines of continuity. Instead of a particular child characteristic or behavior being attributed to a biological factor, caregiver characteristic, environmental variable, etc. developmental outcomes at any point in time began to be seen as the result of dynamic interrelationships among all and more of these variables both in moment-to-moment interchanges as well as over extensive periods of time.

Dr. Stanley Greenspan was among the first to define the “baseline” functions /benchmarks of this model that could applied in a more practical sense for comprehensive clinical intervention strategies along such multiple lines of development. While traditional psychiatry and medicine had previously emphasized a single-line causality (poor parenting, brain damage, etc) for autism, Greenspan’s theories were able to account for the diversity seen in the disorder in terms of wide ranges of sensory/perceptual differences, cognitive levels, environmental factors, and the relationship of all of these factors to a youngster’s affective/thematic experiences with his world and his caregivers. As opposed to fixing/blaming something/someone that had been broken, his theory offered a more optimistic view of autism based on the belief that human functioning, an all the processes of human change are plastic and open to alteration along multiple, as opposed to singular variables.

Greenspan’s relationship therapy centers around establishing “circles of

communication” with a youngster that are slowly increased, made more complex and symbolic/abstract over time. These circles are actually patterns of interaction /two-way communication between a child and his caregiver. While these are usually initially nonverbal and the primary unit gestural (a smile for a smile, an eye gaze returned when a parent touches a child) they are the foundation upon which language and all subsequent patterns of emotion, and eventually language usage and the conveyance of symbolic thinking. Greenspan’s therapy modes focuses on establishing and expanding upon these circles by following the child’s lead and interest, no matter how low of a level it is on (For example, perseverative pushing of truck wheels). Therapy is done by the parent/caretaker in “floor time” where the parent gets down the floor with his/her youngster to engage him in such circles, first with gentle coaching and therapist suggestions, and then a combination of parent –run home sessions and clinical visits. Because it emphasizes spontaneous, although intentional actions/responses upon the part of the adult to motivate more meaningful interactions on behalf of the child, “floor time” is not as neatly defined as the Lovaas approach or other more behavioral techniques. Treatment protocols also include intensive occupational and speech-language therapy. Unlike Lovaas, Serena Wieder, Greenspan’s colleague, also advocates parents supplementing his “floor time” with Lovaas treatment for select cases. Unlike Lovaas, he does not have prerequisite IQ scores for entry into his intervention programs.

Prior to 2001, most published research using the DIR model was more qualitative in nature with case reports, chart reviews (Greenspan & Weider, 1988) as well as actual video tapes that chronicled the treatment progress of children with autism. Clinical and empirical

studies have increased over the last decade regarding the effectiveness of the DIR treatment program for children with autism (Mahoney & Perales, 2005; Solomon et al., 2007), along with continued clinical accounts and parent reports of treatment effectiveness.

While Lovaas views learning language and other skills as discrete entities that must be taught whether inside or outside of a close emotional relationship (and to a certain extent, irrelevant to it), Greenspan's interventions were the exact opposite. Greenspan views the relationship as the foundation of therapy and skill acquisition, with the spontaneous affective emotions (both positive and negative) that accompany it the "glue" that pieces together the scattered cognitive/sensory/linguistic/perceptual deficits of autism into a more integrated.

Expanded Discussion

Although the word "relationship-based" therapies may be reminiscent of the earlier psycho-analytic treatment approaches for autism, the resemblance is in name only. This form of treatment developed as a result of increased integration of child-clinical psychology and developmental scholars through the early 1980s. Just as beliefs about autism began to undergo radical change during this decade, so did the overall views of normal infant and early childhood development. To understand how these changes opened the doors for a new psychotherapeutic approach to autism, it is necessary to review first the history and research base regarding early childhood developments which serve as this treatment's foundation.

Up until the late 1970s infant development was largely studied in isolated

categories/lines of thought. Psychiatry focused on drive, object relationships, the development of the ego, etc. More empirical researchers looked at attachment and separation issues, focusing on the maternal/child interaction, while Piaget isolated cognitive development into numerous stages. Speech/language skills, gross and fine motor skills were all viewed as linear entities with a developmental framework. Eventually the effects of the environment in regards to stimulation, enrichment, or impoverishment were also added as another tract in development.

All of these categories however, were based on expectations about continuities/connectivity in behavior from early development to later-that is there was a link between early and later developmental behavior in any area. But results began to come forth from various longitudinal studies following infants to young adulthood suggesting support for this model might not be as strong as initially thought. Kagan (1982) could not show this continuity for cognition, and Plomin (1993) was unable to demonstrate a conclusive connection between infant behavioral temperament and that of much older youngsters. Within the area of cognitive-behaviorism, Kendall, Lerner, and Craighead (1984) were also rejecting the reciprocal deterministic concepts of social learning theory, citing numerous studies they and others had conducted showing the differential effectiveness of such well known behavioral intervention as systematic desensitization, self-control therapy, modeling and interventions for social isolates as well as parent training programs. The authors noted results of over 12 studies showing that the organismic attributes of the child, the developmental levels of memory, language, conditional thinking, categorization abilities, and perhaps most importantly the “goodness of fit” between the

child, his competencies, the environmental context, and his caretakers were all far more predictive of the success of a cognitive behavioral interventions than the use of the interventions themselves (Kendall et al., 1984). The authors argued that these factors, with a particular emphasis on the organismic attributes of a child, were the key components in predicting intervention success, and thus provided both opportunities for, as well as constraints on the timing and techniques of various interventions.

An earlier study in 1975 showed family interaction variables to have some predictive value in regards to cognitive development, and that these factors were independent of environmental impoverishment or enrichment (Sameroff, Seifer, Barocas, Zax, & Greenspan, 1986). While theorists such as Kagan, Rutter, and Kendall and Craighead suggested that behavioral continuities began to be seen when self-awareness and an organized executive self became consolidated (usually sometime after the second year), much doubt was being cast on the unidirectional model of causality in psychological and biological development (Emdee & Harmon, 1984).

Sameroff and Chandler were the first to suggest a model of development away from theories of predicted trajectories (Sameroff & Chandler, 1975). The authors discussed how many healthy attached full term infants still ended up with mental disorders, and also how many infants with major disabilities (like Helen Keller) could show outstanding resilience and little psychopathology (Sameroff, 1991). Because such infants did not unfold with a predetermined line of growth, they proposed instead a *transactional model* of development. Instead of a particular child characteristic (or behavior) being directly attributable to a biological factor, a caregiver characteristic, an environmental variable, etc., the authors

suggested that developmental outcomes at any point in time should be seen as the result of the dynamic interrelationships. These were among the child's behavior, the caregiver's responses to the behavior, and the environmental variables that were influencing both. Such transactional processes were operative in moment-to-moment aspects of the social exchange, as well as over extensive periods of time where the cumulative experience of these bi-directional influences has a significant impact on child development and caregiver style (Sameroff & Fiese, 1990). Designing an intervention based on the premise that the source of a problem lied essentially within the child, within the caregiver, or within any other isolated link was beginning to be seen as futile (Kendall et. al, 1984). Instead of describing milestones from simply a neuro-motor, cognitive, or physical benchmarks, interaction patterns needed to be examined and accounted for. This included establishing some baseline of optimal interaction for different infant temperaments/biological dispositions, as well determining the characteristics of at-risk patterns (Greenspan, Wieder, & Nover, 1985). Looking for continuity in terms of a developmental level of adaptability that would provide a set of "baseline" functions would become the issue of need, as opposed to just looking for the appearance of specific behaviors outside of the interactive context (Greenspan & Lourie, 1981). This meant looking for the precise competencies transactionally that were required to attain a "good fit" for the child and the demands of any given context within and across time. The process is best explained with an example. A low birth weight infant may cause anxiety to an otherwise composed caregiver, which then may lead the caregiver to over or under stimulate the child (Prizant & Wetherby, 1990). This in turn could make the infant more irritable and exacerbate any problems that were biological

in nature. Another caregiver might avoid such a child who was difficult to calm, and thus have too few reciprocal interactive experiences which in turn interferes with normal communication and language development. Thus a hypothesized language delay might be determined partially by prematurity, temperament, and partly by the maladaptive transactional process that developed between the caregiver and the child. On the other end of the spectrum, a caregiver of a premature infant with extreme sensitivity and high self-esteem might provide the ideal levels of stimulation that could mitigate or overcome the biological risk factor.

While this view of early development along multiple as opposed to single lines may appear self evident, most intervention approaches up until recently did not integrate such theory into actual practice. Stanley Greenspan and Reginald Lourie (1981), child psychiatrists, were among the first to define the “baseline” functions of this transactional model of development, and later develop and actually put into practice a comprehensive clinical intervention strategy along multiple lines of development. What made their model so different was the clear emphasis on the innate physiological/biological nature of the infant himself. Like Lovaas, Dr. Greenspan did not initially begin this line of practice and research with a focus on autism in particular. Rather, he was first looking at infants who could not seem to regulate their internal states or self-calm, and were over/under reactive to sensory input. It was only after the model became more developed that it became evident how an intervention for autism could dovetail with this theory. Greenspan’s and Lourie’s model, as will be described below, offered flexibility in terms of the range of sensory/perceptual differences and their relationship to affective/thematic experiences that

could explain and “fit” the wide range of differences manifested in youngsters with autistic behaviors. Traditional psychiatry, with its’ emphasis on the Bettleheim’s psychoanalytic approach of single-line causality (poor parenting), had failed to account for diversity. Finally, and perhaps most importantly, their theories were more optimistic in nature. As opposed to fixing (and blaming) something that had been broken, the emphasis in the transactional/developmental/structuralist model was based on the supposition that human functioning, as well as all the process in human change are plastic and open to alteration. Because of the very plasticity of human development, Greenspan and his colleagues believed the potential for substantial flexibility and modification remained present for more of life than was previously believed, while still clearly stating that interventions did not have equal potential across the life span, and that portions of life circumscribed possibilities for change in succeeding ones (Kendall et. al, 1984).

Greenspan and his colleagues developed their stage model of adaptive functioning using a transactional orientation, but added the significantly complex factor of viewing the infant as an organism with different thresholds and competencies for organizing sensory and affective-thematic experiences. Here it is assumed that each infant has a unique method of dealing with internal and external experiences or stimuli (or mode of coping) according to their developmental structural characteristics (Greenspan, Lourie, & Nover, 1985). This unique method is both biological and physiological in nature and involved an infant’s sensitivities (both under and over) to auditory-verbal-affective stimuli, visual-spatial affective stimuli, and spatial-motor movement and tactile vulnerability. Included is also a youngster’s motor tone and planning ability, and finally the ability to process and react to

varying degrees of emotional/affective intensity in a stable manner (Greenspan, 1992a). A youngster's innate competencies in these areas ultimately affect his ability to regulate his moods and internal states, organize basic sleep/wake/eating rhythms and cycles, habituate to the stimuli of his caregivers and environment and eventually organize and regulate communication with them. This involves ultimately developing close, appropriate affective relationships with those around him, and be open to experiences his world will offer. Intersecting these of course, is the caregiver's capacity to deal with the type of differences unique to their child, and provide flexible, age-appropriate responses. Thus, a two year old who is withdrawn from his caregivers may have originally had a severe sensory processing disorder, (perhaps over-reactive to touch) and his parents misinterpreted his crying as needing more holding and a cycle was set up where the youngster had to withdraw from his caretakers to maintain equilibrium of his nervous system. This is now no longer needed as much, but is a well established defense pattern which will need to be reversed and understood properly. The optimal developmental structure facilitates progressive development of the caregiver and child through a full range of age and phase appropriate human experiences without significant compromises in functioning. The product of the interaction between etiological or causal agents and constitutional patterns is the "final common pathway" from which the evolving personality is formed.

Greenspan's ideas of somato-psychological differentiation among infants and the interaction of this vulnerability with the caregiver response style was not just a hunch, but rather based on many years of intensive observations of youngsters by himself and colleagues that are documented in case study format (Greenspan, 1992a; Hibbs,

Findikogul, Lieberman, Lourie, Nover, Wieder, & Greenspan, 1982; Hofheimer, Poisson, Strauss, Eyler, & Greenspan, 1983; Klein, Wieder, & Greenspan, 1987). There was also some historical basis for his ideas. As early as 1919 Cameron (as cited in Greenspan, Wieder, & Nover, 1985) had described constitutional and maturational patterns of nervousness in babies which subsequently exhausted and influenced the formation of early relationship patterns. Additional descriptions of infants with unusual sensitivities were given by Bergman and Escalona (1949), Murphy and Moriarty (1976), and Thomas, Chess, and Birch (1968). In 1988 along with Georgia DeGangi, Greenspan compared infants with extreme difficulty in developing sleeping/eating patterns, calming etc. (regulatory disordered) with normal infants on tests of sensory processing dysfunction. Results indicated that the regulatory group had an overall higher incidence of sensory processing dysfunction, with particular hypersensitivity to tactile and vestibular stimulation (DeGangi & Greenspan, 1988).

Greenspan's theories were given more credence when other studies arguing for a physiological component to the difficulty in achieving self-regulation indicated that hyperirritable infants had defective central neural programs caused by a condition in the parasympathetic nervous system called vagotonia, characterized by high vagal tone and hypervagal reactivity. Stephen Porges (1983, 1985, 1986) developed the technology to measure spontaneous vagal tone and tone changes during a variety of psychological processes, and together with DeGangi showed clear vagal tone differences between 24 normal and 11 regulatory disordered infants (DeGangi, DiPietro, Greenspan, & Porges, 1991). Clear differences in heart rate and respiratory patterns were also viewed in another

study to by potential individual difference measures of central nervous system integration (Porgess, McGabe, & Younge, 1982).

Greenspan considers youngsters with the DSM-IV diagnosis of autism/PDD to be children who had severe regulatory dysfunctions, but who later also developed and demonstrated disturbances in relating and communicating (Greenspan, 1992b). As noted in the *Definition/diagnosis of autism* section of this paper, the National Center for Clinical Infant Programs reconceptualized the terms of autism/PDD into *Multi-system Developmental Disorder*, and proposed three categories of the these youngsters. These three patterns were defined on a continuum in regards to sensory processing uniqueness and motor planning skills with a primary emphasis on language and relationship styles according to Greenspan's theories. For the remainder of this section, the term MSDD will be used synonymously with autism/PDD.

The NCIP and Greenspan hypothesized that the MSDD youngster had a biologically based unique way of processing and organizing experiences that predisposed them to relationship and communication difficulties, as well as perseverative and idiosyncratic behaviors (Greenspan, 1992b). Expanding on this further, it was the types of interactions, of lack of them, that would bring the child's biology into a more integrated state of physiological and emotional response to the world at large.

The Greenspan system of assessment for determining intervention for the MSDD, regulatory, and other disorders described in the stages above involved examining six core variables: Prenatal and Perinatal, Parent, Family, and Environmental, Primary Caregiver and Caregiver-Infant-child relationship, Infant-Physical, Neurologic, Physiological, Infant -

Sensory, Motor, and Cognitive, and Infant-Formation and Internalization of Human Relationships. Finally, these variables are compared with a developmental structuralist table of milestones that indicate that the best possible “goodness of fit” benchmarks to strive for that is presented on the following page.

The specific functional behaviors that would illustrate these interactive milestones, as well as selected associated motor, sensory, language, and cognitive capacities are defined in Greenspan’s Functional Emotional Assessment Scale for Infancy and Early Childhood (Appendix B). This assessment instrument is now standardized and looks at critical behaviors in the development of affective-thematic experiences. Selected behaviors are observed, rated, and totaled to determine a total level of milestone achievement, as well as point out individual strengths and weaknesses within each functional emotional assessment domain (see Appendix B).

Within this model, the derailment from the adaptive path of development for a youngster with autism usually begins in the somato-psychologic differentiation stage, in connection with difficulties in sensory processing and motor planning and gesturing. It is not usually observed or noticed as clearly however, until a youngster approaches two years when dysregulation and inadequate sensory processing drastically affect development and the child cannot organize his experiences sensorily and motorically and cognitively efficiently to develop Behavioral Organization and Behavioral Elaboration (Wieder, 1992). The youngster cannot move forward, and is instead “stuck” in a constricted behavior pattern so that other lines of development (communication, language, relationships) become thwarted. For such a child, particular sensations, his responses to them, and the

way people respond to him responding to the sensations become the basis of experience of what life is about and who they are. This is in sharp contrast to the normal externally oriented, relationship/communication tract followed in normal developmental patterns. The stagnation at this point for the child can elicit alarm, flight, withdrawal, total disorganization and/or perseverative motor behaviors. The children and their parents must then learn to relate to each other and the world within this confusing context, and find ways to survive.

While the behaviors may appear bizarre to the outside observer, in Greenspan's philosophy they are a deliberate and necessary attempt of the child to organize his world, and mirror the individualized under and over-reactivity to sensory experiences which a youngster can not process in normal ways. Dr. Serena Wieder (1992) stated that children develop atypical behavior patterns to cope with the myriad sensations they cannot interpret or regulate successfully ...for example, constant jumping, running, and squishing into tight spaces provides proprioceptive and vestibular input, helping the child locate his body in space (Wieder, 1992, p.11).

The dependency of these youngsters on these behaviors is clearly reported by parents who note how vehemently such children respond when one tries to change one of these patterns, and thus the organization of their world. The usual responses are either resistance or retreat.

This is the point at which Greenspan's view of autism/MSDD differs in terms of conceptualization, and correspondingly, treatment approach. As opposed to seeing the reactions of resistance, withdrawal, and retreat as relationship avoiding, Greenspan and

Serena Wieder propose that the MSDD youngster is very involved in a powerful relationship with his parents.

...as skewed, controlling, and unrewarding as they may be and are extremely dependent on their parents' cooperation in keeping the world the same for them. The issue is not that these children do not relate, but that they relate straightforwardly and overtly only under certain circumstances. What appears as no response or as rejecting response from the child *is* a response. It is often the adult, rather than the child who *stops* interacting when he or she does not persist in finding some way to going and join the child. (Wieder, 1992, p.11)

By failing to observe this interactional process, Greenspan argues that clinicians have failed to identify such a child's foundational capacity to relate intimately, and thus treat inappropriately or misdiagnose (Greenspan, 1992b). Working on individual splinter skills, per the Lovaas approach, was not initially seen by Greenspan to be helpful in this regard, because the true foundation for thinking and communicating, basic social interaction/relationship skills, has been ignored. Within this philosophy a sense of "self" evolves over time from an endless number of affective interactions with caregivers, after being initially organized around physical sensations first, and then a connection to others with a sense of intentionality (two-way communication with the use of complex as well as simple gestures). A child who lacks the ability to abstract and organize an emotional, sensation based experience of who he is, can not develop this sense of "self." The MSDD child lacks this very foundation for interpersonal relationships, and within the transactional model of the effect of the caregivers' response to the child's atypical response, a pattern of more withdrawal, more repetition, more perseveration, and more rigidity can be set up because the interaction stops becoming spontaneous and experiential. The goal of intervention then, is to affect the child's ability to abstract and organize the emotional,

sensation based experience of who he is with human interaction experiences that are planned for, but spontaneous in nature, as opposed to only more rigid and controlled.

How does adult-parent child interaction create the learning experience for the child that can in effect, alter the course of differential development? While Piaget (1952) had long ago presented direct interaction with the environment as one variable of human learning, this never quite explained the full variability of cognitive development in individuals. In 1980, Carew (as cited in Klein, Wieder, & Greenspan, 1989) reviewed the literature extensively and conducted her own experiments and concluded that experiences that involved infants' interactions with others, especially when an adult reacted to a child in a pre-structured manner, correlated higher with different measures of development and cognition, than experiences that the child created/experienced himself.

Reuven Feuerstein, however, was the first to define this type of learning as the *Mediated Learning Experience*. Greenspan's theories about harnessing the power of human interaction to impact abnormal development drew merit from Feuerstein's research in this area in special education that is documented in his work with the mentally retarded (Feuerstein, Miller, Hoffman, Rand, Mintsker, Morgens, & Jensen, 1981; Feuerstein, Rand, Hoffman, & Miller, 1979a). Dr. Feuerstein's basic assumption was that human cognition is modifiable, and the major factor that affects the variability in the amount of modifiability in individuals is the type of Mediated Learning they have experienced. As opposed to learning from the senses, mediated learning is the process that happens when the environment is mediated to the child by another person who understands the child's needs, interest, capacities, and sensitivities. This person then deliberately schedules, selects, frames or

groups stimuli, information, etc in time and space to take an active role in making components of that environment (as well as past and future experiences) compatible with the child. Within this theory, limited modifiability is viewed as a series of restrictions on processing information that could include a lack of systematic ways of obtaining sensory information, sweeping as opposed to focused exploration, lack of need for precision, poor use of temporal and spatial dimensions, as well as several others (Klein, Wieder, & Greenspan, 1989). With such difficulties, one could not benefit from direct exposure to stimuli, nor even acquire a need for adequate functioning of these processes, without a mediated learning experience. It is easy to see that this concept typifies the bind of the autistic child, who can not process his world accurately and thus requires the mediation of another relationship to do so.

MLE interactions could be initially on a preverbal level and not relate specifically to a modality, language, or content, and thus are universal to any culture (Klein et al., 1989). One of the critical components of MLE is that the contents of the information/stimuli/experience presented could never have reached the consciousness of the receiver without the mediation by the adult. In relating this to autism, one can infer that an autistic youngster can not understand his world without an adult to mediate it for him. The other component of MLE relates to the forms of processing information. Once a child receives MLE, they “develop a need for more mediation, i.e., a need for events or objects to have meaning, a need to search for relations beyond the information provided by the senses at any given moment (Klein et al., 1989, p. 113). In regards to autism, children who receive such relationship based therapy begin to find the mutual engagement more and more

rewarding, and thus want to learn more through this medium.

In his 1980 research conducted in Israel with 218 retarded adolescents, Feuerstein demonstrated increases in intellectual ability and cognitive structure for youngsters given MLE type instruction (Feuerstein, Rand, Hoffman, Hoffman, & Miller, 1979b). His research in this area is particularly interesting as adolescence is not usually the focus of cognitive intervention efforts. The sample in this had scores that placed them between the borderline and what, at that time, was the category of Educable Mentally Retarded on the Primary Abilities Test. The subjects, ages 12-15, were placed into two groups and then a subset of 57 matched pairs (for age, sex, ethnicity, and PMA pretest score) was selected whereby one member received a form of MLE instruction (Instrumental Enrichment) and the other a non MLE instruction (General Enrichment) for a two year time period.

The General Enrichment program involved regular school subjects with tutorial help available and field trips. The Instructional Enrichment program received the same GE program, but with an additional 5 hours weekly (or 300 hours less of the total GE program) of individualized teacher instruction involving pencil paper tasks that one would not have expected a sample of EMR students to be capable of. The involved tasks such as organization of dots, analytic perception, some vocabulary and reading skills, numerical progressions, temporal relations, syllogism, transitive relations, to name a few (Feuerstein et al., 1979b). On the Primary Mental Abilities Test, the IE group performed significantly better on the total test scores, as well as the addition, spatial relation, figure grouping.

Perhaps the most interesting aspect of her study was the significantly higher scores in the Project Achievement Battery (administered post test only) for the IE group, given the

fact that the GE group had actually received 300 hours more instruction in these specific content areas than the IE group (Feuerstein et al., 1979). Furthermore, the youngsters were divided between residential and day settings, and IE groups did better irrespectively of the setting they were in.

In a follow-up study conducted 2 years after the subjects completed the program, 184 of the subjects were drafted into the Israeli Army and tested on an Army intelligence test called the DAPAR, which yields stanine scores from 10 to 90 (Feuerstein et al., 1981). Using a chi-square analysis, the results yielded significant differences between the initial high and low performers on the PMA pretest with respect to their subsequent distribution on the DAPAR, as well as a significant difference with respect to the overall performance in favor of the IE over the GE groups. These results however, masked the much more interesting correlation for membership in group based on high or low initial PMA scores seen with multiple regression. The amount of explained variance for high performers based on group was only 8%, and did not correlate significantly with the DAPAR results. But for the low performers, the PMA pretest and DPAR had a significant correlation that accounted for 11%. Feuerstein concluded that participation in the intervention program appeared to have considerably more powerful long-term predictive value for low-functioning subjects in comparison with initial performance results. This is very different in light of usual research programs which tend to suggest a fade-out effect for intervention programs. Feuerstein held that groups receiving MLE type instruction would show cumulative gain not only upon post-testing, but also over time. This was demonstrated with a real-life result/consequence for all of the IE subjects. Two years later, their scores placed

them within the normal IQ range, and made them eligible for life opportunities not normally afforded to them previously!

Feurerstein's study can be criticized for its subject selection in that all of the subjects were from culturally deprived backgrounds, as 28% of the parents of the subjects were illiterate and 30% had no schooling. This may have meant that her subjects were not mentally retarded, but actually just in need of remedial educational experiences to raise their scores. But the differing results between the groups clearly argued for the effectiveness of MLE to produce greater change than overall general enrichment, no matter what the true initial ability level of the subjects. Thus, it provided some empirical foundation for Greenspan's therapies that emphasized the use of relationships to improve overall functioning and skill development, and not just instructional techniques.

Klein, Wieder, and Greenspan were the first to conduct an empirical study of MLE in assessing interactions between adults and children in the United States in a 4 year longitudinal study beginning in 1981. The subjects were 51 mothers and infants from multi-risk families that were recruited through general medical facilities in the country or referred by mental health or social services. The subjects were drawn from an original sample of 81 involved in another longitudinal study by the Clinical Infant-Child Development Research Center of the National Institute of Mental Health in Adelphi, Maryland, and involved 25 girls and 26 boys. The mean Peabody Picture Vocabulary Test score of the mothers in the study was 77.49 ($SD=17.55$).

Free play sessions with the mothers and their infants were videotaped at the child's ages of 4, 8, 12, 24, and 36 months, and were analyzed using a criteria for observation of

MLE by Klein that involved intentionality and reciprocity, mediation of meaning, transcendence, mediated feelings of competence of the child, and mediated regulation of behavior. The observed variables were then compared to the children's Bayley scores obtained through individual testing at the same time, and to testing at 36,42,48 months with the McCarthy Scales of Children's Ability by a team of psychologists from the Clinical Infant Development Program. The subjects were aware they were being videotaped (Klein et al., 1989). The overall MLE rate remained stable over the 4 year time period for virtually all the subjects. No correlations were found between the Bayley and MLE ratings at 4, 8, and 12 months, and low, but significant correlations were found at 12, 18, and 24 months (Klein et al., 1989). However, the correlations between the MLE observed up to 24 months and McCarthy score of up to 36 months increased with age significantly. The most interesting result was that the 10 minute observations of the mother child interactions done up to 2 years of age for MLE correlated the most significantly with the cognitive performance of the same children at 4 years of age, with the best correlation seen with the 12 months MLE measure. Overall, MLE observed at 4 and 8 months of age predicted cognitive performance better at 18, 24, 36, 42, and 48 months, than did it at the younger ages of 4, 8, and 12 months. Results suggested that the MLE measures predicted better language and higher cognitive functions measured by the McCarthy Scales at 36, 42, and 48 months than Bayley Scales at earlier ages because of their emphasis on motor/perceptual skills at the early ages (Klein et al., 1989).

Because there was no control group for the study, the generalizability of the MLE concept to a population other than this high-risk group can not be made, and certainly one

can not draw a causal relationship between the MLE amount and the cognitive ability scores of the youngsters evaluated. The authors argued however, that while MLE wasn't a direct measure of language and higher cognitive processes, there was a strong likelihood that it tapped some of the variables that might contribute to their development at a later time (Klein et al., 1989). The other significance of the study was that it broke new ground in looking at the variables within adult-child interactions that were content-free and culturally independent. While there had been a large amount of data on the relationship between early environment and later cognitive performance, the study suggested that there might be specific variables to the human interaction factor that carried strong weight in its ability to influence learning ability, beyond the environmental effects of poverty, lack of educational toys/materials, malnutrition, etc.

In 1981 Greenspan and his colleagues implemented a pilot model program, the Clinical Infant Development Program, to study in-depth for two or more years 47 multi-risk families with more than 200 children to help address this issue further. The CIDP approach was to organize to respond to a family's concrete needs and offering them a human relationship that would help them understand some of their maladaptive coping styles and then teach them how to deal with the needs of their infant children (Greenspan, Wieder, & Nover, 1985). The multi-risk families, many of whom were identified prenatally, were recruited from several agencies as part of the large 81 family sample described in the previous study. The CIDP staff developed a therapeutic relationship scale (later to become the Functional Emotional Assessment Scale to be used in this dissertation), that differentiated between high and low risk groups, was reliable (.84 for intra-class

correlations), and correlated with other measures of caregiver functioning (Greenspan et al., 1985). Entry range scores were given in regards to regulatory, attachment, and process level variables for both high and low risk groups that were significant at .004 or below.

In addition to providing a constant emotional relationship with the family, and assisting in obtaining and organizing service systems for needs such as food, housing, and medical care, the clinicians utilized Greenspan's highly technical techniques and patterns of care to reverse maladaptive developmental patterns in the areas of affect, social interaction, sensori-motor development, and cognition through training parents in some of the strategies that will be elaborated in the paragraphs to follow (Greenspan et al., 1985). Basically, they followed a tenet (along the lines of MLE) of using human interaction to make the most adaptive functioning occur between the parent and child taking into account the child's unique somato-physiological profiles. The general approach was transactional and holistic, as opposed to remedial, skill, or developmental domain specific. This involved determining what types of experiences were aversive/pleasurable to the child, and then the parents' underlying feelings that could get in the way with giving the elements of such a comforting and pleasurable interaction (Greenspan et al., 1985).

While the specifics of this study are too lengthy for the purposes of this paper, infants in the intensive intervention group showed a capacity to recover from early perinatal stress or developmental deviations (Greenspan et al., 1985) both from qualitative observations and statistically significant improvement from entry range scores measured using the CIDP therapeutic relationship scales. What was most remarkable was that within only one to four months, infants whose development had decompensated during the first

three months of life (as demonstrated by chronic gaze aversion, lack of human attachment, and extreme affect lability) were able to achieve adaptive homeostatic and attachment capacities according to the developmental stage model. It is of interest that this intervention was not daily clinical work by a therapist, but rather with weekly, bi-weekly, and eventually monthly visits with the parents who took over the treatment in their daily interactions with the child by making the subtle changes in handling and approach unique to the infants sensory and processing styles.

Other case studies using Greenspan's model of sensory-affective interaction therapies include work with physically and mentally challenged infants. In 1988 Williamson documented his work with a Down syndrome infant and her mother to foster 6 months gain in social interaction, communication, and most importantly, self-initiated coping skills on the 7-month-old infant's behalf. Bernstein (1988) also documented these techniques with a youngster born addicted to narcotics and her foster parent over a two- to three-year period to successfully enter the youngster in a regular public school kindergarten. Greenspan himself described his work with a preterm, low birth weight infant with moderate cerebral palsy over a two year period in 1990. While the progress was slow in this case (six months of work beginning at 18 months until two circles were closed in sequence) the case ended in successful placement socially and educationally in a regular education kindergarten.

Although Greenspan and his colleagues had not conducted empirical research in these early years with children with autism, they began to see more and more youngsters (usually coming to them between two and three years of age) who fit the characteristics of

this diagnosis in their private practices between 1984 and 1992, and began to apply their diagnosis and treatment concepts to this population. A summary of the techniques employed, within this developmental structuralist framework, will be described below. Following this, results of various case studies by different clinicians will be reviewed.

As noted earlier in Greenspan's Functional Emotional Assessment Scale, one of the key components and criteria for improved symbolic functioning, relating, and advanced stage acquisition in the model is the "circle of communication." This term became one of the main strategies and measure of progress in later therapy to be done with children with autism and is the cornerstone of Greenspan's treatment approach.

In 1998 Greenspan and Wieder published *The Child with Special Needs*, which became the "bible" for professionals and families supporting their philosophies. In the book, the circle of communication is defined as a basic pattern of interaction/ two-way communication. When a caregiver takes an interest in a child, the first circle of communication is opened. If the child responds (verbally or nonverbally), he is closing the circle, and when the parent responds in turn, another circle is opened. If the child responds again, he or she has closed a second circle. The circle of communication involves following the child's lead with interest, responding, and then the child responding to the parent's response and closing the circle. For a young infant, this may involve only one or two circles, progressing to ten or more by 18 months of age that convey themes. These include imitation of language, delayed searching, and imitating others as part of dealing with the emotional patterns of dependency, assertiveness, anger, etc. This is actually when (and hypothetically how) symbolic thinking emerges. While the opening and closing of circles

of communication is usually initially nonverbal, and the primary unit of interaction gestural, it becomes the very foundation upon which all subsequent communication (including language) is built (Greenspan, 1992b).

In addition to this “two-way communication skill,” there are three other critical processes necessary to understanding relationship based therapies in the developmentalist/structuralist approach. The first is the ability to attend and focus on stimuli, followed by the ability to engage warmly and trustingly with others (shared attention and engagement). This is related to the concept of “shared joint attention” noted by Prizant and Wetherby (1990). Shared meanings occur when a youngster uses representations (symbols or emotional ideas) to comprehend his or her world. This occurs any times words convey intentionality (as opposed to rote parroting), or play involves representations or symbols that have emotional themes or content, all skills that seem stymied in autism.

The other is representational differentiation or “emotional thinking” (Greenspan, 1992a). This involves the integration of feeling and thought, as well as the ability to categorize units of thought or ideas into different configurations so that connections are seen between images or representations or symbols. Such youngsters categorize in dimensions of time (what’s happening now, in the future, and in the immediate past) and thus develop an essential skill for limit setting and impulse control. This, too, is another task autistic children seem unable to master.

Unlike a psychodynamic method, Greenspan does not believe a youngster can “play out” his inner conflicts, because the difficulties are actually pre-symbolic (i.e.,

sensory, regulatory based) in nature (Greenspan, 1992b). The essential core of this therapy is to use and develop interaction patterns that will influence and mobilize development in all areas holistically. This involves creating opportunities that assist the child learning to attend and focus, engage and trust with others, communicate intentionally with simple and complex gestures (close circles), represent or symbolize intentions and feelings in play and language, and finally, organize and differentiate experiences (especially affective). The goals in therapy involve supporting these capacities in a stable and broad range. For example, the child should be able to master not only warmth, but also assertiveness, anger, curiosity, self control etc. in each of the opportunity areas listed above.

The major intervention tool in this methodology is “floor time.” This involves the caretaker/parent getting down on the floor with his/her youngster and engaging him in such a way as to mobilize the four processes described earlier. Floor time is also part of the assessment process for the clinician and caregivers, and is used to gain additional information about the youngster’s sensory sensitivities and processing proclivities, as well as his motor capacities and affective expressions (Greenspan, 1992a). In general, floor time focuses on optimizing the parent-child interaction through gentle coaching and suggestions of the therapist so that the parent can employ the strategy at home away from the clinician’s office. It can however, also involve isolated work with the therapist and the child alone, as well as entire family sessions of floor time with available siblings assisting.

Because “floor time” is based upon the many subtleties of human relationships, and unique interplay of the constitutional/maturational factors of the child, caregiver, and their interaction, it is not as neatly defined as the behavioral approach. This should not mislead

the reader to view it within the psychoanalytic framework of play therapy, or worse just “hang-out” time with a child. Rather, using the MLE concepts delineated earlier, floor time is intentional actions/responses upon the part of the adult designed to benefit the interaction (for both the child and the adult) that generate motivation and desire for meaningful interactions on the part of the child. As opposed to coming with a set task to teach that the adult reinterprets meaningfully (in MLE terminology), in floor time the adult uses the child lead to determine which actions/responses he will take, while simultaneously capturing the child’s emotional tone and supporting the sense of connectedness, even if it is conflictual in nature. In this manner, the interaction is spontaneous in nature, experiential, and based on the moment of the present so that ultimately it is meaningful to the child.

The strategy is illustrated by an actual case example given in the Zero to Three October/November 1992 issue followed in 2006 by actual Floor Time Training DVDs. The first goal of floor time is to engage the child (get his attention and interest) and than get to a two-way circle of communication (Greenspan, 1992b). Let’s say an extremely withdrawn, nonverbal child, is endlessly moving his car perseveratively back and forth on the rug. Only verbalizing to such a child will not gain his attention, nor will passively sitting beside him watching gain an interaction. The parent would be suggested to take advantage of the child’s natural interests, and put his hand on the car while his son was moving it, and point to a wheel while moving the car slightly. Because the child felt the parent’s hand move the car, he immediately took it away. A circle of communication was thus opened and closed, even though the child took the car back in resistance. Next the parent might get another car and move it quickly towards his child’s car. The child might pull his car away, but move

the car as fast as his parent had, and repeat this sequence of events, again opening and closing circles. Interest, focus, and engagement, as well as interaction are present. In trying to take the interaction to a more symbolic level, the parent might say “fast” as he moves his car, and then move it slow and say “slow,” or bang it into his child’s car and say “crash,” all depending on the child’s interest and response. In this way, the word has meaning to the child, and he may be motivated to repeat it.

In dealing with the perseverative activities of children with autism, Greenspan advocates turning the perseveration into an interaction, instead of trying to get the youngster to do something else and turning it into a power struggle (Greenspan & Wieder, 1998). If a child is banging blocks together, get your hands caught between the blocks, and be gentle and playful as he tries to get you out of the way in a cat and mouse type game. Although these circles are only gestural, they are interactive, even with affect of anger or annoyance. In floor time, all human feelings are welcome, but the parent needs to help modulate them, and soothe and comfort as well. Indeed, Greenspan considers relating to the child when he has a strong affect is vitally important, because this is when the child with autism is most motivated. Suppose a child who is trying to open the door to go outside is angry that he can’t do so. While he doesn’t advocate deliberately frustrating a child beyond their tolerance, Greenspan points out that “frustration derived from a difference of opinion is a fine motivator, and one that occurs naturally” (Greenspan, 1992b).

The point here is to stretch out the period of negotiation before the resolution and don’t short cut the power struggle too fast, because some opportunities for more circles of communication will be eliminated (Greenspan, 1992b). This might involve “playing

dumb,” and bringing the child a little out of his frustration by getting him confused. For example, if a child wants to get a cookie an adult could say, “You want to go drink milk (using words/gestures and going to the refrigerator)?” Or if a child is banging at the door, the parent could question, “You want to go out later (after lunch, etc.)?” All such responses drag out the interactional process and force the child to have to respond to make his need clear. The similarity between Prizant and Wetherby (1990) ideas of “inducing communicative intent” and making it functional can be seen here. For such a child with language, this might involve the following: “I want to go out;” “Not now;” “Now;” “Later;” “Not later, now,” etc. (Greenspan, 1992b).

Should a youngster become even more distressed and escalate into a tantrum, Wieder (1992) advocates stepping back to prevent injury, but not abandoning or isolating the child and staying by until he/she begins to reorganize. During the sessions, it’s important to allow time for transitions, such as getting ready to end, as well as set limits on destructiveness.

Wieder (1992) also advocates turning what looks like a random behavior into an intentional act that gets a specific response from an adult. So if a youngster is repetitively dropping objects on the floor, an adult might take a basket and catch them. If flapping or pacing occurs, the suggestion is made to march in front of the child with a bubble wand or musical instrument, give the child one, and sing a song he knows. Should a child withdraw and lie down on the floor, dim the lights and start singing a lullaby.

The point of paying close attention to when a youngster is most/least attentive because of their unique sensory profile can not be overemphasized. For some children, they

will more attentive with motor interactions such as throwing balls, chasing, rolling cars etc, while others prefer the repetitive verbal sing-song memorization of lines from songs, movies, TV shows/commercials etc. These are the vehicles to enter to get the attention and engagement, and the foundations to make interactive and then expand upon (Ghuman, 1992). At the same time both Kahlmonson (1992) and Wieder (1992) both strongly recommend against bolstering rote splinter skills of verbal repetition by removing exposure to repetitive media, especially videotapes and TV. Rather, they recommend going to the video store to engage in the natural act of exchanging tapes, and acting out repetitive, memorized “scripts” with symbolic toys to give them meaning-even if only the part the child has recalled is all that is initially enacted. The idea is to eliminate the rote perseveration form competing with what for the child with autism is much more difficult--spontaneous verbal interchange. The idea involves taking the verbal perseveration which the child loves dearly, and building upon it to impose interaction and meaning. Although clearly Greenspan and his colleagues are not behaviorists, there ideas regarding motivation in autism and the need for the natural, spontaneous use of language intersect with those of Koegel and Schreibman discussed previously, and draw credence from these behaviorists’ research in these areas discussed earlier.

Once mutual attention and engagement are achieved and well established, the next step involves helping the child into the world of reality, communication, and logical thinking by developing symbolic and representational abilities. Some of these strategies for verbal perseveration were described in the above paragraph. Another technique is to add imagery to action (Wieder, 1992). This might be having a child who is climbed up a pile of

pillows, stand on top of, and then slide, and then climb up the mountain. Using a large doll figure to act for the interacting adult is sometimes less threatening to such children, and can be used to eat pretend food, go to the doctor (first pretend), etc. Also recommended are traditional symbolic toys such as garages, farms, animals, doll houses, etc. Real trips to a farm can be preceded and followed by play with the appropriate toy set.

Moving to symbolic thinking could also involve having a child who just keeps taking furniture in and out of the doll house and putting it back through the windows (Ghuman, 1992). A caregiver could interject her presence and more symbolism by knocking at the door, saying “Who’s there?” or becoming the child’s assistant in moving the furniture by asking which piece he needed to move next. Finally, Greenspan and Wieder firmly believe in the use of sensory integration therapies to normalize a child’s sensory systems, particularly with the use of occupational therapy, speech-language, and augmentative communication techniques (Wieder, 1992). The sensory integration techniques employed might include rapid, soft brushing of a child’s skin at designated time periods during a day to decrease tactile sensitivity and bouncing and spinning activities to normalize proprioceptive reactions. Again, such adjunct therapy is considered important within Greenspan’s somato-psychological framework because the child’s relationship disturbance is a consequence of his sensory, reactivity, processing and motor dysfunctions. If sound, touch and visual stimulation frighten a child, than he will find a way to push off and avoid the facial expressions, voices and physical touches that are the normal entries of infancy/early childhood to intimate human relationships.

Kahlmanson and Pekarsky of San Francisco General Hospital first documented

their casework using relationship-based therapy with an autistic toddler in the *Infant Mental Health Journal* in 1987. The authors described in great detail their successful 3 and a half years of treatment with Joshua and his family which began when he was only 18 months of age (Kahlmonson & Pekarsky, 1987). Initially, Jonathan showed no evidence of early imitative abilities, no object permanence skills, and was easily overwhelmed by sensory input to the point of withdrawing and preoccupying himself with self-stimulatory activity. He had no social smile, and preferred to be alone. Although he had acquired 15 words six months prior to treatment initiation, he now only used three of them. His typical method of making contact was to direct the other person's hand like a tool in order to reach something he wanted, or to assist with its use. This characteristic served as the initial therapy gateway to obtain mutual attention and engagement. The therapist encouraged the youngster to use her to open a latch, hand him a toy, reach an object, etc. whenever possible by setting up the environment to make it absolutely necessary for her assistance in order to do these things. The desired objects were always handed in the mutual line of vision so the youngster had to notice her hands and face simultaneously, and thus encourage the youngster's perception of human beings as interactive/helpful, versus simply tools. Light touches, with eye contact always at an arms length, and environmental adjustments to control intensities of light, sound, and visual distractions were undertaken. The clinicians helped the family focus on adjusting their behavior to the delicate balance of stimulation he could tolerate, and then purposefully stretch this capacity integrate and manage more stimulation so that his interactions with the world and people would be pleasurable and effective.

Attention to speech was gained by a slow verbal pace, with exaggerated vocal inflections and facial expressions based on observations of auditory/visual sensitivities. These were modeled for the parents to use, and after 3 months of weekly treatment, Jonah showed expectation and joy when the therapist or his parents came for floor time with him, as well as became more attentive visually to them when they verbalized. Reciprocal interaction was taught using his perseverative interests in opening and closing cupboard doors, expanding it to opening, smelling, and closing spice jars, then to tasting some unfamiliar foods in the cupboard, and eventually to play kitchen activities. These included pouring beans from one container to another, water play in the sink, and finally some representational symbolic play doing pretend cooking with play dough to eventually completing at least one step of food preparation with his family every time they cooked a meal. Once these relationship foundations and attention were firm (6 months of treatment), imitating physical movements, and eventually vocalizations, were expanded into naming objects in the cupboards, and eventually the house.

For the next two years the therapy continued with rapid advancement in language and imaginative play to the point that the youngster was role playing with separation issues with dolls. Therapy with the parents also focused on reinterpreting Jonah's social distance and physical withdrawal from people at times as sensory overload, and focused on ways to minimize/adapt for this internal deficit in coping. By the time the youngster was five, only minor idiosyncrasies in symbolic thinking and expressive language remained as reminders of his former severe delay, and these were remediated by helping Jonah develop an expanded vocabulary of feelings, and well as the spontaneous use of words in the context

of ordinary interactions.

In 1992, Kahlmanson documented three additional case studies with children with autism, ranging in ages at intake from ranging in ages at intake from 18 months to 4 years of age, again culminating with dramatic results. The 18 month old had no eye contact, and demonstrate much self-stimulatory activity with extreme fear of touch from anyone. At two years of age and less then a year of treatment, the child now cuddled her mother closely and was engaging in pretend and symbolic doll play. The 3-year-old (who talked only to himself in high-pitched screams and echolalic clips from favorite videos) entered a regular Kindergarten classroom at age six where the teacher described him as happy and popular (she was unaware of any previous difficulties (Kahlmanson & Seligman, 1992).

Finally, the four year old who repeated video tape dialogues ad infinitum, as well as roared whenever she was approached by other children, was able to cope with her intense sensitivity to various auditory tones by simply putting her hands over her ears and moving closer to her Kindergarten teacher. This was in contrast to crawling away from a group and making bizarre animal noises at them to ward them off. The therapist cleverly turned the child's bizarre noise rituals around by feigning distress and fear whenever the child engaged in such noises. This made the child laugh and then proceed to try and surprise the therapist with more sounds, to which the therapist again pretended/exaggerated a dramatic reaction. What resulted was an interactive game, as opposed to the child's typical pattern of withdrawal, and a format for practicing how to manage the youngster's noise sensitivity with strategies other than roaring. Through weeks and weeks of playing this game at home and in the clinic, and extending and modifying the circles of

communication within the activity, the youngster's sense of fear of unexpected sounds was changed into a sense of pleasure at the unexpected.

Through an adult mediating the experience for her, this child learned to contain the excessive stimulation and her bizarre responses to it, and generalize this strategy to other settings. Jaswinder Ghuman (1992) of the Department of Psychiatry at the John Hopkins University of Medicine documented successful use of these methods with foster caregivers of such children.

An extensive case study was also presented in 1992 to the American Psychoanalytic Association in Washington D.C. by Rebecca Shanook describing the recovery process of an autistic youngster who began treatment when he was 3 years old. The youngster obsessively investigated opening and closing every door he encountered for 15 minutes to half an hour, used no language other than a few rote lines from songs, and related only to his parents. This youngster's therapeutic program involved four times a week parent/child therapy sessions, twice weekly speech-language/relationship-based therapy and twice weekly occupational therapy emphasizing sensory integration. In addition, the parents were seen at least weekly, and conducted their own private floor time sessions with their son (and his sibling) 2 to 3 times daily. Finally, he was placed in a small nursery school with normal, but somewhat younger children.

The case study took the time to document the considerable familial and financial hardship incurred by the intensiveness of the program, similar to what Lovaas claimed was required for treatment to be effective. This included the youngster's mother leaving her job to coordinate and supervise her son's treatment and minimal insurance support to cover the

costs (Shanook, 1992).

This case study of Simon used the methodologies described earlier over two years. At the end of this time period, a psychological evaluation done by an individual who had no previous contact with Simon, and no contact at all with his treatment providers described the youngster as follows:

This attractive, charming lad currently demonstrates a solidly average level of intellectual cognitive achievement; with ultimate potential somewhat greater . . . despite his articulation problem . . . has good word knowledge, expressive abilities, visual-analytical and organizational abilities, mathematical and reading readiness, capacity for abstract thinking and fund of general knowledge. His cognitive skills, his readiness and eagerness to absorb information like a sponge, and to participate with others have been marching out ahead of the maturation of his internal representations of feelings and relationships between himself and his world. (Shanook, p.18, 1992)

This was in sharp contrast to the initial evaluation at 3 years of age at a major hospital unit where he was described quite differently (Shanook, 1992).

He has a severe inability to process information due to severe delay in both is expressive and receptive language and in his inability to engage in meaningful problem solving tasks which require following simple commands. . . . His attention span is short . . . (he had) a noticeable lack of interaction with anyone (besides family). (p.17)

Other qualitative documentation of the successes of Greenspan's treatments are journaled through film/video clips of clients at various segments during the treatment process which Greenspan and his colleagues collect during their work and show at workshops around the country and internationally through the International Council of Developmental and Learning Disorders (Greenspan 1995, 1996). The number of empirical studies of the effectiveness of the DIR model has increased over the last decade. Quantitative data collection improved with the development and pilot testing of a standardized instrument, the Functional Emotional Assessment Scales (Greenspan,

DeGangi, & Wieder, 2001) that provided uniform definitions of the behaviors that indicate progress in the DIR program that could now be observed and measured.

More recent quantitative research studies, include a one year comparative pre and post test study with 30 youngsters diagnosed with PDD and 20 with other developmental disabilities (Mahoney & Perales, 2006) and a pilot study of sixty-eight children enrolled in the PLAY Project Home Consulting Model for 6-12 months using the DIR model in Michigan (Solomon, Nechels, Ferch, & Bruckman, 2007). The Milton and Ethel Harris Research Initiative at York University in Canada in 2008 initiated a rigorous study that looks at not just the impact of DIR treatment on behavior and cognition, but also neuro-physiological changes every 6 months over a 2 year time period. Fifty children are randomly assigned to an ABA based treatment with a 12-month delay before Floor Time treatment or immediately enrolled in a DIR treatment model for the 2 year time period. Program effectiveness will be compared as well as the magnitude of gains/changes neurologically and developmentally for each group.

Since 2000, Dr. Steve Gutstein's Relationship Development Intervention (RDI)) has joined world of autism interventions. Just like the DIR model, an emphasis of developmental and relationship growth as the foundation of treatment. However, Gutstein claims his approach to be more related to the ideas of Peter Hobson and the Tavistock clinic in England (Hobson, 1991) than Greenspan. Like DIR, RDI also incorporates a stage based model of skills of emotional relating and experience sharing with others, but with skills delineated in more behavioral terminology than Greenspan's. Since Gutstein's book *Solving the Relationship Puzzle* was published in 2000, the RDI model has gained an

impressive following that continues to grow, giving parents who want to focus on relationship with their children with autism another option in the intervention arsenal

Despite their many successes, Greenspan and Wieder (like Lovaas) have not been successful with all of the children with autism they have treated, even when treatment was started at an early age. It is interesting to note that when imitation skills, particularly verbal, do not start appearing after several months of treatment, Greenspan begins worrying about the prognosis for success. This is the same benchmark that Lovaas had pointed to, despite the fact that both treatments strive to achieve this skill, albeit through dramatically different methods. For some of these families, a switch to a total Lovaas treatment has met with more success and “recovery,” and not surprisingly much anger at Dr. Greenspan for lost time (FIAT newsletter, 1995).

Serena Wieder, Greenspan’s colleague and collaborator, feels strongly that youngsters with extreme deficits in motor planning, combined with extreme reactivity to auditory stimuli and thus minimal responsiveness to it begin to have a stronger reliance on visual cues. She feels that children with these profiles do not recover in either treatment approach, although they can and do make progress (Wieder, 1995). In the Fall 1994 issue of *The Advocate*, Lovaas also described these “visual learners” as the group he continues to have the least success with (Johnson, 1994).

For some children, Wieder has actually advocated combining Lovaas structured approaches at teaching imitation in the traditional behavioral format, while still doing :”floor time” at a regular schedule in an effort to “jump-start” the language process (Wieder, 1995) and has attempted unsuccessfully to win Lovaas’s support for such

collaborative treatment efforts (Greenspan, 1995). Currently, there is not research data available on the success rate of the combination of these approaches, although there are many narrative reports from parents who attempt to combine them.

Comparison and Contrast of ABA/DIR Treatment Models

Despite their many philosophical differences, Lovaas and Greenspan agree on several important points in treatment of autism. First, they advocate that the earlier age at which treatment has started (before age 3 in particular), the better the prognosis and possible chance of recovery (Greenspan, 1992b). Next the issue of the level of intensity of the treatment to be given is emphasized. While Greenspan does not specify 40 hours a week like Lovaas, he advocates that the more severe the deficit, the more time needed with “floor time,” usually up to at least 20 hours a week, in addition to other adjunct sensory integration therapies. Both clinicians also emphasize language use and development, though from entirely different angles, as well as argue strongly for the inclusion of preschoolers with autism in non special education settings. The both feel that modeling and interaction with normal peers is critical for the social learning and progress of children with autism.

Finally, both place strong emphasis on intense parental involvement, and moving treatment out of the hospital and clinic to the natural settings of the school and home. Finally, both clinicians strongly argue that even when full recovery is not possible, all youngsters benefit from their respective treatment in terms of increased skills, relational

capacities, language comprehension and coping abilities (Greenspan, 1995; Lovaas & Smith, 1989).

The differences in treatment approaches however, are dramatic and not surprisingly confusing to parent who want only what is best for their child. Lovaas focuses on gaining compliance and attention through rote exercise as the main tasks in the early stages of treatment. Greenspan emphasizes establishing attention, but through gaining rapport and trust by gently intruding on the child's world, as opposed to Lovaas's theories of outright attacking it. While Lovaas emphasizes development of specific isolated skills, Greenspan focuses on the development of the relationship as the necessary foundation for any skill development to be permanent and lasting. This is done with an emphasis on spontaneity, based upon the child's lead. In contrast Lovaas argues for structured repetitive interactions that are anything but spontaneous as the best vehicle of learning for children with autism. Any relationship that develops from this is considered to be a bonus, a reward inherent in the treatment method itself, but not the meat of the program. This is not to say that Lovaas does not train his staff to enjoy their clients. Indeed, he strongly argues for the frequency of positive social reinforcement during the program as well as play breaks where the children with autism are involved in unstructured interaction with their teachers. These are considered to be the motivational reinforcers that motivate the youngster for treatment, but they are clearly separate from the treatment itself.

For Greenspan, getting a reciprocal, interactive relationship *is* the treatment, with all aspects of spontaneous emotion that come with it, both negative and positive. Language use is taught/developed as a natural consequence of this interaction that develops because

the child has reached the developmental stage for this to occur emotionally. For Lovaas, words and language are again separate from their relational context, and instead taught for the sole purpose of labeling words, objects, etc. in the initial stage of treatment. Lovaas believes that more spontaneous language and interaction occurs as a natural consequence and step in the logical progression from earlier skill acquisition of compliance and labeling. Only after these earlier skills are mastered, will language that involves social interaction be specifically taught and programmed for if it does not develop further on its (Oke & Schreibman, 1990).

From a philosophical vantage point, it is interesting to note that autism treatment has caused both the psychodynamic and behavioral approaches to abandon some of their rigid adherence to their theories and meet more in the middle since the 1970s. At that time, a psychodynamic therapist would never have intruded on the self-stimulatory/perseverative world to force an interaction; neither would they have looked at the importance of generalizing the relationship to settings other than the clinic, let alone conceived of the parents as being able to be the major provider of treatment.

At the same time, most behaviorists would not have even begun to focus on social communication skills, and the use of social cues or the communicative intent of various behaviors. Rather they would have continued to view autistic behaviors as excesses/abnormalities to eliminate, without realizing the need to teach appropriate replacement skills. In this regard, Autism, and the previous ineffectiveness of both forms of intervention in the past, was the only force strong enough to motivate these subtle but significant changes in perspective. It was the softening, not the hardening, of both positions

that opened the door to more and more effective treatment strategies for autism in each methodology, despite the long history of animosity between the two.

Special Education Models of Intervention

Synopsis

The special education programs that are considered to be models of “best practices” are clearly not identical in terms of treatment approach, setting, philosophy, as well as technology and parent involvement. Despite their differences, they do share some characteristics in common. These include the following:

1. Structured interventions that emphasize behavioral techniques, but incorporate developmental considerations for preschoolers
2. Curriculum that has an ecological emphasis with focus on practical skills needed for real life that are immediately useful for real life success
3. Focus on development of reciprocal social interaction and communication
4. Strategies that prevent maladaptive and stereotypy behaviors and encourage appropriate alternatives
5. Incorporation of programming for skill generalization in all areas.

With the exception of the Lovaas type programs, none of the research data regarding the effectiveness of these various special education programs uses the word “cure” or “recovery,” even though many document sending youngsters back to regular education settings, or nonautistic classifications on the CARS rating scale. Powers (1992), Matson (2005), and McConnell (2002) criticize research in special education for failing to provide information about the particular components of their intervention packages, given the many different strategies employed to teach social interaction and communication skills between them and the fact that to varying degrees they all document “success.” The lack of uniformity of outcome measures between programs and the lack of specificity about the child’s actual skill increases (simply reporting placement in a regular education setting) does not always tell us what strategies causes what changes for what behaviors, as well as for how long. The Rogers and Lewis (1989) study is certainly an exception in this regard, as is the Bondy evaluation of language usage with the PECS, and Egel’s study of the influence of parent stress variables on child outcome. Most programs fail to give information about the essential and nonessential components of the educational program. Such information would facilitate comparisons of strategies across settings and between children with varying degrees of autism severity.

Expanded Discussion

Special education and the term “treatment” are not synonymous. That is, “treatment” is generally utilized from a medical model, whereby there is an illness/disorder which can be “cured” or at the very least the symptomatology made better. In contrast,

education has implied the teaching of various skills, and special education has traditionally involved the use of strategies not generally applied by regular education staff to teach such skills to youngsters who because of innate/acquired physical, neurological, mental, and emotional challenges, can not learn without such specialized instruction. This includes not only uniquely trained personnel, but also adapted environments/materials, different class ratios when necessary, and possible removable from nondisabled peers for varying time periods during the day when necessary for the challenged student to benefit from instruction. Speech-language, occupational, and physical therapies can be recommended as related services within a special educational program, as well as medical, psychiatric, and psychological consultation when necessary to help a youngster benefit from such instruction.

Special education should not be viewed as a “treatment” for autism from a medical/psychiatric perspective because it has never been designed to help “cure” autism. It has, however, been designed to help such a child learn the various skills necessary to survive in his life, and such skill acquisition may at first involve and require the removal of a variety of the negative behaviors of autism that interfere with learning. In this regard, special education certainly has been charged with some of the removal of the symptomatology of autism, even though this task is not synonymous with its cure. With its focus on skill acquisition, and the elimination/substitution of such behaviors to facilitate this acquisition, special education is perhaps best considered under the terminology of “intervention.” Indeed, it spearheaded the first realistic look at autism by looking at what such youngsters needed to learn and could learn as opposed to simply “curing” them, and

gave parents achievable goals they could not only strive for, but could obtain. While teaching a youngster to use the bathroom independently did not cure autism, it certainly made it more manageable, as did teaching a child not to self-stimulate or throw prolonged tantrums.

As noted in the *Behavioral Treatments-The Lovaas Method* section of this chapter, this emphasis on skill acquisition actually changed the pessimistic outlook on treatment approaches to one of more realistic optimism, and actually served as the foundation for Lovaas's own highly successful behavioral treatment methodology. Even though the special education focus has not been on treatment, its contributions can not be underestimated.

In particular, the treatment approaches discussed in the previous sections are generally implemented by licensed mental health professionals (psychologists, psychiatrists, social workers, etc.) and in the Lovaas treatment, trained para-professionals. All of these services require payment, and many do not qualify for insurance reimbursement. In sharp contrast, special education is free, and thus accessible to virtually every youngster with autism. More recently since 1986, P. L. 99-457 extended this service of free multi-disciplinary diagnosis, assessment, and appropriate public education to all 3 to 5 year old youngsters, with incentives to assist states to establish comprehensive services to infants and toddlers (birth through 2 years) in P.L. 99-457. Specific features of the infant toddler program reflect the special problems in diagnosing very young children, the range of inter-disciplinary service needs as well as service settings (home, hospital, daycare, etc.), as well as a mandate for an Individualized Family Service Plan that involves outcomes to

be achieved not only by the child, but also by the family (Fewell, 1991). Needless to say, as the treatment research about the need for early and intense interventions to help remediate and lessen the impact of autistic tendencies became public, parental pressure to access such services through the special education doorway became enormous. At the present times, due process procedures have not resulted in consistent decisions about whether the use of para-professionals, let alone mental health professionals qualifies under the definitions for a free and appropriate “education.” In general, special education programs continue to require a special education teacher as the main program component, with an array of other professionals and related services providing both indirect and direct support services. Usually, Lovaas and/or Greenspan therapies are done within the home setting, while the youngster receives special education services in a school setting, or as recommended by both clinicians, within a regular education setting to the extent possible.

Comparing special education interventions with the treatment approaches of Lovaas and Greenspan is difficult because the outcome measures of progress (i.e., not “cure”) are different. Overall, success in special education programs is measured by the youngster mastering specific skill objectives that are specified on his Individualized Educational Program, be it decreasing self-abusive behaviors, tying shoes, or learning the alphabet. These are definitively different than such measures as Lovaas’s increased IQ scores, or Greenspan’s higher skill level on the Functional Emotional Assessment Scale. This is not to say such measures of goals of improvement could not be written on a youngster’s IEP, but in general this has not been the practice to date. Many legal advocates for each of the above treatments try to ensure such terminology for the clients’ IEP’s in attempts to secure

funding for their preference of service delivery outside of the traditional special education model.

Many school systems not only avoid, but refuse to follow one specific trademark intervention model (i.e., ABA, Verbal Behavior Analysis, DIR, “floor time,” etc) for autism and argue that they retain the judgment to determine what is “best practice” and what is appropriate for each individual child. This has been the cause of many legal battles where parents believe one intervention is more effective than another for their child, and school systems will argue that the intervention they are providing is “appropriate” under the requirements of the federal law, IDEA.

The issue of special education for autistic youngsters is further complicated by the fact that many jurisdictions deliver services heterogeneously, that is a special education teacher or program may service a wide variety of disabilities within his/her caseload, and may or may not be specifically trained in specialized techniques (such as discreet trial training) for autism. As the teaching techniques for dealing with an autistic youngster may be quite different from those used with a youngster who is solely mentally retarded or learning disabled. This section will focus on reviewing special education services/programs that are provided by staff trained in specific techniques for working with preschoolers with autism, and in particular, those that include social-competency and social communication programs.

Several authors (Anderson, Avery, Dipietro, Edwards, & Christian, 1987; Dunlop, Robbins, Morelli, Dollman, & Plenis, 1988; Egel & Powers, 1988; Guralnick, 1988; Harris & Handleman, 1989; Karnes & Johnson, 1988; McGee, 1991; Mattson, 2005; McConnell

2002; Olley, Robbins, & Morelli-Robbins, 1993; Powers, 1992; Strain & Hoyson, 1988) have identified characteristics of early intervention programs for autism would be considered to be “best practices.” Powers (1992) and Olley et al. (1993) identified which existing special education programs conformed to these practices. The programs are clearly not identical in terms of treatment approach, setting, instructional technology and the degree of involvement of the families, but have in common a framework for program development that provides the structure for formative and summative program evaluation, as well as firm curricular and instructional foundation. This section will first review the commonly held “best practices” for autism programs in special education, and be followed by a look at the programs that are seen as exemplary of these practices and the research data that supports their effectiveness.

Powers (1992), Strain and Hoyson (1988), and Schopler, Mesibov, and Hearsey (1995) all emphasize that special education programs need to administer *a structured intervention approach using the principle of applied behavior analysis, but incorporating developmental considerations for preschoolers*. This is not as simple as it sounds, because the technology of behavior analysis has often been separate from the curriculum content of early childhood. The trick is to address developmental skills systematically, in well-sequenced, structured teaching and evaluation methods that are characteristic of behavior analysis (Powers, 1992). Balancing this with the focus on learning objectives that are functional is difficult. Durand (1992) emphasizes strongly that the skills that should be targeted the most in educational programs are those that lead the student to become more independent.

This means that the *curriculum should have an ecological emphasis that looks at the individual functioning in his/her surrounding environment, and focuses on practical, independent living skills that enable the person to survive and succeed in the real world* (Gaylord-Ross & Browder, 1990). For a preschooler this may include turn taking, walking in a line, picking up toys after use, listening to directions from both near and far, etc. Egel (1989) holds that the skills to be taught should be immediately useful to the child (or at least be a prerequisite to a skill that will be immediately useful), that the materials used to teach the skill should be common to the child's everyday environment, and finally, that the skill when acquired should decrease the probability that someone else will have to do it for the child in the future.

In addition, *a focus must be placed on the development of reciprocal social interaction and communication skills* (Odum, Hoyson, Jamison, & Strain, 1985; Powers, 1992; White, Koenig, & Schahill, 2007; Wetherby & Prizant, 1992). While these skills are learned largely from just experience for non-handicapped preschoolers, they must be taught in autism programs, as the impairments in these areas are core deficits in the syndrome (Olley & Stevenson, 1989; Prizant and Wetherby, 1990; Schopler & Mesibov, 1987). The areas to address include the autistic youngster's lack of interest in communicating, his/her use of communication for solely means-end purposes, the lack of initiation and responsiveness to non vocal and social cues, the limited interest in and recognition of the feelings of others. Also paramount is the elimination of the deficits and excesses that interfere with the very functionality of communication (the idea that communication is power, and "makes the world happen") (Powers, 1992).

Standard preschool curricula does not address this issue specifically enough for the autistic child to benefit in this area. The curricula needs to teach the attending social, and communicative prerequisites of each preschool task and behavior based on several factors. The first is the actual characteristics of the current, typical preschool setting in which the child is placed and next is the skills that will be required for placement in the next environment for which the child is targeted, be it a larger group setting, a class with nonhandicapped peers, etc. (Vincent, Salisbury, Walter, Brown, Gruenewald, & Powers, 1980). Considerations to be viewed in each setting include the type and frequency of teacher-child interactions, reinforcers or punishers used (and those implicitly or explicitly not allowed), the number and type of transitions throughout the day and how they are managed, the daily schedule, and the degree/frequency with which staff teach language and social interactions incidentally. In addition, there are the “bottom line expectations for behaviors” that each preschool teacher has in order to accept a youngster in order to stay in their classroom (Powers, 1992). Within such a program, teaching transitions, social routines, play, and school readiness skills will be included as actual instructional objectives, through a sequential, orderly task-analytic approach.

Powers (1992) advocates that a classroom also emphasize the use of basic school readiness skills such as shape, color, and number recognition that an autistic child must acquire them to integrate more successfully, even if they may not be immediately functional in nature at that moment. When a child can't learn such a skill, the objective needs to be augmented and the curricula modified to allow the autistic youngster the maximum opportunity for involvement with a group and his/her teacher in his specific

setting. This means teaching a child who can't learn colors yet to identify an object depicting a color (i.e., a red apple) instead of the color itself. While the task of color identification is not abandoned, the child will in the meantime have a reciprocal social skill to foster her interaction, inclusion, and integration in the group as opposed to the isolation so typical of autism.

The idea that there is a relationship between the lack of social competencies and increases in maladaptive problem behaviors has gained increasing recognition by researchers and theorists (Durand, 1992; Guralnick, 1988). In addition to teaching the relative behaviors that sustain social engagement such smiling at peers, turn taking, hugging parents, etc, effective preschool education programs *promote strategies that work to prevent maladaptive and stereotypy behavior, as well as reinforce appropriate alternatives* (Stokes & Osnes, 1988). This includes identifying and recruiting the natural reinforcers in the environment (such as the approval of “high-five” given by typical peers), identifying a menu of reinforcers specific to the autistic child, and modifying environments that support maladaptive behavior (changing the physical space, crowding, or amount of intrusions by adults/peers during a specific activity). When the lack of ability to communicate verbally results in inappropriate behavior, communication alternatives in the forms of picture symbols, augmentative devices, and other programmed devices are developed (Durand, 1992; Prizant, 1983).

Koegel, Koegel, and O'Neill (1989) and McConell (2002) stressed that the most powerful instructional technologies developed in the last decade for autism will be of limited worth if the skills learned cannot be maintained for long periods of time and

generalized to untrained environments. *Programming for generalization* is a hallmark of effective special education programs for autism (Harris, 1995; Koegel et al., 1989). Such strategies to ensure generalization work to overcome the stimulus overselectivity that is a cardinal feature of the syndrome. This involves teaching the skill first in a highly structured setting at first to bring about the change, but then rapidly incorporating diverse settings into the training sequence to prevent the selective attention to stimuli that are environment-specific, but irrelevant (Stokes & Osnes, 1988). This involves incorporating the discriminative stimuli used in the original training setting into the novel setting. For example, this might involve using a series of pictures specific for a fast-food restaurant trip to MacDonald's. The same communication board could be used in the classroom with the same format of presentation, and the same food bought into the class. Even though training might not take place in McDonald's, the board and reinforcement history associated with it could serve as functional mediators for appropriate requests for social attention (and prevention of tantrums maintained by attention) in the new setting.

At the same time, initial training should also be done loosely, and incorporate periodic distractors into the training condition so the child can get practice in discriminating essential from nonessential conditions for getting reinforcement (Stokes & Osnes, 1988). This also implies using a wide variety of examples and sample responses in training behaviors. So if social initiation around play material toward a typical peer is a goal, then teaching should include training various verbal initiations with various play materials, to avoid getting the youngster stimulus dependent upon a set response, a set toy, and a set child for social initiation.

Like the Lovaas and Greenspan models, effective special education programs *emphasize parent involvement at home, school, and in the community* (Egel & Powers, 1989; Guralnick, 1988; Olley et al., 1993; Paul & Sutherland, 2005; Powers, 1992; Schopler, 1987). Parent involvement means parents are a core component of the service delivery, and must learn the skills necessary to teach adaptive skills at home and in the community. Hopefully, as these skills are expanded, behavior problems are simultaneously decelerated. Parents actually become part of the technology of generalization to the environments in which their children could perform competently. Powers (1992) and Egel and Powers (1989) did a comprehensive review of the approaches, outcomes, and problems in training parents to teach their children, and studied treatment failures within these processes. They concluded that the diverse needs of families with preschoolers with autism called for a highly individualized approach to parent training, because even when the technical adequacy of behavioral intervention was outstanding initially in a family, they might not be able to maintain the skills over time because of other variables such as isolation in the community or marital problems due to the stress of raising such a youngster. Schopler (1987) emphasizes the need for a co-teaching/co therapist relationship with parents out of recognition of the fact that no established knowledge about the specific cause or cure for autism exists. Thus, no educator or therapist can honestly claim they know what will and will not work with an autistic youngster. This inability to fall back on professional expertise is further supported by the high degree of individual variation among children in degree of handicap and developmental level. Schopler advocates that the parent is a trainee of the staff, as well as a trainer to the staff. This fosters parent empowerment

and ownership, as well as increased self-efficacy and a “culture of optimism” (Powers, 1992). Schopler (1987) claims this variable of collaborative staff/parent relationships is a factor in his educational programs treatment success rate.

Finally, the empirical evidence strongly supports the integration of preschoolers with autism into educational environments with nondisabled peers for varying degrees of time during their school day (Carr & Darcy, 1990; Fisher & Myer, 2002; Guralnick, 1981; Harris, Handleman, Kristoff, Bass, & Gordon, 1990; Lord & Hopkins, 1986; Sasso, Simpson, & Novak, 1985; Strain 1983). These studies show the increases in language, social interaction, on-task time, cognitive functioning, play, and appropriate behavior for autistic youngsters who spent some of their school day with non-handicapped preschool peers as compared to youngsters in more segregated settings. The studies however, utilized regular education programs where peers and staff were trained in specialized strategies to incorporate the autistic child into their classroom. Egel and Powers (1988) noted that mere physical integration alone is insufficient, and pointed out several factors that the literature held in common to the effectiveness of such programs. These included strong administrative support, training programs for staff that involve the use of multiple strategies, ongoing communication between all staff, administration, and parents, and finally the fact that attitude change on the part of both the staff and children was implicit. The authors stated that in successful integrated programs, the use of logistical and training strategies was ongoing, expected, and commonplace. Some of the effective logistical strategies included assigning special students to school jobs with peers already in those roles, maintaining “open door” visitation policies, special education staff sharing total

regular education responsibilities (lunch duty, bus, etc.), specialized crisis support and technical assistance readily available at an “on call” basis, cooperative work projects for regular and autistic students, and concurrent use of student-use areas such as cafeteria, halls, etc. Training strategies suggested by the authors included recruiting and training peers for buddy roles, observing peers for targeted social interaction skills for autistic students, and planning and conducting training in the context of activities for both peers and staff. Such activities should have the potential for frequent opportunities for both negative and positive interaction so skills are practiced as close to “in vivo” as possible (Egel & Powers 1988; Lord, Bristol, & Schopler, 1993;). In addition, variation of the peers in the training contexts is also recommended. Recently, Bryson, Rogers, and Fombonne (2003) discussed in detail the challenges inherent in including young children with autism in regular education classes in regard to the large number of trained staff necessary required to make such programs successful.

Olley, Robbins, and Morelli-Robbins (1993) studied various early intervention programs for autistic youngsters and determined several that not only met the “best practices” standards described above, but also had some, even if only preliminary empirical support for successful outcomes. These included the LEAP program at the University of Pittsburgh, Eric Schopler’s TEACH program at Chapel Hill at the University of North Carolina, Marshall University, the University of Maryland Preschool Autism Project, the Delaware Autistic Program, the Walden Learning Center at the University of Massachusetts, the Groden Center in Providence, Rhode Island. Other model special education programs that are based on Lovaas’s theories (with less treatment time) include

the Princeton Child Development Institute, Rutgers University, and the May Center. What was most interesting about the review by Olley and his colleagues was that although the special education programs retained the characteristics described above, they still demonstrated considerable variation in some of their approaches. That is, while behavioral teaching techniques were largely implemented, there were also varying degrees of more interactive, affective components along the lines of the relationship therapies discussed earlier, as well as different styles of teaching communication and normal peer interaction.

Learning Experiences-An Alternative Program for Preschoolers and Parents (LEAP), is operated by Phillip Strain and his colleagues at the University of Pittsburgh. The program has a unique emphasis on the use of normally developing peers in the teaching of social interaction, individualized group instruction using traditional behavioral principles noted earlier, conceptual and skill training for parents, and transition programming. The program is essentially center-based within a regular education setting, and supplemented by home teaching. In Strain's program, peers are supported in their interactions with autistic children, but are not directed how to behave in order to encourage spontaneous interaction (Lord et al., 1993). They are however, given a number of standard guidelines to follow regarding language usage, praising, putting themselves in the same space and proximity as the autistic peer, and joining the autistic child in activity and then gradually modifying it to do something the normal peer would like to do to. Strain developed special small group activities around interesting activities for both types of youngsters, and then used the adult staff to direct the activity, as opposed to being an active participant. The adult in these activities in his program has the unique job of affecting the

autistic children not through direct interaction, but through the other children or through manipulating the environment. The adult also deliberately varies the temporal and physical structure of the group around the needs of the group members, and works to develop group rituals. Strain's most significant contribution to the field was his research in this area, where he documented the fact that preschool peers can learn to initiate interactions with an autistic child, and that this in turn caused increased social responsiveness in the children with autism (Odom et al., 1985; Odom & Strain; 1985). Criticisms of the study (Harris, 1995) pointed out the complexity of the demands imposed on the teachers to carry out the training procedures, as well as the limitations of generalized responding and the difficulty the most impaired children had in benefiting from the exposure. Strain, however, continued to suggest that generalization sessions in integrated settings according to his model resulted in higher levels of social behavior for his youngsters than those in segregated settings. Other initial outcome reports (Strain, Hoyson, & Jamieson, 1985) described six graduates whose scores on the Learning Accomplishment Profile (Sanford & Zelman, 1981) and measures of social interaction were normal for their age. By 1988, 52% of their 26 children in a follow-up study had successfully entered regular education, although some continued to require smaller classes and individualized support. Only two were in classes for autism. Better outcomes with less program effort were indicated in social interaction, cognitive functioning, expressive language, on-task behavior, reduction of maladaptive behavior for youngsters who had begun the treatment before 3 years of age to the extent that one-half of the initial children enrolled in the program were fully mainstreamed in a typical first grade and required no special services (Strain & Hoyson, 1988).

Eric Schopler's TEACCH (Treatment and Education of Autistic and Related Communication Handicapped Children) Program at the University of North Carolina at Chapel Hill has provided services for children and adults with autism and related handicaps since 1981. In 1986, he was honored with the American Psychological Association Distinguished Professional Contribution to Public Service award for his development of this program. His preschool program services about 700 preschoolers throughout the state at any given time in integrated classrooms, day-care centers, regular preschool classes, segregated classes (5 to 2 ratio), and finally the home. Schopler's special education program operates under a model of "Parents as Cotherapists" as discussed earlier. Educational strategies use a structured teaching approach, with the primary purpose of improving each youngster's adaptation by improving his individual level of skill, and modifying /structuring the environment to accommodate autism's deficits. The goal is to increase the flexibility of the child and the environment, because of the belief that children are best served within their community and within their own families (Shopler, 1987). This is done using assessment instruments especially developed by Schopler and his colleagues that will be discussed in the next section of this paper (Schopler, Mesibov, & Hearsey, 1995). A strong emphasis is placed on continual assessment of the effectiveness of the interventions utilized, and modifying them as necessary. There are four major components to Schopler's structured teaching model. The first is physical organization of the room or space used for teaching, working, leisure or living activities. The emphasis is on consistent, visually clear areas and boundaries for specific activities to enable youngsters to identify and remember the activities that take place and the relationship between them. A specific

space is also designated for transitioning between each activity that the youngster returns to, where the schedule for the day is kept. Schedules that are visually clear are also an important program component, and usually involve a general classroom schedule, and an individual student schedule. For a nonverbal youngster, his schedule may involve selected objects on plates that symbolize the activities, with later generalization to picture symbols, and possibly written words for higher functioning youngsters. Each youngster in the program also has an individual independent work study box that is systematically and sequentially organized in regards to what needs to be done and what is left to be done, from left to right, with clear visual recognition of when the task is finished. The work systems for preschoolers include color matching, tooth brushing, as well as other developmental and functional tasks. The program also incorporates the use of both verbal and nonverbal prompts, as well as the systematic use of wide variety social and tangible reinforcers.

While research studies of Schopler's preschool programs continue, data is available about the overall program for youngsters aged 3 to 21. Research indicated improvements in teaching effectiveness of parents (Marcus, Lansin, Andrew, & Schopler, 1978) and generalization of both child and parent gains from the classroom to the home setting for all youngsters in the program (Short, 1984). The most significant study however, was Schopler's comparison of long-range outcomes for TEACH graduates with those from six published follow-up studies of other autistic children (Schopler, Mesibov, & Baker, 1982). Thirty-eight to 76% of autistic children were institutionalized in mental hospitals after they reached adulthood according to these studies done between 1963 and 1974. In contrast only 8% of Schopler's graduates were institutionalized, where as the rest stayed in group homes,

at home, or in the community.

The Delaware Autism Program provides preschool services primarily in public school classrooms with a smaller number of youngsters in a day care center with project staff support (Olley et al., 1993). The preschool program is a part of a larger program serving children and adults aged 0 to 21. Overall methodology in this program is behavioral, with frequent data collection occurring in both one-to-one discrete trial and incidental teaching. The unique feature of this program is the use of Andrew Bondy's Picture Communication Exchange system, in which the youngsters are taught to hand pictures to others to convey a variety of messages. Another feature is teaching of alternate behaviors to reduce behavior problems.

Bondy's system gives non vocal children as young as two years of age a functional communication system within social, real-life contexts (Bondy & Frost, 1995). At first, children using the PECS are taught to view a picture of a desired item to a communicative partner in exchange for the item. This avoids the issue of teaching eye-contact and focus on how the child should respond to the social approach of others. Rather, it teaches the youngster to initiate social contact in a communicative interaction, and bypasses the presumed requirements that attending (eye-contact) and verbal/motor imitation skills have to be taught before one can acquire social language. Thus, "requesting" an object is maintained by its own specified consequences, usually concrete reinforcers. The child immediately receives what he wants, gets social reinforcement, and has a successful interaction, not just an incident of eye-contact or imitation. No verbal prompts are given initially, only physical/gestural ones to avoid getting the child dependent on a verbal

prompt and assure the independence of his initial communicative attempts.

Gradually additional pictures of unique reinforcers are added consistent with discrimination training principles until the child can use 10 to 20 pictures (Bondy & Frost, 1995). These are put on a communication board, and eventually a sentence strip of “I want ___” is added to the board where the student has to place a desired item on the strip, and give the entire strip to the partner. Eventually this is expanded to answering the question “What do you want?” and “Do you want this?” with a yes/no response. With verbal preschoolers, interventions focus on anticipatory prompting/modeling prior to errors, as well as teaching directions to familiar routines and activities in situations where the student will be motivated to participate (teaching “get a spoon” when milk and cereal are at the task) with a gradual fading of contextual cues and expansion of settings.

Bondy and Peterson’s (1990) outcome data for children taught with the PECS was extremely encouraging. Over 5 years, 66 youngsters under the age of five began the program without functional speech. Each child learned to exchange at least one picture for an item within 1 month of teaching. Thirty-four of the original group now use functional speech without any augmentative systems, and are now placed in integrated settings and have had their handicapping condition of autism removed or reclassified. Fourteen use a combination of speech and pictures or written words. Nineteen of the children remain on a picture based system and function in all other skill areas in the severely and profoundly retarded range.

Using the Autistic Behavior Checklist (Krug, Arick, & Almond, 1980), Bondy and Peterson (1990) were also able to document significant reductions in behavior-management

issues, and various idiosyncratic behaviors of all the youngsters using the PECS. Different changes in the amount of autistic behaviors were associated with different communication modalities. The youngsters who stayed on the PECS system only showed limited reduction, those who were in mixed systems showed modest reductions, and those who had started on the PECS and were now using speech showed statistically significant reduction (scores change from 60 to 20). The means of all three groups on the ABC scores were equivalent at intake. While the outcomes don't support a causal relationship between the development of effective communication skills and the reduction of behavior problems, they certainly suggest it, and point to a viable teaching method other than the traditional behavioral training programs approaches to language development. Currently 75% of the youngsters placed in the Delaware program that used the PECS and remained in the program for at least a year are now integrated in regular education settings.

The University of Maryland Preschool Autism Project operated two preschool classes in a regular elementary school in Rockville, Maryland (Powers & Egel, 1989). The youngsters spent parts of each morning in a segregated autism class where focus was on small group (2 to 3 students per teacher) discrete trial/stimulus training using many of the Lovaas techniques. The PECS were also used as part of the program. As youngsters acquired specified skills for that setting, skills needed for the next environment (a Head Start class next door) were targeted, and attempts were made to integrate the youngsters slowly. Afternoons were again spent in the autism class. Major emphasis was placed on teaching the skills delineated by Egel that were needed for success in Head Start and other preschool environments. Therefore, the curriculum, while strongly behavioral in approach,

was varied and also includes incidental teaching of language and social skills. Outcome data for the first two years of the program showed a mean proportional change index above 3.0, indicating that youngsters acquired a learning rate three times higher than before they entered the program (Olley et al., 1993). However, follow up studies of the children as they grew older suggested that many needed 1 to 1 support to function in the mainstream educational setting and when this could not be provided, required other special education program options.

There are several special education programs that have successfully incorporated play and interpersonal relationships activities to foster symbolic thought, increased communication, and improved social relationships. Such programs do not emphasize the acquisition of discrete skills, but rather tie the skills to a developmental framework similar to that outlined by Greenspan earlier.

Rogers and Lewis (1989) studied 31 children (ages 2 through 6) in day treatment program of this nature at the University of Colorado Health Sciences Center for very young children with autism and pervasive developmental disorders. Each of the children in the study attended the program for at least a 6 month period, and follow-up data was collected over five years. The special education program involved the use of play in all its interpersonal, cognitive, and structural aspects, a pragmatics-based language therapy model delivered within a highly predictable and carefully structured milieu. The main intervention strategy was the use of positively charged affective experiences to aid the development of close interpersonal relationships. A specific adult was assigned to join a child in his activities, and to introduce social games as a way of scaffolding adult-child reciprocal

interactions and becoming a source of pleasure and attention for the child. Peer awareness was helped through getting the youngsters in close proximity to each other's activities, and then having the adults limit their role to cuing the youngster's attention to a peer's activities. Focus was placed on helping adults interpret each child's repertoire of potentially communicative verbal and nonverbal behaviors, and respond at a corresponding level (similar to Greenspan's strategies).

The classrooms were grouped with six youngsters, and one teacher and two assistants, for 4.5 hours a day, with two hours individual speech therapy sessions per week (Rogers and Lewis, 1989). All other interventions, including consultation of psychiatrists, psychologists, and occupational therapists were done in the classroom, with parents receiving one hour a week services from mental health professionals regarding the aspects of the child's behaviors that were of most concern to them. The authors describe the classrooms as functioning as an ego structure to regulate, mediate, select, focus and organize the sensor stimulation for each child. Cognitively oriented activities requiring mental representations, particularly symbolic play and preoperational grouping activities were a daily part of the program to help jumpstart the shift from sensori-motor to symbolic intelligence.

The authors used both descriptive and developmental data to describe the results paying close attention to training raters of videotapes to obtain agreement, and factoring out the effects that might be attributed to maturation alone and those to treatment on several instruments using a prediction index analysis. This procedure allowed comparison of the children's post-treatment gains against projected scores that estimated what their second set

of scores would have been had they not received any treatment. Assessment measures utilized were the Early Intervention Profile and Preschool Profile (Schafer & Moersch, 1981) to measure skills in cognition, language, fine-motor/perceptual, gross motor, social-emotional and self-care areas, deriving a developmental score in months in each area. The Play Observation Scale (Rogers et al., 1986) was used to measure several characteristics of each child's symbolic play, including symbolic agent, symbolic substitute, and symbolic complexity (amount of schemas linked together in one scene), and social communicative level (incorporation of adult into play). The scale was scored via videotapes of a 20 minute standard play procedure (adult initiation of play, no adult initiation, adult modeling of more mature symbolic play), with the rater scoring the highest level of play behavior demonstrated in each 30 second interval according to standardized instructions. Finally, the Childhood Autism Rating Scale was scores according to standard instructions from videotapes of the play sequence described above.

In comparing the projected scores (as accounted for by maturation alone) with the actual post-treatment scores at the end of each 6 to 8 months period using one-tailed t tests, the authors noted statistically significant ($p=.01$) scores in all five areas of the EIDP and PDP (Rogers & Lewis, 1989). Within the 6.5 month period, 41% or more of the change was attributable to treatment in the areas of perceptual fine-motor, and social emotional skills, with the least amount (19%) seen in acquisition of self-help skills. Fifty-three percent of the change was attributable to treatment in language, and 43% in cognition. All youngsters post treatment scores exceeded their projected no-treatment scores in all areas.

One tailed t-tests also showed statistically significant increases in symbolic play at

all levels using the Play Observation scale. In addition, a highly significant increase ($p=.002$), was found in the mean Social Communicative Level for the youngsters (Rogers & Lewis, 1989). CARS results completed by trained raters based on videotapes showed that the group mean dropped from a score of 35.12 (mildly autistic) to 28.96 (not autistic), with a significance level of $p<.001$. Even the seven most severe subjects, who stayed within the same category of severity, showed a significant reduction in severity of symptoms as reflected by decreasing scores.

Additional analysis of the data broke down the groups into differing severity levels of autism, but was still able to show a significant improvement trend regardless of the severity, with the largest growth were for the most severe youngsters overall (Rogers & Lewis, 1989). The data further suggested that following the initial sharp rise in developmental rates, there may be a slowing of acceleration, but no deceleration of the improved rate occurs once it as been achieved. Their conclusions were strengthened by using the conservative method of prediction index analysis. The researchers felt their results supported the central role of symbolic play in promoting exploration of the social world and growth in self-awareness, and its strong relation to improvement in cognition and communicative abilities. In addition, they believed the establishment of important relationships with adults that emphasized reactive and reciprocal interactions led to significant improvement in social interactive skills. In concluding, they speculated that their special education program addressed the social, emotional, and communicative, and ego deficiencies from a sound, developmental, affective approach that had been recently neglected with the resurgence of behaviorism as the treatment of choice for autism.

Another special education program in which the curriculum stresses social interaction and communication in natural play/learning activities is The Walden Center at the University of Massachusetts, an integrated preschool located on the university campus (McGee & Izeman, 1988). The class serves seven youngsters with autism together with eight neuro-typical children each year. The children attend for 2 years in full-day, year-round program that emphasizes the development of language and social engagement through incidental teaching. This means that the teachers arrange the environment and prompt children to initiate involvement in the activities. Normal children are used as intervention agents in play activities. While the authors state that their approach has a behavioral rationale, it emphasizes child initiation over compliance, and strives to help foster generalization by bringing behavior under the control of natural cues. No evaluation studies of the program's success are currently available.

Finally, the Language and Cognitive Development Center in Boston published a study in 1992 regarding the effectiveness of their special education program of toddlers with autism and pervasive developmental disorders (Miller & Miller, 1992). Forty-eight percent of the center's students returned to the public school for all or part of their classes. The program employed an approach based on what they called cognitive-developmental systems theory, which is very similar to Greenspan's developmentalist/structuralist approach. Basically the authors hold that autistic youngsters have impairment in their ability to react to and influence the world, with no clear sense of their body or self in relation to it. Thus, salient stimuli drive them into scattered or stereotypic behavior from which they cannot extricate themselves to establish functional systems. The program

incorporates sensory-integration theories, occupational therapy, and teaching through structured interactive play activities to motivate relationship and communication skills. Language is taught with directed body action toward or with objects and events to help youngsters become more aware of their bodies, better focused, and more able to cope with obstacles or demands confronting them. Thus, the authors place obstacles in a child's path and "narrate" what the children do as they comb over, in, through, and across these obstacles first, from elevated boards. The authors' research claims that many autistic youngsters who can not follow directions on the ground, can do well in elevated board situations. This observation is actually supported by another research study regarding postural control in autistic youngsters (Kohen-Raz, Volmar, & Cohen, 1992). Once the child masters these directions/meanings on the board, he can apply them on the ground. The authors incorporate the use of signs/gestures with words in all of their teaching. Repetitive and supposedly reassuring rituals are used to help a child reorganize from a tantrum, as opposed to the more traditional "time out" procedures of most special education programs.

Other special education school programs have opened in the private sector that have embraced the DIR model of intervention and integrated it within an academic and social curriculum. The Lionheart School in Georgia and Celebrate the Children in Boston opened in 2000 after several years of operation in local churches. As parent demand for the programs increased, so did funding and resources. Both programs are currently certified private schools within their states at this time. No doubt as parents become more aligned with selected interventions that the public schools can not/will not embrace, the more

similar programs are opening across the country over the past decade, and continue to do so.

Measurement of Treatment Effectiveness

Synopsis

The wide range of diversity among youngsters with autism, particularly at the preschool level, confounds traditional methodology of measuring treatment effectiveness involving sound practices of matching subjects, random assignment, and actual skill measurement with standardized instruments. The differing sequences by which the disorder manifests itself and the variation in skill generalization on a day to day basis further complicate efforts. Traditional standardized measures also don't tell enough about how an autistic youngster is doing in the everyday situations of his real life. That is, a normal IQ and a rating of no presence of maladaptive behavior does not indicate a youngster is happy, or even that he has circle of friends and supports he can engage daily with in reciprocal interactions.

Current best practices advocate the use of three types of assessments for diagnosis. For preschoolers with autism, these include direct testing with standardized instruments as well as informal instruments, behavioral reports (in checklist form) from parents and teachers, and extensive observations of play, communicative, and interactive skills with a variety of materials and settings. Such methods focus on not just getting test scores, but to obtain information regarding the degree of skill deficit in such critical areas as joint attention, imitation, social interaction, and communication and play skills. These same

measures/concepts are also appropriate in evaluating the effectiveness of early intervention programs.

Current focus in the field is to provide assessment not only for purposes of accurate diagnosis, but also for guiding specific treatment goals, methods, and needed supports so treatment effectiveness is meaningful in a real-life sense, and thus socially valid.

Expanded Discussion

By now the reader will be well aware that the measurement of the effectiveness of various treatment and special education programs for preschoolers with autism is fraught with difficulty.

One of the foremost reasons for this problem is in the wide range of diversity between youngsters with this disability as described in the *Description and Diagnosis* section of this paper, and the even wider range of difference within a group of preschoolers with the disability. This confounds the traditional research task of matching subjects on the basis of various characteristics. Hobson (1991) noted an example matching subjects with autism and subjects with mental retardation (who did not have autism) for Chronological Age and Mental Age on an individual basis. A given level of performance on a task purporting to measure MA does not indicate that the matched groups are at all comparable on certain intellectual skills that might be important for constraining task performance. If subjects are systematically matched according to a full scale IQ on the WISC, in most cases they will be systematically *unmatched* on various subscales, and particularly in those measuring verbal skills. In Britain, autistic subjects matched on the British Picture

Vocabulary Test actually performed better than control group subjects without autism on the nonverbal Raven's Matrices (Hobson, Ouston, & Lee, 1988). Hobson further reflects that even when very loosely defined domains of nonverbal and verbal ability are used with an autistic population, a given score may reflect very different processes underlying the performance between subjects with and without autism that are salient for interpreting the results of treatment. While such tests measure what has been learned, they in no way indicate how easily or the manner in which something was learned, and thus the ability of a youngster to gain from treatment.

Trying to match preschool subjects is even more difficult, partially because of the differing sequences by which the disorder may manifest itself in the first three years (Marcus & Stone, 1993). While by age three the main features are usually seen (again in varying degrees of severity), the course of the development of the symptomatology varies strikingly. One road involves fairly normal development until 18-24 months, followed by marked regression, or a halt in acquisition of skills. Another could be pronounced difficulties from infancy, or normal development for a year and then a gradual falling off of skills. Other youngsters may acquire a 20- to 30-word vocabulary, and then lose it. Another difficulty is that many clinicians are reluctant to apply the autism/PDD/MSDD diagnosis to preschoolers, because developmental course overall is ambiguous at young ages. Differentiation from mental retardation and language disorders is difficult because of a greater overlap at the younger ages (Marcus & Stone, 1993). At younger ages, the discrepancies between language/communication, social delays, and deviances and global development are less obvious, and more qualitative in nature. Easily recognized patterns of

ritualistic or stereotypic behavior may not yet be overtly as obvious. Finally, at younger ages, parents may automatically compensate for their child's difficult or absent social behavior, by initiating more interaction, or actively interpreting the child's meaning when communication seems unclear (Lord, Bristol, & Schopler, 1993). Thus, they elicit more "normal" interactions than is otherwise possible, and professionals have difficulty sorting out the true level of deficits.

Measuring the effectiveness of treatments generally involves random assignment of subjects to different groups. The severity of autism, combined with so much current ambiguity about prognosis and outcome of varying treatments, makes such efforts futile in dealing with parents, let alone unethical. Indeed, Lovaas attempts at doing so were thwarted when the parents in his study threatened to strike and not participate at all if their youngsters were assigned to varying treatment levels randomly (FIAT newsletter, Fall 1994). No parent would ever knowingly allow their child to be assigned to a less intense treatment option, let alone a treatment option where success had not yet been demonstrated versus one that had. Kazdin (1993) has argued that quasi-random assignment can be just as convincing in results, yet all studies surveyed in this paper listed the lack of random assignment as a major criticism for all results.

Other difficulties inherent in measurement are present in not knowing that given changes in behavior or skills will remain stable over time, given the problems of generalization in autism. Most treatment effectiveness studies can only answer short-term questions, and are erroneous when they make predictions about future skill levels in this regards, or even assume that skills acquired are maintained in different settings. Only long-

term studies such as the McEachin and Lovaas work can answer these questions, and even this fell short because test scores and rating scales don't tell us about actual observation of a youngster's behavior in the situations of his real-life. A normal IQ and rating of no presence of maladaptive behaviors does not indicate that a youngster has a circle of friends that he engages daily with reciprocal interactions with.

Berkell (1992) and Durand (1992) argue that actual treatment utility has also been lacking in the reliance of clinical outcome studies on behavioral assessment only, because few behavioral techniques exist for guiding treatment decisions. "With respect to providing guidelines for selecting specific treatment, behavioral assessment is a promise that has not been kept (Berkell, 1992)."

The issue of changes as a result of early intervention being truly meaningful (having social validity) and guiding treatment decisions has been discussed (Bodfish, 2004; Bryson, Rogers, & Fombonne, 2003; Peck, 1990; Rogers, 2000), even in the face of the push for early intervention. Indeed, Karnes and Johnson (1988) specify that social validity must be a major component of future research in early intervention studies for children with a variety of handicapping conditions. For autism, where deficits in social interaction are a prominent characteristic, the issue is particularly cogent. As Schreibman [Koegel, Mills, & Burke] and her colleagues (1981) noted, the issue was not just in terms test scores/test response, but whether an independent observer could note positive change in the overall flow of interactions between autistic children and their parents, teachers, and peers. Such a change would contribute to having the average person in everyday life respond to the autistic youngster normally, and promote an improved quality of life that was the true

measure of treatment effectiveness. The need for more social validity of change actually changes the research questions in autism (Berkell, 1992). Instead of, “Which approach gets rid of the most maladaptive behaviors?” more value-laden issues are implied. The newer questions could be, “Which approach will result in lasting reduction of challenging behaviors without pain or humiliation in the most settings?” or “Which approach increases the youngster’s ability to make choices or function independently in the classroom?” In such an approach, autistic children are viewed first and foremost as children from the same standards of human dignity and worth that we apply to ourselves, and not just subjects with test scores.

To insure that answers about treatment outcomes are accurate, as well as aid in forming the correct questions, it is imperative that youngsters receive initial accurate diagnosis during the preschool years, not only in regards to the diagnosis of autism itself, but also in regards to the degree of skill deficit in the most salient areas of joint attention, imitation, social interactions, symbolic play skill, communication skills (Marcus & Stone, 1993; Wetherby & Prizant, 1993) as well as the presence/absence of behaviors seen in normally developing youngsters from the same age group (Watson & Marcus, 1988). In general, these are also the areas the public and professional spheres want treatment outcome measures to address, and derive their research questions from (Scahill & Lord, 2004).

Current best practices in regards to autism diagnosis in the preschool years advocates the use of three types of assessments for the areas described above: direct testing of the child using both formal/informal instruments, collection of behavioral reports from

parents and teachers (usually in a checklist format), and extensive observations (possible use of videotapes) of play, communicative, and interactive skills with a variety of settings and materials (Berkell, 1992; Campbell et al., 1991; Lord, Bristol, & Shopler et al. 1993; Marcus & Stone, 1993; Wetherby & Prizant, 1993). Karnes and Johnson (1988) also recommend the use of multiple measures (triangulation) in evaluating the effectiveness of early intervention programs. Some of these same instruments/measures used for diagnostic purposes are also appropriate measures of treatment effectiveness to varying degrees. A review of the pros and cons of the use of these measures for this purpose follows.

Traditional Standardized Assessments

The use of traditional psychological assessments with autistic children on a routine basis is actually a new practice, as these youngsters were generally considered to be untestable up to about 20 years ago [check Myer] (Evans & Meyer, 1990). As behavior technology for improving compliance gained impetus, along with the introduction of standardized modifications of traditional tests (Sattler, 1982), the use of standardized tests to measure cognitive ability, academic achievement, and social development based on normed comparisons became more common (Durand, 1992). Initially, these measures of IQ were used to determine prognosis, as several studies in the 1980s demonstrated generally good predictability and stability for intelligence and developmental quotients for autistic children (Lord & Schopler, 1989; Shah & Holmes, 1985).

Several cautions however, were indicated by these research findings, that practitioners ignored. Use of the Bayley Scales of Mental Development when compared

with later scores on performance or nonverbal tests showed large increases on subsequent school age IQ scores, giving to limited predictive power (Lord & Schopler 1989). The reader will recall this is one of the instruments Lovaas relied upon in his study. Lord and Schopler (1989) also found considerable variability among autistic children in regards to showing substantial changes over time in test scores, despite the overall findings of stability. Predictability for younger autistic children was strongest when the youngsters were 4 years of age or older at the time of initial assessment. Overall, for young preschool children, intellectual and developmental scores predicted latent nonverbal intelligence fairly well, but they did not provide good discrimination regarding the degree of mental retardation in young preschoolers. This corroborated results of an earlier study (Lord & Venter, 1992) showing that it was not possible to predict which young autistic children would be mildly versus moderately retarded. Indications were also present that while IQ scores for a speaking autistic youngster were likely to continue to remain in the same range throughout his school years, the converse was not true. A nonverbal 3-year-old who scored poorly (IQ range of 30 to 50), would not necessarily never speak or remain severely handicapped. In fact, in one study, 50% of nonverbal autistic 3-year-olds showed increases of more than 30 points when reassessed 5 to 8 years later (Lord & Schopler, 1989)! Finally, Lovaas own research and the dramatic differences seen in his IQ scores after treatment additionally muddied the waters regarding the prognostic value of IQ and other standardized normed assessment. No longer was a low IQ at age three a guarantee of a pessimistic outlook.

There are other cons to the use of traditional tests of intellectual ability (both verbal

and nonverbal) as measures of treatment effectiveness. While any item a youngster can pass during formal psychometric assessment is likely a true sample of his ability, the same case can not be made for items the youngster doesn't pass (Lincoln, Allen, & Kilman, 1995). [2nd appear] The chance that the child did not pass the item is all too likely the result of a lack of motivation, poor attention to the task, or a lack of ability to communicate the response appropriately, as opposed to necessarily the a lack of skill to complete the task. There are many observations in the field of such discrepancies. One involves a 4-year-old with autism who could not understand/pass the matching concepts at the two year old level on the 1957 edition of the Leiter Scales of International Performance but could complete matching tasks on a computer game, and actually boot up, select the software, and play interactively independently (Lincoln et al., 1995). Poor performance on standardized cognitive tests should not be viewed as synonymous with poor intellectual ability.

Another away around this issue was attempted by Lovaas (1987) when he first trained for compliance behaviors for testing before administration of the test itself. The problems with this were delineated previously in this paper, and center around bias and defeating the actual concept of standardized administration which are part of the foundation of these instruments.

As noted earlier in this section, IQ and DQ scores also do not reflect the processes by which an autistic individual acquired the skills they passed. That is, two autistic children may pass the same item, but through using dramatically different strategies. As such, the tests are measuring what has been learned, as opposed to how easily or the manner in which something was learned. There are currently no studies evaluating a more dynamic

assessment of learning potential in autistic youngsters, such as those done by Feuerstein (1986, 1987) in his work in special education programs with the mentally retarded in Israel. Advocates of his theories hold that if we were able to measure/delineate how a youngster processed information better, we would be in a better position to teach a child with autism the skills he/she lacks, or modify/adapt the present ones so that he or she can communicate more effectively. Butera and Haywood (1995) claim to have developed such a teaching/dynamic assessment model based on determining and then specifically teaching fundamental cognitive processing skills (comparison, classification, causality, seriation, etc.) in their Bright Start program. Their research shows gains in not only IQ, but also the cognitive processes themselves, planning and organizational strategies, as well as increased receptive language skills. However, the results are based on a heterogeneous population of handicapped youngsters, and thus can not be determined to be specifically effective for autism. Lincoln et al. (1995) hold that because youngsters with autism frequently lack the skills necessary to function adaptively in certain contexts, it might actually be more valid to utilize an assessment technique that incorporates the ability to gain from training, before and after abilities/skills associated with varying tasks have been taught, rehearsed, and practiced. He advocates that Feuerstein's methodology and thoughts regarding learning-potential theory not be overlooked, and their development encouraged more in the field of autism.

Another reason to avoid the use of traditional psychometric instruments for treatment outcome measures is the limited impact such instruments have on the treatment process themselves or the process of deciding among specific treatments. Hoy and

Retusham (1984) concluded that they are only useful in long-term monitoring of outcome aspects.

Standardized Behavior Checklists

Several behavior checklists were developed to answer the need to collect reliable data about the maladaptive and adaptive behaviors of autistic youngsters in a standardized way, as well as obtain information about the more subtle, but common characteristics of autism regarding sensory abnormalities, motor stereotypes, insistence on sameness, and patterns of play and use of objects that are not easily measured using the more traditional psychometric tools. Structured and semi-structured diagnostic interviews are useful in evaluating treatment outcomes, particularly when they are reliable and valid.

The best known of these is the *Childhood Autism Rating Scale*, (CARS), by Schopler, Reichler, and Renner (1988) which is currently undergoing an update and revision. The instrument took over 15 years to construct, and has the strongest psychometric properties of all the diagnostic scales for autism (Morgan, 1988). The design of the CARS incorporates the DSM-IV definition, as well as the definitions of the National Society for Autistic Children (1978), Creak (1961) and Kanner (1943). The CARS is composed of 15 four-point scales on which a clinician rates the child after a structured clinical observation on the presence and severity of certain behaviors. Its empirical nature limits the use of clinical intuition, but makes it possible to move diagnosis and observation to the less restrictive domain of other individuals (professionals and parents) who are involved with the child (Schopler, Reichler, & Renner, 1994). The scale can be used not

only for identification/diagnosis, but also research or classification of severity purposes.

The 15 scales include: Relating to People, Imitation, Emotional Response, Body Use, Object Use, Adaptation to Change, Visual Response, Listening Response, Taste, Smell, Touch Response and Use, Fear or Nervousness, Verbal Communication, Nonverbal Communication, Activity Level, Level and Consistency of Intellectual Response, and General Impressions (Schopler et al., 1994). Each scale is rated from 1 to 4 (with midpoints included) for severity, and includes a detailed description of each level of rating as well as description of the scale. Children with scores below 30 are categorized as not having autism, while those with score of 30 and above are autistic, with higher scores indicating the severity of the autism.

The scale has been developed and refined based on over a decade of use with more than 1,500 children aged 2 to 11+ with age distribution similar for the two sexes, and racial distribution reflecting that of the public schools in the state of North Carolina in 1982-83 (Schopler et al, 1994). The same distribution of IQs as noted earlier in this paper for autistic youngsters, also provides clear evidence of the true representativeness of Schopler's norm sample. Because Schopler included behavior-disturbed children in his pilot studies, discriminate validity has also been established which is not currently present for any other autism rating scale in existence today. The coefficient alpha assessing internal consistency of the CARS was .94, and inter-rater reliability averaged .71. Test-retest reliability correlation was .88 ($p < .01$) over time, and CARS diagnoses from the second and third evaluations agreed 82% of the time.

The instrument is not without criticism however at this time as the CARS is based

on DSM-III-R criteria. Therefore it has been found to miss children diagnosed with PDD-NOS and over-identify children with only mental retardation as also having autism (Perry, Condillac, Freeman, Dunn-Geier, & Belair, 2005; Pilowsky, Yirmiya, Shulman, & Dover, 1998). [vs. Matson] Matson (2005) is currently advocating the revision process for the CARS be stepped up to match the broader phenotypes of autism across the spectrum. As at the time it was first developed it was with out equal in the field, and relatively easy to use, one wonders why Lovaas did not include its first edition in his 1989 UCLA study. Its use would have added substantial statistical power and validity to their results (if they were indeed valid), and perhaps prevented some of the intense criticism that followed.

The *Autism Behavior Checklist* (ABC) was developed by Krug, Arick, and Almond in 1980, consisting of 57 behavioral descriptions that are grouped into the 5 areas of Sensory, Relating, Body and Object Use, Language, Social Skills, and Self Help. The list of behaviors and weighted scores enable identification of varying levels of autistic behavior. It is designed to be administered to both parents and teachers, and includes information about a youngster's early developmental history. It is actually part of a larger instrument, The Autism Screening Instrument for Educational Planning, and is considered the best researched subtest within this test (Morgan, 1988). The ABC is unique in that claims to differentiate autistic individuals from those who are severely handicapped, but without autism, as well as deaf-blind, severely emotionally disturbed, and normal. It also includes separate profile charts for different age groups.

The test was developed creatively using three samples (Krug Arick & Almond

(1993). The first involved 1,049 individuals from 18 to 35 years of age, of which 172 had been diagnosed with autism, 423 with severe mental retardation, 254 with emotional disturbance, 100 deaf and blind, and 100 with no disabilities. The second sample used 62 individuals diagnosed with autism ranging in age from 3 to 23 years, and the third sample had 953 adults aged 21 to 68 years with 95% having severe mental retardation. The actual checklists were developed and rated for each descriptor through many drafts using 26 international experts first, and then 3,000 professionals in the field of special education, with the resulting version finalized by 14 of the 26 original autism experts.

Concurrent validity analysis showed those with autism scored significantly higher on the total behavior checklist using ANOVA, than each of the other handicapping condition categories noted in the previous paragraph ($p < .001$) [see above] (Krug et al., 1993). Inter-rater reliability was $r = .87$. Volkmar, Cicchetti, Dykens, Sparrow, Leckman, & Cohen (1988) state it is valuable as a screening instrument, but question its validity for diagnosis in studies that base the diagnosis of autism solely on its use. It is common practice however, to never make a diagnosis of autism on the basis of only one instrument (no matter what its psychometric properties)!

The ABC is not as simple to complete as the CARS, and because some of the items also include the presence of various symptoms in a youngster's early development as weighted scores in the final score, it is probably not ideally suited for measuring treatment outcomes at varying intervals. If these items were eliminated, the use of it in this regard could be investigated further. The inability to account for the degree/severity of many of the behaviors listed is also a weakness, making it difficult for a rater who has only seen a

behavior exhibited once or twice as opposed to chronically to know what to score.

The Autism Diagnostic Interview (Le Couter, Lord, & Rutter, 2003) interviews the principal caregiver to assess behaviors relevant to the differential diagnosis of PDD/autism spectrum for children and adults aged 18 months and above. There three versions include a lifetime version, a version based on current behavior and a version for use with children under the age of 4. The items focus on three main areas: the qualities of reciprocal social interaction (such as greeting behavior, emotional sharing, offering and seeking comfort), communication and language (including features as social usage, conversational interchange, idiosyncratic language, and stereotyped utterances) and repetitive, restricted and stereotyped behaviors (such as unusual preoccupations, abnormal attachments, ritual, and unusual sensory interests). Also included are questions on self-injury, pica, overactivity, and aggression. The interview is a lifetime assessment of this range of behaviors, beginning with history since infancy and proceeding forward. The ADI focuses on the 4 to 5 year age period for many ratings to help differentiate deviance from severe delay or impairment in the same functions.

High inter-rater reliability (.75) was present for the communication/language items, and repetitive restricted, and repetitive, restricted, and stereotyped behaviors [check sp] (LeCouteur, Rutter, Lord, Rios, Robertson, Hodgrafer, & McLennan, 1989). An algorithm from the ADI relevant to the working draft of the ICD-10 diagnosis of autism was found to be a reliable and effective discriminator of autistic versus neurotypical school-age mentally handicapped children, and has relative validity (66.7%) with the CARS (Saemundsen, Ludvigsson, Rafnsson, 2003). The instrument has promise for evaluating treatment

outcomes because is set up so behavioral deterioration or growth can be accounted for within designated age periods, unlike many other checklists.

Other checklists include the PDD Behavior Inventory (Cohen, 2003), which is designed to assess response to intervention for children with PDD in regards to maladaptive and adaptive behaviors. Although it does provide a summary “Autism Score” that reflects the severity of the condition, this instrument was designed to address treatment related changes (Cohen, 2003).

The Gilliam Autism Rating Scale (GARS, Gilliam, 1995) is another standardized autism diagnostic instruments that rely on parent or teacher report. The measure is a frequent choice by some clinic (Akshoomoff, Corssello, & Schmidt, 2006). However, recent studies have reported that the GARS may miss as many as 58% of children according to the current DSM diagnostic criteria (Lecavalier, 2005; South et al., 2002).

Standardized Observation Checklists

In contrast to simply observing the frequency of specified defined behaviors in a designated time period (behavioral assessments) and the antecedents and consequences associated with them, observational methods of assessment and measurement of treatment outcomes also come in more standardized formats that provide statistical back-up to the qualitative aspects of observations.

The Autism Diagnostic Observation Schedule (Lord et al., 2001) is an investigator based interview designed to standardize the observation of social and communicative behavior in autism and related disorders, and is used in conjunction with the Autism

Diagnostic Interviews developed by the same authors. Before it was released to the market at large, the ADS was used in research and academic centers for close to 15 years and revised in these settings to meet high standards of both quantitative and qualitative measures. The instrument is novel in that it is interactive, and involves direct observations of interactions that also accounts for the developmental level and age of the child. It is considered the “gold standard” in several Best Practice Guidelines in School and Clinical Psychology as well as the National Research Council (2001).

The ADOS looks at the quality of social behavior. Eight tasks are presented by the examiner that press for interaction, and certain target behaviors are coded during the course of the assessment. The examiner plays with and talks to the child following a semi-structured protocol. General ratings are made immediately after the interview on a 3 point scale.

The original of version of the test was limited in its use for many clinicians because the subjects must be verbal and have a mental age of 3 years or better. As this eliminated so many preschoolers who are nonverbal, Ms. Lord and her colleagues combined their previously published Prelinguistic Autism Diagnostic Observation Schedule with the original ADOS. The results was the ADOS-G, which has 4 different modules for individuals of various ages and developmental and language levels through adulthood. The instrument provides an opportunity to observe specific aspects of the child’s social behavior such as joint attention, sharing of affect, and imitation with a stranger and with the parent. For each task, a hierarchy of “presses” or social structures is provided, and specific coded behaviors resulting in a Communication Score, a Reciprocal Social Interaction score,

and a Total Score.

An algorithm that relates abnormalities on the ADOS to operationalized clinical guidelines for the diagnosis of autism is reported to have high reliability and discriminate validity (Campbell et al., 1991), similar to its ADI counterpart.

Test-retest reliability with intra-class correlation ranged from .73-.92 on the Communication and Reciprocal social Interactions domains and .59 to .86 on the Sterotyped Behaviors and Restricted Interests domains. Rigorous validity studies have been published showing good predictive validity with sensitivities ranging form 90% to 97% and specificities ranging from 87% to 94% for the autism/ASD versus other clinical diagnoses (Lord et al., 2001). Intensive training is required for certification to use the instrument to establish a reliability rate of 890% agreement or better on the protocol and algorithm (Akshoomoff, Corsello, & Schmidt, 2006).

The Play Observation Scale (Rogers, Herbison, Lewis, Pantone, & Reis, 1986) is used to measure several characteristics of symbolic play, and is appropriate for use with handicapped or non-handicapped youngsters. This instrument is described in detail in Chapter 3 of this paper, and can be viewed in Appendix C. Inter-rater agreement for this instrument was at 85% in a 1989 study that is detailed described previously in this chapter.

The ASIEP described earlier also includes an *Interaction Assessment* where the autistic child's responses are categorized as Interaction, Constructive Independent Play, No Response (Self-Stimulatory), and Aggressive/Negative over time during three structure conditions where an adult models toy play, is passive and initiates no interaction, and finally, provides direct cues for the youngster to utilize the toys (Krug, Arick, & Almond,

1993). The technique records only a general class of responses, but does provide them some context. Agreement scores for 87 raters were between 73 and 100%. Multiple regression analysis of the sample population for the entire ASIEP found that those students with higher ABC scores also had high levels of No Response behaviors on the Interaction Assessment.

Overall, the general class of behaviors makes this assessment inappropriate for the broader range of preschool youngsters with autism, especially those with language and higher functioning skills at intake. It may however, have some value in measuring interaction progress for an exclusive group of lower functioning autistic youngsters.

The *Kiddie-Infant Descriptive Instrument for Emotional States* (Stern, MacKain, Radons, Hepper, Trad, Polan, Barnard, & Spicker, 1992) investigates individual differences in affective and behavioral responsivity among children with PDD/autism, and contrasts their profiles with those of other child psychiatric populations. It quantifies the frequency and intensity of eight affective dimensions, including Happiness, Sadness, Anger, Fear, Disgust, Surprise, Distress, and Soberness and the frequency and intensity of eight behavioral dimensions, including Startle, Regression, Aggression, Attention Span, Negativity, Attention to Persons, Attention to Things, and Activity. The dimensions are evaluated based on facial, vocal, gestural, and postural displays, and score in terms of frequency and intensity of a 5-point scale.

The instrument was used in a 1993 research study with 47 children, half of whom were diagnosed PDD and half autistic disorder (Trad, Bernstein, Spiro, & Hertzog, 1993). Twenty-one children were diagnosed with a specific developmental disorder and were

considered the controls. The subjects were videotaped while interacting with their mother, their teacher, and an unknown doctor for 15-minute episodes each. Mothers were present in the room throughout the assessment. Ratings of the facial, vocal, gestural, and postural displays were made at successive 30 second intervals.

Reliability ratings between raters ranged from .61 to 1.0, with dimensions of Happiness, Attention to Persons, and Attention to Things all at .82 or higher (Trad et al., 1993). Through the use of a time-series regression analyses, the researchers showed impaired affective responsiveness in several areas when compared to the control groups, but also found considerable variability within the PDD/autism group members. In general, much less consistency in affective responsiveness across the experimental situations was noted for the PDD/autism group. The instrument includes ratings regards to the ratings of facial, vocal, postures, and gestures that are not found in other instruments.

Another standardized observation instrument is the *Communication and Symbolic Behavior Scales* (Wetherby & Prizant, 1993). This instrument recognizes communication development as a transactional process between the child, caregiver, and environment and thus measures both the developmental and qualitative aspects of preverbal and early linguistic communication and related abilities in young children. It is a direct challenge to the traditional formal language assessment instrument which focused primarily on the structure of language and relied solely on elicited responses. As language impairments in autism are most apparent in the area of pragmatics, such instruments have had limited utility for autistic children. Wetherby and Prizant (1993) sought to examine the communicative abilities of people with autism in natural communicative exchanges, with

his/her symbolic ability serving as a developmental frame of reference. As such, the communicative functions expressed by the individual (as well as the repertoire of behaviors used for communicating) are surveyed even if they are at a pre-intentional level. The instrument believes that any behaviors that serve a communicative function based on others' interpretation of the behaviors should be identified. These include several categories of communicative functions that actually emerge prior to speech such as communications to regulate one's own or another's behavior, social interaction signals to attract and maintain attention to oneself for affiliation, and joint attention (acts to direct another's attention for purposes of sharing the focus on an entity or event (Bruner, 1981).

The CSBS was standardized on a normative sample of 350 8 to 24 month old children. Within the assessment, a child's behavior is analyzed and rated on 22 scales on the basis of analyses of communication and play behavior in semi-structured and relatively unstructured play contexts. This analysis results in composite scores in the domains of communicative function, gestural, and vocal communicative means, reciprocity, social-affective signaling, and verbal and nonverbal symbolic behavior. Information about the representativeness of the assessment is obtained through a detailed caregiver interview and a caregiver perception rating, which are completed before and after the direct assessment. The results yield a profile of relative strengths and weaknesses for intervention planning, as well as developmental indexes.

The instrument provides a measure of treatment outcomes related to communication competencies and social interactions, because of its unique specification of nonverbal communicative functions and measuring of them in its schema. It is one of the

few instruments where nonverbal youngsters will be able to show standardized evidence of gains, as opposed to earning scores of zero on traditional formal language tests, or being found untestable.

Qualitative Measures of Treatment Outcome

Greenspan's *Functional Emotional Assessment Scale* (Greenspan, DeGangi, & Wieder, 2003) also enables the classification of nonverbal communications through Greenspan's "circle of communication" concept described previously in this chapter. It determines the developmental category into which a youngster fits based on the amount and complexity, and symbolic level of the circles achieved in interactive play sequences. Each domain/stage of development has several items which are scored for the presence/absence of various behaviors, and requires trained professionals to score video tapes of youngsters' play sequences. The technical data for this instrument is described in detail in Chapter 3.

Other observational methods assessing treatment outcomes have been largely behavioral in nature, defining a behavior to be observed and measuring its occurrence. Cafiero (1994) measured the success of her Natural Language Training program using Picture Communication Symbol and communication boards with nonverbal autistic preschoolers with such a tool. This instrument can be viewed in Appendix D and is also described in detail in Chapter 3. Before and after her training program, she videotaped the youngster and parents in enjoyable interactions together.

Cafiero (1994) wanted her program to result in increased communicative units. She

defined the communicative unit as an active and intentional process whereby a sender formulates and transmits a message to a receiver through words, gestures, signs, pictures, or a combination of them. Such a unit did not include random and unintentional touching, reaching for objects, demonstrations of affection or hand over hand use of picture symbols except for the actual facilitator. Verbal approximations of words or phrases which were contextually appropriate were scored. She then divided the communicative units into four categories of parent initiation, parent response, child initiation, child modeling, and child responses. Each of these categories was in able to be coded as verbal, signed, gestural, picture symbols, or a combination of these modalities.

After training coders who were naive to her research question, Cafiero had them score a 10-minute play session using a 15-second continuous partial interval scoring method. The percent of intervals in which a communicative interaction occurred was determined as well as the specific type of interaction. Results of the study showed a significant increase in communicative acts initiated by the child for all 5 families in the study after the treatment, as well as decreased parental stress according to the Parent Stress Index and an adaptation of the CARS.

Many other researchers have used similar methods of defining specific behaviors to measure as desired outcomes of treatment, and then had trained, but naive observers rate observations/videotapes of behavior samples for the presence/absence of desired outcomes.

An alternative view of outcome in autism, although for adults, has been proposed by Ruble and Dalrymple (1996) that warrants mention. The authors suggest that the interaction of the environment and the person is better method to conceptualize “good

outcome,” drawing upon Rosen, Simon, and McKinsey’s 1995 literature suggesting that quality of life is the overriding map for developing programs, providing services, and evaluating environments. This includes looking at the happiness of people with autism as an important aspect of the outcome (Lord & Venter, 1992).

Rosen and Dalrymple (1996) state that the protective factors of the environment, including supports, treatments, and adaptations, serve to counterbalance the risk factors of the autistic person that include the personal challenges of sensory problems, challenging behaviors, cognitive disabilities, etc. Because such interactions fluctuate, they are not static across a lifetime, but rather must be looked at different time periods in an autistic child/or adult’s life. They argue that this type of ecological measurement, which includes looking at how happy the autistic individual is, is more valuable than the variables of IQ, speech, and adaptive behaviors, particularly given the statistics about the prevalence of mental retardation with autism for at least half of the population (Gillberg, 1990). IQ, other cognitive, and linguistic variables, in this line of thought, remain relatively stable over time (Freeman et al. (1985) because of the retardation factor. Assessing the interaction of the environment and the autistic person however, allows a focus on variables that are more amenable to change. While an autistic child with a low IQ score and limited language might be viewed in traditional assessment models as having had a “poor outcome” after two years of special education, Ruble and Dalrymple (1996) offer a different conceptualization. Rather, they look at the child’s general level of happiness, participation in family and community activities, specific skill development in selected areas, and supports available and utilized for aberrant behaviors as more important criteria for a “good

outcome” than actual test scores.

There is one other aspect of measuring treatment effectiveness in early intervention for autism that Guralnick (1988) and Karnes and Johnson (1988) feel has been largely ignored. The authors cite that in the use of dependent measures, there has been a singular focus on child data to the exclusion of instruments that look at the impact of the intervention on a family, or on a classroom. Guralnick calls for broadening the parent role beyond that of teacher by providing them with coping strategies and expanding the types of resources given to them, as well as the way they are utilized resourcefully in intervention programs.

Chapter 3

Methodology

Twenty-eight children participated in this study, 14 from the ABA treatment group and 14 from the DIR treatment group. As noted in Chapter 1, a control group of 15 children with autism enrolled in a public school system special education program were also in the original process of selection when the agency withdrew from participation in the research study. The following criteria were met for entry the study:

1. The child had a diagnosis of autism according to the DSM-IV definition by both medical and psychological professionals prior to or shortly after the date treatment was begun.
2. The child had undergone a minimum of two years of an exclusive intensive ABA or DIR treatment (no less than 30 hours per week).
3. The treatment program was started at no younger than two years of age, and no older than the age of four years, six months.

As the research advocates treatment for autistic children to begin at the earliest age possible, every effort was made to obtain samples of children who fell into the lower, as opposed to the higher, end of this age bracket. However, only within the last five years has awareness of the intensive programming options reached the public. Thus, most of the autistic children who met the criterion of having participated at least two years in a

program were between three and five years of age at the time they began treatment.

Participant Selection

Participants in the Lovaas treatment group were referred first through contact with the For Intensive Autism Treatment (FIAT) of Maryland. At the time this study began, the group had a membership of over 50 families whose children had been involved with, were receiving or were on a wait-list to begin receiving ABA treatment. Other organizations contacted for referrals included Community Services for Autistic Children and Adults (Treatment Program) in Rockville, Maryland, the Rutgers University Young Autism Project, the New Jersey Life Institute, and the May Institute Intensive Autism Treatment Unit in Massachusetts. Employees at these agencies distributed the information described above (see Appendix E) to qualifying families.

Participants for the DIR treatment group were referred by Dr. Stanley Greenspan, Dr. Serena Wieder, and their colleagues in the Interdisciplinary Council for Developmental and Learning Disorders, who distributed the information (Appendix E) to qualifying families.

When letters of interest were returned to this researcher, interested parents were contacted by phone to explain the details of the research and the videotaping procedures, in addition to being provided this information in written form (Appendix F). Once parents agreed to their child's participation in the study, random selection was undertaken with each treatment group and chosen participants were requested to sign a consent form giving permission for their youngster's participation (see G) as well as permission to review their

youngster's medical, psychological, and educational files (Appendix H). Most parents provided these files or the information in these files directly to this researcher.

Incentive

As an incentive for parents to encourage participation, the researcher offered to provide individual feedback to each family regarding their child's results on the assessments videotaped assessments at the conclusion of the study. This feedback involved interpretation of the assessment results, with a written summary if requested. This researcher provided each family with a written summary of her experience in working with autistic/developmentally disabled, and her qualifications to interpret the results of this assessment. All families would be provided an executive summary of the research results at conclusion of the study.

Confidentiality

Individual results of each child's assessment as well as the videos were kept confidential through use of a coding system. Privacy of the videotapes and individualized results were insured by keeping these materials locked when they were not in use.

Description of Participants

Although they were selected as randomly as possible, the final subject pool represented the breadth of characteristics and estimated cognitive potentials at diagnosis that were encompassed in the DSM-IV and more recent DSM-IV TR diagnostic

categories of Pervasive Developmental Disorders (which includes Autistic Disorder, Aspergers' Disorder and Pervasive Disorder Not Otherwise Specified) . This variety occurred despite the initial efforts of the referring sources to send subjects who they viewed as “the highest functioning” or having what they defined as “the best outcomes”. It is noted that over the years this project was undertaken, the incidence increased from 11 to 21 per 10.000 (Gilberg, 1990) to 1 in 250 (Autism Research Institute, 2004). This may have contributed to the wider range (and more representative nature) of the pre and post treatment characteristics of the children with autism in the study.

The information used to obtain the pre and post treatment characteristics was obtained through a structured family interview (Appendix I), as well as when authorized by parents, a review of the child's records (Appendix K). If the information provided in the interview or records did not address a given characteristic, this information was recorded as missing data.

Table 1 depicts the age ranges at symptom presentation as reported by parents. These ranged from 5 to 10 months through 29 to 32 months for each treatment group. The most frequent age group for symptom presentation for each treatment group fell between 16 and 19 and 20 and 24 months of age. Only one family was unable to recall the age at which they first observed their child's symptoms of autism.

Table 1
Age in Months When Autism Symptoms First Observed

Treatment Group		5-10	11-13	16-19	20-24	25-29	29-32	33-37	38-42	43-48	49-50
ABA	N	2	0	5	4	2	1	0	0	0	0
	%	14.3	0	35.7	28.6	14.3	7.1	0	0	0	0
DIR	N	2	1	6	4	0	1	0	0	0	0
	%	14.3	7.1	42.7	28.6	0	7.1	0	0	0	0
Total	N	4	1	11	8	2	2	0	0	0	0
		14.3	3.6	39.3	28.6	7.1	7.1	0	0	0	0

Table 2 illustrates the ages at which the subjects received a formal diagnosis from the DSM-IV ranging from 16 to 19 months to as late as 32 to 48 months. The most frequent age for each treatment group at which diagnosis was made for this sample was between the ages of 29 and 37 months. Subjects also began their respective treatments at similar ages, with the majority starting between 33 and 42 months for each group. There were 4 DIR subjects who began their treatment before 25 months of age, while the earliest treatment start date for subjects in the ABA group was at 25 to 29 months. Five ABA and one DIR subject started treatment programs after 42 months of age.

Table 2
Age at Formal Diagnosis and Age at Treatment Initiation

Treatment Group		Age in Months at Formal Diagnosis									
		5-10	11-15	16-19	20-24	25-29	29-32	33-37	38-42	43-48	49-50
ABA	N	0	0	1	2	2	3	5	1	0	0
	%	0	0	7.1	14.2	14.3	21.4	35.7	7.1	0	0
DIR	N	0	0	2	0	3	5	4	0	0	0
	%	0	0	14.3	0	21.4	35.7	28.6	0	0	0
Total	N	0	0	2	2	5	8	9	1	0	0
	%	0	0	7.1	7.1	18.5	29.6	33.3	3.6	0	0

		Age in Months at Treatment Initiation									
		5-10	11-15	16-19	20-24	25-29	29-32	33-37	38-42	43-48	49-50
ABA	N	0	0	0	1	2	0	4	2	2	3
	%	0	0	0	7.1	14.2	0	28.6	14.3	14.3	21.4
DIR	N	0	1	0	3	0	3	2	4	1	0
	%	0	7.1	0	21.4	0	21.4	14.2	28.6	7.1	0
Total	N	0	1	0	3	2	3	6	6	3	3
	%	0	3.6	0	10.7	7.1	10.7	21.4	21.4	10.7	10.7

The types of therapies and services the subjects were receiving at the time they began their treatment programs is illustrated in Table 3. The table also includes the number of subjects who had been documented as having some type of seizure disorder, as this is a characteristic more frequently co morbid in youngsters with autism than in other disabilities. Special Education services were defined as provided by certified special education teachers through the public or private school systems in which the subjects were enrolled in some capacity. The use of noncertified teachers did not qualify as a special education service. The bio-medical interventions and special diets of the subjects in the study included gluten/casein free diets, use of nutritional supplements, as well as a chelation protocol. Eight subjects from each of the treatment groups were on the gluten-

casein diet at the time treatment was initiated. All of the subjects were enrolled in occupational therapy, and all but one was enrolled in speech-language therapy at the time they began their intensive treatments. Medications used by children in the study included Depakote, Prozac, Tenex, Ritalin, and Resperidol.

Table 3
Types of Interventions in Use When Treatment Was Initiated

Treatment Group		Special Education	Biomedical Treatments And/or Special Diets	Speech Therapy	Occupational Therapy	Seizure Meds.	Psychotropic Medications
ABA	N	13	10	13	14	4	4
	%	92.8	71.4	92.6	100	28.6	28.6
DIR	N	7	12	14	14	2	4
	%	50	85.7	100	100	14.3	28.6
Total	N	20	22	27	28	6	8
	%	71.4	78.6	96.4	100	21.4	28.6

Table 4 presents the coding system utilized to classify the estimated cognitive ability, verbal ability, and adaptive skill levels of the youngsters at treatment initiation. The participants had undergone a wide variety of both formal and informal assessments when they were first diagnosed, and most parents in the study made this information available to this examiner in paper copy. Best estimates of ability levels were determined from information in the child's records as well as information provided in the parent interview. These estimates were placed in levels ranging from more than two years below to more than two years above chronological age level, as indicated below:

Table 4
Coding Levels for Estimates of Cognition, Verbal Ability and Adaptive Skills

LEVEL	
1	More than 2 years below chronological age
2	7-18 months below chronological age
3	6 months below chronological age
4	6 months below 6 months above chronological age
5	7 months to 1 year above chronological age
6	1 to 2 years above chronological age
7	More than 2 years above chronological age

Table 5 and Table 6 depict the range of participant ability estimates according to the coding system. No subjects were estimated to function above average (more than 7 months above chronological age) in any area. Only 2 subjects in the entire study were estimated to function in the average range in one category (Verbal Receptive Language ability). The majority of children in the study were estimated to function at least 7 months to over 2 years below their chronological age level in the areas of Verbal Expressive and Receptive Language Skills (as well as Verbal IQ) and Adaptive Skills. Slightly higher estimates were obtained for Non-Verbal Reasoning Abilities for the subjects in the study.

Table 5
Cognitive Ability Estimate Level at Treatment Initiation

Treatment Group		Verbal IQ Estimate Level					Non Verbal IQ Estimate Level					
		1	2	3	4	5	1	2	3	4	5	6
ABA	N	6	7	0	0	0	1	1	3	2	0	0
	%	46	54	0	0	0.	14	14	43	29	0	0
DIR	N	2	6	5	0	0	1	2	2	1	0	0
	%	15	46	38	0.	0	17	33	33	17	0	0
Total	N	8	13	5	0	0	2	3	5	3	0	0
	%	31	50	19	0	0	15	23	38	23	0	0

Note. Totals within group vary because of missing data.

Table 6
Verbal Ability Estimates at Treatment Initiation

Treatment Group		Verbal Receptive Language					Verbal Expressive Language				
		1	2	3	4	5	1	2	3	4	5
ABA	N	6	5	1	0	0	7	3	2	0	0
	%	50	42	8	0	0	58	25	17	0	0
DIR	N	2	2	3	2	0	2	8	3	0	0
	%	20	20	30	20	0	15	62	23	0	0
Total	N	8	7	4	2	0	9	11	5	0	0
	%	36	33	19	9	0	36	44	20	0	0

Estimations of adaptive skill levels are given in Table 7. Adaptive skills should not be considered indications of cognitive ability. Rather, they represent the amount of supervision a child requires to be independent in his/her life commensurate with his age

peers. They are measures of the degree of supervision a participant would require in the world at large.

Table 7
Estimations of Adaptive Skill Levels at Treatment Initiation

Treatment Group		Adaptive Level			
		1	2	3	4
ABA	N	1	5	2	0
	%	13	63	25	0
DIR	N	1	4	3	0
	%	13	50	38	0
Total	N	2	9	5	0
	%	13	56	31	0

Table 8 shows the range of expressive and receptive language characteristics the participants demonstrated prior to treatment. No children were using simple or complex sentences when they started treatment programs. All of the participants demonstrated problems in language comprehension, regardless of their estimated expressive language abilities.

Table 8
Language Characteristics of Participants

		Words/Sentences						Comprehension Problems	Echolalia	Average Word / Sentence Rating
		1	2	3	4	5	6			
ABA	N	5	6	2	1	0	0	14	9	1.93
	%	35.7	42.9	14.3	7.1	0	0	100	64.3	
DIR	N	3	5	5	1	0	0	14	8	2.29
	%	21.4	35.7	35.7	7.1	0	0	100	57.1	
Total	N	8	11	7	2	0	0	28	17	2.11
	%	28.6	39.3	25	7.1	0	0	100	60.7	

Note: Words/Sentences Rating Scale 1– Non-Verbal 2 – Less than 25 words and sounds 3– More than 25 single words 4 – Two word combinations 5 – Simple sentences 6 –Complex sentences

Sensory and affect regulation/modulation issues are hallmark characteristics of an autism spectrum disorder that often serve as the first “warning sign” to families that their child has a problem. Table 9 shows the number of children in the study presenting with these issues and the range of their differences. The types of sensory issues and affect characteristics were close to equally divided across both treatment groups.

Table 9
Sensory and Affect Regulation Characteristics of Participants

Group		Over /Under Reactive to Stimuli				
		Sound	Vision	Touch Taste	Movement	
ABA	N	13	13	11	14	
	%	93	93	79	100	
DIR	N	14	11	10	14	
	%	100	70	71	100	
Total	N	27	24	21	28	
	%	96	86	75	100	

		Over/ Under Activity Level	Withdrawal Unresponsive		Excessive Crying	Tantrums	Self- abuse
ABA	N	13		12	11	11	5
	%	93		86	79	79	36
DIR	N	11		11	10	13	1
	%	79		79	71	93	7
Total	N	24		23	21	24	6
	%	86		82	75	86	21

The last decade of research (Gernsbacher and Goldsmith, 2003, Smith, 2002, Wieder, 2001) has indicated some of the earliest signs of autism can be seen in subtle deficits in motor planning—the ability to initiate, execute, and recall associated sequences of motor movements, conceptual units, and/or events. Such deficits are more evident in demand situations than in spontaneous situations where a child does not have

to process input information from an outside source. Pre-treatment motor planning behaviors often affected by autism are listed in Table 10 below. It is interesting to note that more youngsters in each treatment group could perform the fine motor/perceptual skills to complete puzzles than were consistently able to point.

Table 10
Motor Planning/Praxis Characteristics of Participants

Treatment Group	Child Points	Child performs 1-2 step imitation of motor movements	Child pulls others to get needs met	Child likes to line up objects	Child likes to do puzzles	Child performs 2-step play sequence	
ABA	N	4	5	7	6	10	1
	%	28.6	35.7	50	42.9	71.4	7.1
DIR	N	4	3	9	6	8	0
	%	28.6	21.4	64.3	42.9	57.1	0
Total	N	8	8	16	12	18	1
	%	28.6	28.6	57.1	42.9	64.3	3.6

Outcome Measures

The social-interactive, communicative, and play skills of the children were measured using behavioral and formal instruments, in both structured and unstructured play interactions with their primary caregivers. In addition, results of the parent questionnaires and interviews were utilized to determine the age at which treatment was initiated and the Level of Communication competency a youngster had prior to starting treatment.

Supplementary data analysis using results of the Vineland Adaptive Behavior Scales and Childhood Autism Rating Scales was conducted, although completion of these instruments was not a requirement for entry into the study.

This formal process involved a parent interview and record review, followed by four videotaped sequences, two of which were completed within the same session, and the other two to be completed at two different points in time.

All videotaping was done by a two-person research team. This team consisted of this researcher and graduate students in special education and speech language pathology with experience and interest in working with families and children with autism.

Three major outcome measures were examined in this study and are depicted on the chart to follow:

Figure 1: Summary of Outcome Measures

OUTCOME MEASURES			
Descriptors	Parent/Child Communicative Interaction Activity A	Functional Emotional Maturity Level Activity B	Symbolic Play Level and Social Communicative Competency Activity C
<u>Instrument</u>	<i>Natural Language Training Observation Form</i>	<i>Functional Emotional Assessment Scale</i>	<i>Play Observation Scale</i>
<u>Author</u>	Joanne Cafiero, Ph.D., 1995	Stanley Greenspan, M.D., 1986	Rogers, Herbison, Lewis, Pantone, and Rice, 1986
<u>Description</u>	Behavioral measure of parent-child interaction based upon active and intentional communicative units in verbal, gestural, signed, or pictorial form	Qualitative measure of developmental level of verbal/non-verbal play sequences based upon emotional/relationship capacities and associated motor, sensory, language, and cognitive competencies	Quantitative measure of level of symbolic play as well as how child incorporates parent/adult into such play
<u>Format</u>	10 minutes of unstructured parent-chosen activity that is highly motivating for youngster and interactive with parent	15 minutes of unstructured play led by parent (with some clinician coaching) using variety of toys selected by parent as well as made available by researcher	Two 10 minute intervals of structured play sequences with parent using designated toys in test procedures
<u>Measurement Categories</u>	<p><u>Types of Communicative Units:</u> Child Initiation Child Response (includes Child Modeling)</p> <p>Amount of units demonstrated in each category is tallied to obtain a total score.</p>	A total score and level of functional emotional maturity is assigned for the interaction based upon amount of "circles of communication" observed along with other associated qualitative clinical judgments	<p>1. Symbolic Play Level Classification Symbolic-Agent Symbolic-Substitute Symbolic Complexity Sensory Motor</p> <p>A rating from 1 to 4 is assigned within each level observed</p> <p>2. Social Communicative Competency Rating from 1 to 7 assigned based on degree of child incorporation of parent into play</p>

Figure 1: *Summary of Outcome Measures. Con't*

<u>Videotape Sessions</u>	<p style="text-align: center;">Group A Activity #1 Session 1 Activity # 2 Session 2</p> <p style="text-align: center;">Group B Activity # 2 Session 1 Activity #1 Session 2</p>	<p style="text-align: center;">Group A Activity # 2 Session 1 Activity # 1 Session 2</p> <p style="text-align: center;">Group B Activity # 1 Session 1 Activity # 2 Session 1</p>	<p style="text-align: center;">Group A Activity # 3 Session 1 Activity # 2 Session 2</p> <p style="text-align: center;">Group B Activity # 3 Session 1 Activity # 2 Session 2</p>
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One characteristic of children with autism is the extreme variability in their performance within a single time period as well as in repeated ones. One could interpret their highest scores as a measure of how a child functions at his best. At the same time, given the vulnerability of the population to even minor changes in routine or environment, their lowest score could portray how they function under what they experience as “stress.” As daily life has multiple contexts, sensory inputs, and routine changes, this lower score might indeed be considered by some in the field as a better picture of their more “typical” performance.

To provide the most accurate portrayal of the children, two film samples of each outcome measure were taken, and the highest and lowest scores for the Natural Language Training Form and the Functional Emotional Assessment Scale were utilized for each child. The Play Observation Scale did not involve a highest/lowest score sample, as it measures the construct under two conditions. The first condition involves the child and parent, but the parent does not interact with the child unless the child initiates the interaction (C1). The second (C2) incorporates both the child and parent. As discussed in Chapter 2, research indicates children show their highest levels of play in interaction with their parents, as opposed to when they are playing by themselves.

Instrumentation

Parent/Child Communicative Interaction

The Natural Language Observation Training Form was used to measure this construct. This behavioral measure of parent-child interaction (operationalized as communicative units) was developed by Dr. Joanne Cafiero in her 1994 study to measure

the effectiveness of picture symbols as a natural language for autistic children. Dr. Cafiero defines a communicative unit as "... an active and intentional process, whereby a sender formulates and transmits a message to a receiver through words, gestures, signs, pictures, or a combination of these media. A communicative unit does not include random and non-intentional touching /reaching for objects, demonstrations of affection or hand over hand use of picture symbols except for the actual facilitator. A communicative unit does include verbal approximations of words or phrases, which are contextually appropriate."

The NLT form provides a count of the amount of child initiations and responses as well as parent initiations and responses within a 10-minute time period using materials and activities chosen by the child and his family. The test consists of 42 fifteen-second intervals in which the raters score the presence of the designated behaviors.

Communicative units scored according to Dr. Cafiero rating scale are classified as Child Initiations, and Child Responses (including Child Modeling). These behaviors can be Verbal, Signed, Gestural, or Picture Symbols, or a combination of these modalities (Appendix D).

The communicative units that were totaled for the purposes of this research study were Child Initiations and Child Responses. For this first outcome measure, parents were asked ahead of time to select activities/toys that were highly motivating and reinforcing for their youngster, and in which they could interact with their children, no matter how limited the degree of interaction. They were instructed to consider those activities that regularly occurred within the family, and that were highly preferred by the child, as well as the room/location in the home where such interactions usually occurred. They were then asked to engage in this activity with their youngster for a 10-minute interval, while being

videotaped. Two such interactive sequences were videotaped, each at separate times.

Inter-observer reliability for this instrument was established as ranging from 92% to 100% in both the baseline and the intervention stages of Dr. Cafiero's 1995 study. This study of the treatment effectiveness of Natural Aided Language Stimulation in preschool children with autism is detailed in Chapter 2.

Functional Emotional Maturity Level

Dr. Stanley Greenspan's *Functional Emotional Assessment Scale* was utilized to determine the developmental category of a youngster's interactive play sequences, both verbal and non-verbal, based on associated motor, sensory, language, cognitive, and most importantly emotional/relationship capacities (Appendix B). Thus, it provides a more qualitative evaluation of a youngster's interactions and communications by placing them in a developmental context to supplement the behavioral coding of their mere occurrence. Scoring for this instrument is based upon Dr. Greenspan's "circle of communication" concept. The circle of communication is a pattern of interaction/two-way communication (Greenspan, 1992a). When a caregiver takes an interest in a child, the first circle of communication is opened. If the child responds (verbally or non-verbally) he or she is closing the circle, and when the parent responds in turn, another circle is opened. If the child responds again, he or she has completed a second circle. This concept involves following the child's lead with interest, then responding, and then the child responding to the parent's response and closing the circle. While the opening and closing of circles of communication is usually initially non-verbal, and the primary unit of interaction gestural, it becomes the very foundation upon which all subsequent communication (including

language) is built (Greenspan, 1992b).

What may begin for a young infant as involving only one or two circles should progressively expand to chains of more than 10 circles by later ages that convey various themes. Such themes range from imitation of language, delayed searching at early ages, and eventually expands to involve imitating others as part of dealing with the emotional patterns of dependency, assertiveness, anger, etc. According to Greenspan, when these themes emerge, symbolic thinking and representational capacity have begun. The various “chains of circles” then continue to expand with appropriate developmental/emotional growth to involve pretend play with toys, language, and other symbols that convey logically connected emotional ideas (e.g., “Hit bad guy because he did bad thing” or “Hug nice dolly”) (Greenspan, 1992b).

These in turn are followed by expansion into elaborate pretend play sequences that integrate causal, spatial and/or temporal relationships between themes, and test reality. The Functional Emotional Assessment Scale categorizes these progressions into stages, based upon the number of circles/chains demonstrated and the representational and emotional context in which they are demonstrated. Various items are scored in each of the domain/stages and summed to give a total score for each stage as well as an overall score that indicates the approximate level at which a youngster is functioning. A copy of the scale is provided in Appendix B to illustrate this progression. Additional information regarding the concepts and processes encompassed in the FEAS is provided in Chapter 2.

Dr. Greenspan and his staff directly have been training clinicians from all over the country in the use of the FEAS at yearly workshops since 1994. Films of children interacting with their parents are shown at these workshops, and participants practice rating

two to three videos using worksheets under Dr. Greenspan's supervision. Each individual compares his results against that of the expert coder (Dr. Greenspan and colleagues), and extensive discussion occurs regarding discrepancies. The instrument's value is that it accounts for developmental context of interactions and communications, as opposed to just the behavioral documentation of their mere occurrence. For example, a child with a 200-word vocabulary may pass behavioral criteria for improved language, even if the language is not interactive in function and involves rote sentence responses. In contrast, the FEAS is able to place such language within its appropriate developmental context, showing the lack of reciprocity, and thus providing a socially valid corroboration of a youngster's deficit by a professional that any layperson would have casually observed to be abnormal. This corroboration, while qualitative in terms of the observation of symbolic/representational sequences that define the stages, is based upon quantifying the amounts of these sequences (i.e., "circles of communication") that occur.

The FEAS was published in 2001, after validation on 197 normal children, 190 infants and children with regulatory disorders, and 41 children with Pervasive Developmental Disorders, and 40 children from multi-problem families and drug exposure during pregnancy. Construct validity was adequate at item, subscale, and total test for caregiver and child scales to assure discrimination between normal and clinical samples. T tests for items across age levels using independent populations were conducted and showed statistically significant discrimination between normative and clinical samples. Domain and item validity studies, as well as reliability studies utilizing 22 professionals from the medical, occupational therapy, psychiatric, special education, psychological, speech/language, and physical therapy fields, were established between 1996 and 1997.

Reliability was .91 to .97 for child scale for videotaped observations and .89 for child scale for coding of live observation. False normal error rates (i.e., identifying a youngster as normal who actually has a significant clinical problem) were computed and showed significantly fewer misclassifications for children with clinical issues than for normal children. Results showed the FEAS as best for evaluating children with regulatory disorders at all ages, and for children with Pervasive Developmental Disorders from the ages of 2 to 4.

While the instrument was initially designed for identification of children with the above delays at lower age levels, its use has been expanded by clinicians. It is now frequently used across age groups to provide indices of social-emotional functioning for a child using Greenspan's developmental construct of stages. This is done to target intervention areas at their "baseline level" of development, and thus guide determination of appropriate strategies.

Furthermore, the FEAS was selected for this study because it was one of the few standardized instruments at the time this study was initiated that defined, validated, and measured the construct of interaction using other variables in addition to the active demonstration of play. The FEAS includes other variables such as self-regulation and modulation, which can all interfere with a child's ability to demonstrate play. A child will often demonstrate higher and more symbolic levels of play skills when he or she is calm, regulated, and can modulate his or her emotions and body movements than he or she will when he or she has difficulty in self-regulation and modulation. The FEAS offers a more detailed view of interaction and accounts for more variables than those offered in traditional child development theories and measures. Because of the inclusion of these

other variables that interfere with development of relationships, it is more appropriate for children with autism as it offers a measure that is not just age but also stage based while accounting for a larger range of variables. One would assume that children who have made progress in their respective treatments would be scoring at the higher stage end of the FEAS.

Level of Symbolic Play and Social/Communicative Competency

This construct refers to the characteristics of a youngster's symbolic play, without looking at the emotional/relationship factors noted in the FEAS. *The Play Observation Scale* (Rogers, Herbison, Lewis, Pantone, and Reis, 1986) was used to measure this outcome (Appendix C). This instrument incorporates videotaping a play sequence in a more structured format than the instruments used for the other outcome measures. The child is presented with a designated assortment of toys with symbolic play potential that are defined in the instrument, but not selected by the parent. These include dolls, dishes, animals, cars, blocks, and a toy phone. For the first 10-minute sequence, the child is presented with the toys, but the caregiver/parent does not initiate or model any interaction with them. While the parent is instructed to be responsive to the child's initiations, he does not initiate any reply for the entire time segment. For the next 10 minutes, the caregiver initiates play and models more and more mature (symbolic) play sequences while encouraging the child to participate at correspondingly higher and higher levels of symbolism. The characteristics of the play are rated as belonging to one of three levels.

1. Symbolic-Agent. Can the child pretend that a doll can initiate actions?
2. Symbolic Substitute. Can the child pretend to use an object as if it is something else? (i.e., pick up banana and pretend it is a telephone)

3. Symbolic Complexity. How many symbolic schemas can the child link together

Finally, a Social-Communicative Level is also rated that looks at how the child acknowledges the adult and incorporates him or her into the child's play. Because previous research by Sigman and Ungerer (1984) has demonstrated that autistic children show a tendency to underuse their higher level skills in play situations, the highest level of play behavior and social-communicative behavior demonstrated within a 30-second interval was scored with standardized instructions.

The 30-second interval was selected to avoid overweighing singular incidents of high-level play skills, and thus provide a more representative sample of play behaviors (Rogers & Lewis, 1989). Inter-rater agreement for this instrument was established and maintained at 85% in a 1989 study that is detailed in Chapter 2 of this document. This study measured the treatment effectiveness of an interpersonal, cognitive, and structured play treatment program for children with autism.

Procedures

The two groups of children were randomly divided in half and designated as Group A or Group B. The participants for Group A and Group B were filmed for session 1 and session 2 using the following sequence:

Table 11
Filming Sequence

Session	Group A	Group B
1	Activity A1- Natural Language Training Activity B1- Functional Emotional Assessment Activity C1 Play Observation Scale – Part 1	Activity B1- Functional Emotional Assessment Activity A1- Natural Language Training Activity C1 Play Observation Scale – Part 1
2	Activity B2- Functional Emotional Assessment Activity C2 Play Observation Scale – Part II Activity A2- Natural Language Training	Activity A2- Natural Language Training Activity B2- Functional Emotional Assessment Activity C2 Play Observation Scale – Part II

All members of the research/filming team (with the exception of this researcher) were blind as to the nature of group membership of the subjects. The identification of each tape/DVD was kept confidential through a number/letter coding system known only to this researcher, and tapes were kept locked before and after scoring. The procedures for conducting the filming and scoring are described below for each outcome measure.

Parent-Child Communicative Interaction

For this first outcome measure, parents were requested ahead of time in written and verbal form to select activities/toys that were highly motivating and reinforcing for their youngster, and in which they could participate with their child, no matter how limited the degree. They were instructed to consider those activities that were a regular occurrence within the family, and that were highly preferred by the child in making this choice, as well as the room/location in the home where such interaction was usually conducted. Parents were requested to engage in this activity with their youngster for a 10-minute interval, while being videotaped. Two such interactive sequences were filmed, each at a separate session. This was done to enable the youngsters to demonstrate their highest level of functioning, and account for the fact that a child and parent might initially feel uncomfortable in the filming process. Three school psychology/special education graduate students who were naive to the experimental questions and the type of treatment the children had undergone subsequently scored these videotapes.

The parent-child communicative behaviors as videotaped were scored using a 15-second partial interval scoring method with an audiotape marking the 10-minute sessions into thirty 15-second coding units. Each unit was followed by a 5-second interval for recording data where no interactions were coded. Auditory cues indicated when each of the 30 coding units started and ended. The raters circled the appropriate letters on the coding sheets to indicate the specific type of interaction that they observed. These coded interactions were categorized and tallied according to the type of interaction, person engaged in the interaction, and the modality used. The graduate students were trained to score the interactions and communication modalities using training tapes obtained from Dr.

Cafiero, the author of the study.

The students' scoring was compared with that of an expert coder (Dr. Cafiero) to determine criterion-related agreement using Light's coefficient (.80 or greater), based upon the criterion frequencies of each category (Frick and Semmel, 1978). A total score for the types of interaction utilized (parent or child initiation/response/modeling), as well as the modalities observed (verbal, gestural, signed, pictures), was computed for each youngster for each tape. As indicated previously, both the highest scores and lowest scores were used in the analysis. During data collection, to prevent intra-observer drift, raters again scored a training tape against that of another expert coder, and the acceptable .80 or greater coefficient was again reached.

Functional Emotional Maturity Level

For this outcome measure, parents were again asked to play with their child using the child's favorite toys and activities for a 15-minute time segment. In addition, three baskets of toys were used to demonstrate the various stages of the scale were made available for the parent. These toys included special wind-up toys and kinesthetic items that Dr. Greenspan and his colleagues have observed to be enjoyed by many autistic preschoolers, as well as items to be used for more symbolic play activities such as toy telephones, fire trucks, dolls, animals, action figures, etc. The same toys were made available for each subject, with no variations. A comprehensive list of the toys included can be found in Appendix J. Prior to the taping, parents/caregivers were instructed in how to follow their child's lead during the play interaction, while gradually introducing new items from the basket as necessary that involved higher symbolic skills, if such items were not already among the child's favorite toys already being utilized. At the same time, if a

toy/activity elicited no interest from a youngster, parents were also taught how to follow their children's cues in selecting and guiding their child to use alternative items. To help prevent frustration with use of play items at a level too high or too low for a youngster, the parent/giver was given minimal coaching by a trained clinician in the use of the scale. This coaching was done only if necessary to prevent frustration or probe for a higher skill level using the following statement: "You might want to try _____ with your child." Parents were informed of this cue before the actual taping.

Two such interactive sequences were filmed, each at a separate session. This was done to enable showing the youngster at his or her highest level of functioning, and to account for the fact that a child and parent might initially feel uncomfortable in the filming process. These tapes were subsequently scored by a team of three clinicians trained by Dr. Greenspan/ Dr. Wieder or their designees in the use of 2001 *Functional Emotional Assessment Scale* manual and score sheets with practice training tapes. The highest scores and lowest scores in each category were used for the final data analysis.

Determination of criterion related reliability against an expert coder (Dr. Greenspan and Dr. Wieder) using Cohen's Kappa coefficient (Cohen, 1960) was achieved using training tapes unrelated to this study until a minimum level of .80 was reached by each clinician. During the actual data collection, criterion-related agreement was rechecked after a review of eight of the tapes of the studies. This was done using another training tape again against the scoring of an expert coder. Acceptable levels of both coefficients were again reached.

Symbolic Play and Social Communicative Competency

Parents/caregivers were given written as well as verbal instruction for two separate play segments indicated by the *Play Observation Scale* administration directions.

Instructions were demonstrated by a member of the research team prior to the videotape session, and parents were asked to demonstrate their understanding of the procedures. The standard play procedure followed a specific format. For the first 10-minute segment, the parent presented the child with an assortment of dolls, toy dishes, plastic animals, cars, blocks, and a toy phone. During this time period, the parent was directed to be responsive to the child's initiations at play, but not to initiate any play himself. In the second 10-minute time segment, the parent modeled and suggested more mature play sequences, encouraging the child to participate at increasingly higher levels of symbolic complexity (Rogers et al., 1986). Indications of the 10-minute interval segments beginning and end were signaled with a bell timer.

Scoring of these play sequences occurred at 30-second intervals. Previous research by Sigman and Ungerer (1984) demonstrated that autistic children show a tendency to under use their higher level skills in play situations. Therefore, only the highest rating of play behavior *within each level of play* as well as the highest level of social-communicative behavior demonstrated within each 30-second interval were scored. This scoring was done with the use of standardized instructions published by the authors of the study. An auditory signal was used to indicate the ending of a 30-second interval, followed by a 30-second time period for scoring prior to resuming the video.

Three graduate students in psychology and/or special education were trained to score the videotapes of the Play Observation Scale by this researcher. Training tapes

(provided by Dr. Rogers) were used to determine criterion-related agreement with an expert rater (chosen by Dr. Rogers from her research team) for both the Symbolic Play Level Scores and Social-Communicative Competency score using Cohen's Kappa coefficient. Levels of .80 were met for criterion related agreement before data analysis was initiated. . During data analysis, after reviewing eight tapes, the raters were tested using a training tape to ensure against drift, with the above score met again before analysis of the research tapes resumed.

Parent Interview and Record Reviews

Parent interviews and record reviews were conducted by this researcher and this information was kept confidential. This helped insure that the filming staff was unaware of which treatment program each child participated. This interview time was designed to assist in helping each family reach a maximum comfort level before the filming process began with this researcher and a member of the graduate student team. The *Parent Interview* (see Appendix I) and *Record Review* forms (see Appendix K) were utilized to obtain in-depth information regarding the description of the participants' medical and educational history, behaviors, and learning styles, as well as other characteristics noted previously in this chapter. The information obtained from these interviews was also utilized to determine a Communication Competency Level (Rowland, 1996) at the time treatment was initiated as defined below.

Table 12
Levels of Communication Competence

LEVEL	
1	Pre- Intentional Behaviors
2	Intentional Behaviors(that function as communication to express intent)
3	Unconventional Communication
4	Conventional Communication
5	Concrete Symbols
6	Abstract Symbols
7	Language

Determination of the communication competency level was made by three speech language pathologists with at least 3 years experience in the field of autism using the above framework provided by the Rowland Communication Matrix (1999). This determination was based on the information provided in the Record Reviews and the Parent Interview Questions 1, 3, 4, 5, 7, 8, and 9. Inter-rater reliability for this task was established by this researcher using five sample parent interviews in which three trained speech language therapists classified each within a Communication Competency Level, with 100% agreement across raters for each case.

All parents were requested to complete a Vineland Adaptive Behavior Scale indicating their child's current ability to operate independently in their environments and functional life skills, as well as a Childhood Autism Rating Scale. The lead researcher, who is a state-certified school psychologist, scored these test forms. As these are standardized instruments typically utilized in psychological assessments, many of the parents of the children in this study were not willing to complete them. Therefore, completion of the forms was not held to as a requirement for entry into to the study, or for the filming and interview procedures. Several families declined to complete both the CARS and Vineland,

stating their desire to avoid completing more standardized testing given the preponderance of such forms they had completed over the years in prior evaluations.

Data Analysis

Independent Variables: Type of Treatment
a. Lovaas Treatment Group - ABA
b. Greenspan Treatment Group - DIR

Dependent Variables: Outcome Measure Categories:
a. Parent Child Interaction
(Natural Language Training Form, 1988)
b. Functional Emotional Maturity Level
(Functional Emotional Assessment Scale, 2001)
c. Symbolic Play/Social Interaction Communication Level
(Play Observation Scale, 1998)

The following scores in each of the three outcome measure categories were obtained, with the levels designated within each main variable below:

<u>Parent-Child Communicative Competency</u>	<u>Functional Emotional Maturity Level</u>	<u>Symbolic Play /Social Interaction Communication Level</u>
Child Initiation Child Response (includes Child Modeling)	Child Total Score FEAS Level	Symbolic-Agent Level Symbolic-Substitute Level Symbolic Complexity Level Sensory-Motor Level
Total Score		Social-Communicative Competency Level

Covariables

Age at which treatment was initiated

Level of Communication Competency at initiation of treatment

Research Questions and Procedures

Research Question 1

Are there differences between the two treatment groups while simultaneously accounting for: (a) Age at Treatment Initiation, and (b) Average Number of Communication Levels Mastered on the Communication Matrix Pre-treatment?

Procedure: Question 1 was analyzed using ANCOVAs with two covariates as listed above. The Johnson-Nieman procedure was used to determine if there was an interaction effect between the treatment group and various levels of the covariables.

Research Question 2

Are there differences between the treatment groups on the NLT, FEAS, and POS outcomes when each of the following pre-treatment variables is accounted for:

- a) Biomedical Interventions (e.g., special diets, nutritional supplements, etc.)
- b) Demonstration of Echolalia
- c) Use of Words/Sentences
- d) Presence of the Ability to Pull Others
- e) Child Lines Things Up
- f) Overall Cognitive Ability Estimate
- g) Number of Communication Functions Mastered

Procedure: Analysis of Co-Variance was utilized for Question 2 followed by the Johnson-

Nieman procedure to determine interaction effects between the treatment group and various levels of the covariates *a-g*.

Research Question 3

To what degree do the assessments utilized in this study measure the same construct both within and across treatments?

Procedure: Question 3 was analyzed using correlations between the highest and lowest scores on all three of the outcome measures for each treatment group.

Research Question 4

- a) Are there differences between treatment groups' Estimated Communication Competency levels based on Rowland's Communication Matrix?
- b) Were critical functions and levels of Social Interaction mastered by subjects in the study?
- c) Are there differences between treatment groups in the mastery of the levels of Social Interaction when the covariates of Research Question 2 are accounted for?

Procedure: Question 4 procedures utilized ANCOVAs to look at differential effects of the Communication Matrix scores between treatment groups followed by the Johnson-Nieman procedure to examine interaction effects between the treatment groups and levels of the Communication Matrix scores.

Supplementary Analysis

This investigated the correlations of the Vineland and CARS and the outcome measures. This examined whether there was a relationship between the youngster's current adaptive behavior skills and his or her present rating on an autism checklist and the outcome measures that looked at affective developmental levels in this study.

Procedure: Supplementary Data Analysis conducted correlation procedures between VABS and CARS and within treatment group correlations between the dependent variables

Chapter 4

Results

The results of the data analysis corresponding to each research question will be presented for each of the three outcome measure. This will be followed by an additional analysis of Rowland's Communication Matrix and finally supplementary analyses of the Childhood Autism Rating Scale and Vineland Adaptive Behavior Scales.

Research Question 1

Are there differences between the two treatment groups while simultaneously accounting for: (a) Age at Treatment Initiation, and (b) Average Number of Communication Levels Mastered on the Communication Matrix Pre-treatment?

Part A. The Natural Language Observation Scale

The NLT form provided a count of the amount of child initiations and responses as well as parent initiations and responses within a 10-minute time period using materials and activities chosen by the child and his family. The test consists of 42 15-second intervals in which the raters score the presence of the designated behaviors. The scores for both treatment groups are listed in Table 13 below.

Table 13*Descriptive Statistics for Natural Language Scores: Research Question 1*

	ABA			DIR		
	<i>N</i>	Mean	<i>SD</i>	<i>N</i>	Mean	<i>SD</i>
<u>Child Initiations</u>						
Highest Scores	14	25.43	8.64	14	31.21	8.34
Lowest Scores	12	18.25	9.98	14	24.29	11.86
<u>Child Responses</u>						
Highest Scores	14	28.07	8.19	14	32.64	6.30
Lowest Scores	12	21.42	8.69	14	26.93	8.54

As shown in Table 14, when controlling for age of treatment initiation and average number of communication levels mastered at the beginning of treatment, there were no differences found between the treatment groups on either of the Child Response measures. However, both measures of Child Initiation showed significance, or approached significance, at the $p < .05$ level, in both cases favoring the DIR group.

Table 14*Analysis of Covariance: Natural Language Scores, Research Question 1*

Variable	<i>F</i>	<i>df</i>	<i>p</i>
<u>Highest Scores, Child Initiation</u>			
Treatment (ABA vs. DIR)	3.83	1,22	.06
Covariates			
Age at Treatment Initiation	.63	1,22	.44
Communication Level	1.44	1,22	.24
<u>Lowest Scores, Child Initiation</u>			
Treatment (ABA vs. DIR)	4.51	1,20	.05
Covariates			
Age at Treatment Initiation	.32	1,20	.58
Communication Level	1.30	1,20	.27
<u>Highest Scores, Child Responses</u>			
Treatment (ABA vs. DIR)	1.52	1,22	.23
Covariates			
Age at Treatment Initiation	.10	1,22	.76
Communication Level	.18	1,22	.68
<u>Lowest Scores, Child Responses</u>			
Treatment (ABA vs. DIR)	2.12	1,20	.16
Covariates			
Age at Treatment Initiation	<.01	1,20	.96
Communication Level	.39	1,20	.54

The Johnson-Neiman procedure was used to look at the relationships between covariates listed above in closer detail to determine if there was an interaction effect between treatment group and levels of the covariates. If a significant interaction was found (see Table 15 below), the levels at which the covariates had significant differences between the treatment groups were examined further. Given the small sample size in the study, a .10 significance level was utilized.

Results did not yield interaction effects between the treatment groups and the Communication Level covariate for any of the dependent measures. For the Age at Treatment Initiation covariate, no interactions were found for the Child Response measure. However, in contrast to the ANCOVA results a significant difference was found for participants who began treatment later than 39 months of age favoring the DIR group for Child Initiations on the Highest Score variable, as well as for the Lowest Score variable for participants who began treatment later than 41 months of age. This suggests that treatment group does affect the NLT Child Initiations scores for children who started treatment at later ages in the sample.

Table 15
Johnson–Neiman Analysis, Probability Levels, Natural Language Scores

Natural Language Scores	<u>Age of Treatment Initiation</u>			Cov. Values of Signif.	Highest Group?
	Inter-action	Co-variate	Treatment Group		
<u>Natural Language Highest</u>					
Total Child Initiations	.011	.648	.043*	>39 mo.	DIR
<u>Natural Language Lowest</u>					
Total Child Initiations	.010*	.749	.030*	>41 mo.	DIR

* $p \leq .10$

Part B. Functional Emotional Assessment Scale

The FEAS involved 20-minute samples of child/parent interaction and play that was scored on a standardized instrument for qualitative information. Raw scores are given for each of 6 levels that are combined for a total score. This total score is in turn assigned a rating of 1 to 3 (1-Normal, 2-At-Risk, 3-Deficient). The highest and lowest scores of both treatment groups are listed in Table 16 for the Total Score and Rating.

Table 16*Descriptive Statistics for Functional Emotional Assessment Scale: Research Question 1*

	ABA			DIR		
	N	Mean	S.D.	N	Mean	S.D.
<u>Total FEAS</u>						
Highest Scores	13	42.23	14.71	14	56.36	13.88
Lowest Scores	13	35.54	12.93	14	51.07	16.09
<u>Total FEAS Rating</u>						
Highest Scores	13	1.69	0.95	14	2.57	.85
Lowest Scores	13	1.46	0.88	14	2.57	.85

ANCOVA results found significant differences favoring the DIR group for all FEAS scores, as reported in Table 17. As with the NLT analyses the Johnson-Neiman procedure was used to look at the relationships between covariates in closer detail to determine if there was an interaction effect between treatment group and levels of the covariates. If an interaction was found (see Table 18 below), the levels at which the covariates had significant differences between the treatment groups were examined further. Given the small sample size in the study, a .10 significance level was utilized.

Table 17*Analyses of Covariance, Functional Emotional Assessment Scale: Research Question 1*

Functional Emotional Assessment Scale	<i>F</i>	<i>df</i>	<i>p</i>
<u>Highest Scores, Total FEAS</u>			
Treatment (ABA vs. DIR)	7.24	1,21	0.01*
Covariates:			
Age at Treatment Initiations	3.85	1,21	0.06
Communication Level	2.14	1,21	0.16
<u>Lowest Scores, Total FEAS</u>			
Treatment (ABA vs. DIR)	7.58	1,21	0.01*
Covariates:			
Age at Treatment Initiations	2.85	1,21	0.11
Communication Level	0.44	1,21	0.52
<u>Highest Scores, Total FEAS Rating</u>			
Treatment (ABA vs. DIR)	6.97	1,21	0.02*
Covariates:			
Age at Treatment Initiations	2.24	1,21	0.15
Communication Level	1.50	1,21	0.24
<u>Lowest Scores, Total FEAS Rating</u>			
Treatment (ABA vs. DIR)	10.22	1,21	< .01*
Covariates:			
Age at Treatment Initiations	2.13	1,21	0.16
Communication Level	0.86	1,21	0.36

* $p \leq .05$

Results did not yield interaction effects between the treatment groups and the Average Level of Communication covariates for any of the FEAS scores. However, a significant difference was found for participants who began treatment later than 37 months of age favoring the DIR group for the Total FEAS scores in the highest scoring and lowest scoring groups. Total Rating FEAS scores were found to have a significant relationship with participants older than 38 months of age for the highest scoring group

and older than 35 months of age for the lowest scoring groups. The results suggest that children in the sample who started treatment at a later age had better scores on the FEAS, as they did on the NLT.

Table 18
Johnson- Neiman Analysis, Probability Levels, Functional Emotional Assessment Scale: Research Question 1

FEAS	<u>Age of treatment</u>			Cov. Values of Signif.	Highest Group?
	Inter-action	Co-variate	Treatment Group		
<u>FEAS Highest Scores</u>					
Total FEAS	<.001*	.045	.003*	>37 mo.	DIR
Total Rating	.002*	.081	.005*	>38 mo.	DIR
<u>FEAS Lowest</u>					
Total FEAS	.009*	.196	.042*	>37 mo.	DIR
Total Rating	.003*	.168	.024*	>35mo.	DIR

Note: $p \leq .10$

Part C. Play Observation Scale

The Play Observation Scale looks at the spectrum of play skills from sensory motor to symbolic levels together with social communication. Unlike the other outcome measures, a highest /lowest score was not obtained because the POS is designed with two sections to look at child's play skills when he/she is alone without any adult facilitation, and when an adult is working with the child attempting to guide her/him into higher levels of symbolic play. The descriptive statistics for the POS are listed in Table 19 below. Of the 16 variables produced by the POS, ANCOVA analyses (see Table 20) found significant differences only for two variables, *C1 – Total Social Communication*, and *C2 – Symbolic Play Substitute Average Level*. In both cases the results favored the

DIR treatment group.

Table 19
Descriptive Statistics for Play Observation Scales: Research Question 1

	ABA			DIR		
	N	Mean	SD	N	Mean	SD
<u>Sensory Motor Level</u>						
C1 Scores	12	23.50	13.35	12	28.67	8.24
C2 Scores	11	25.00	9.59	10	26.50	15.76
<u>Sensory Motor Average Complexity Level</u>						
C1 Scores	12	0.96	0.55	12	1.07	0.35
C2 Scores	11	1.00	0.38	10	1.06	0.70
<u>Symbolic Play Agent Level</u>						
C1 Scores	12	18.00	17.04	12	23.17	25.53
C2 Scores	11	25.55	12.04	10	25.00	23.20
<u>Symbolic Play Agent Average Complexity Level</u>						
C1 Scores	12	0.70	0.73	12	0.80	0.90
C2 Scores	11	0.86	0.50	10	1.08	1.18
<u>Symbolic Play Substitute Level</u>						
C1 Scores	12	16.25	17.37	12	21.67	19.83
C2 Scores	11	30.09	14.90	10	37.10	21.23
<u>Symbolic Play Substitute Average Level</u>						
C1 Scores	12	0.73	0.73	12	0.90	0.86
C2 Scores	11	0.93	0.52	10	1.56	1.18
<u>Social Communication Total</u>						
C1 Scores	12	35.67	23.08	12	22.42	26.92
C2 Scores	11	72.00	22.62	10	75.70	32.58
<u>Total Play Level</u>						
C1 Scores	12	56.75	43.84	11	77.73	47.05
C2 Scores	11	80.55	30.78	9	92.78	48.54

Table 20*Analyses of Covariance, Play Observation Scales: Research Question 1*

Variable	<i>F</i>	<i>df</i>	<i>p</i>
<u>C1, Sensory Motor Level</u>			
Treatment (ABA vs. DIR)	2.05	1,19	0.17
Covariates:			
Age at Treatment Initiations	1.78	1,19	0.20
Communication Level	0.32	1,19	0.58
<u>C2, Sensory Motor level</u>			
Treatment (ABA vs. DIR)	0.71	1,16	0.41
Covariates:			
Age at Treatment Initiations	1.15	1,16	0.30
Communication Level	0.40	1,16	0.53
<u>C1, Sensory Motor Complexity Level</u>			
Treatment (ABA vs. DIR)	0.46	1,19	0.51
Covariates			
Age at Treatment Initiations	3.71	1,19	0.07
Communication Level	0.00	1,19	0.99
<u>C2, Sensory Motor Complexity Level</u>			
Treatment (ABA vs. DIR)	0.67	1,16	0.42
Covariates:			
Age at Treatment Initiations	1.10	1,16	0.31
Communication Level	1.81	1,16	0.20
<u>C1, Symbolic Play Agent Level</u>			
Treatment (ABA vs. DIR)	0.02	1,19	0.89
Covariates:			
Age at Treatment Initiations	4.04	1,19	.06
Communication Level	3.64	1,19	0.07
<u>C2, Symbolic Play Agent Level</u>			
Treatment (ABA vs. DIR)	0.02	1,16	0.88
Covariates:			
Age at Treatment Initiation	.97	1,16	.34
Communication Level	0.01	1,16	0.91
<u>C1, Symbolic Play Agent Avg. Complexity Level</u>			
Treatment (ABA vs. DIR)	0.01	1,19	0.94
Covariates			
Age at Treatment Initiation	4.85	1,19	0.04*
Communication Level	2.81	1,19	0.11

Table 20 (Continued)*Analyses of Covariance, Play Observation Scales: Research Question 1*

Variable	<i>F</i>	<i>df</i>	<i>p</i>
<u>C2, Symbolic Play Agent Avg Complexity Level</u>			
Treatment (ABA vs. DIR)	0.89	1,16	0.36
Covariates:			
Age at Treatment Initiation	2.35	1,16	0.15
Communication Level	0.01	1,16	0.92
<u>C1, Symbolic Play Substitute Level</u>			
Treatment (ABA vs. DIR)	0.15	1,19	0.70
Covariates:			
Age at Treatment Initiation	3.70	1,19	0.07
Communication Level	1.96	1,19	0.18
<u>C2, Symbolic Play Substitute Level</u>			
Treatment (ABA vs. DIR)	0.84	1,16	0.37
Covariates:			
Age at Treatment Initiation	0.57	1,16	0.46
Communication Level	0.04	1,16	0.84
<u>C1, Symbolic Play Substitute Average Level</u>			
Treatment (ABA vs. DIR)	0.02	1,19	0.88
Covariates:			
Age at Treatment Initiation	2.84	1,19	0.11
: Communication Level	2.10	1,19	0.16
<u>C2, Symbolic Play Substitute Average Level</u>			
Treatment (ABA vs. DIR)	4.72	1,16	0.05*
Covariates:			
Age at Treatment Initiation	3.28	1,16	0.09
Communication Level	0.43	1,16	0.52
<u>C1, Social Communication Total</u>			
Treatment (ABA vs. DIR)	4.69	1,19	0.04*
Covariates:			
Age at Treatment Initiation	0.26	1,19	0.61
Communication Level	2.99	1,19	0.10
<u>C2 Social Communication Total</u>			
Treatment (ABA vs. DIR)	0.31	1,16	0.58
Covariates:			
Age at Treatment Initiation	0.60	1,16	0.45
Communication Level	0.00	1,16	0.99

Table 20 (Continued)*Analyses of Covariance, Play Observation Scales: Research Question 1*

Variable	<i>F</i>	<i>df</i>	<i>p</i>
<u>C1. Total Play Level</u>			
Treatment (ABA vs. DIR)	0.56	1,18	0.47
Covariates:			
Age at Treatment Initiation	3.67	1,18	0.07
Communication Level	1.27	1,18	0.28
<u>C2. Total Play Level</u>			
Treatment (ABA vs. DIR)	0.67	1,15	0.43
Covariates:			
Age at Treatment Initiation	0.91	1,15	0.36
Communication Level	0.08	1,15	0.79

**p* ≤ .05

Significant interaction effects were found only between Age at Treatment Initiation and treatment groups for the Symbolic Play Substitute Level in favor of the DIR group for children who started treatment after 37 months of age (See Table 21, below).

Table 21*Johnson Neiman Analysis -Play Observation Scale Scores C2: Research Question 1*

Variable	<u>Age of treatment</u>			Cov. Values of Signif.	Highest Group?
	Inter-action*	Co-variate	Treatment Group*		
Symbolic Play Substitute Average Level	0.016	0.06	0.067	>37	DIR

**p* ≤ .10

Research Question 2

Are there differences between the treatment groups on the NLT, FEAS, and POS outcomes when each of the following pre-treatment variables are accounted for.

- a) Biomedical Interventions (special diets, nutritional supplements, vitamin B injections)*
- b) Demonstration of Echolalia*
- c) Use of Words/Sentences*
- d) Presence of the Ability to Pull Others*
- e) Child Lines Things Up*
- f) Overall Cognitive Ability Estimate*
- g) Number of Communication Functions Mastered*

Part A. The Natural Language Observation Scale

As noted previously, no differences between the means of the treatment groups of either the highest or lowest scoring measures were found when covariates were unaccounted for. Table 22 illustrates results accounting for the covariates listed (a-g) above. ANCOVA results show outcome measure differences with both *highest and lowest* scores in Child Initiations, but not Child Responses, when the estimate of Overall Cognitive Ability at the time treatment was started is accounted for. When the ability to line things up (a motor planning skill) was accounted for, mean score differences were seen in both Child Initiations and Child Responses for both the ABA and DIR treatment groups. However, no differential treatment effect was present when this motor planning skill was accounted for. When the use of Biomedical Interventions was accounted for, differential treatment effects were observed for the *lowest* scoring group in Child Responses. However, no differentiation in favor of a treatment group was seen in both levels of the Child Initiation scoring groups when this motor planning skill was accounted for.

Table 22*Analysis of Covariance (2) Natural Language Training Forms: Research Question 2*

Natural Language Training Form Variables	<i>F</i>	<i>df</i>	<i>p</i>
<u>Highest Levels, Child Initiations</u>			
Covariate: Biomedical Interventions	0.60	1, 25	0.45
Treatment (ABA vs. DIR)	2.65	1, 25	0.12
Covariate: Demonstration Of Echolalia	0.38	1, 25	0.55
Treatment (ABA vs. DIR)	3.00	1, 25	0.10
Covariate: Use of Words/Sentences	0.06	1, 25	0.81
Treatment (ABA vs. DIR)	2.85	1, 25	0.10
Covariate: Ability to pull others	0.20	1, 25	0.66
Treatment (ABA vs. DIR)	2.86	1, 25	0.10
Covariate: Child lines things up	3.59	1, 25	0.07
Treatment (ABA vs. DIR)	3.58	1, 25	0.07
Covariate: Overall Cognitive Ability	0.35	1, 23	0.56
Treatment (ABA vs. DIR)	4.57	1, 23	0.04*
Covariates: # of Communication Functions Mastered	0.02	1, 23	0.89
Treatment (ABA vs. DIR)	4.09	1, 23	0.06
<u>Lowest Levels, Child Initiations</u>			
Covariate: Biomedical Interventions	1.94	1, 23	0.18
Treatment (ABA vs. DIR)	1.14	1, 23	0.30
Covariate: Demonstration Of Echolalia	0.21	1, 23	0.65
Treatment (ABA vs. DIR)	1.88	1, 23	0.18
Covariate: Use of Words/Sentences	3.35	1, 23	0.08
Treatment (ABA vs. DIR)	0.92	1, 23	0.35
Covariate: Ability to pull others	0.33	1, 23	0.57
Treatment (ABA vs. DIR)	1.62	1, 23	0.22
Covariate: Child lines things up	4.97	1, 23	0.04*
Treatment (ABA vs. DIR)	1.63	1, 23	0.22
Covariate: Overall Cognitive Ability	1.47	1, 21	0.24
Treatment (ABA vs. DIR)	4.15	1, 21	0.05*
Covariates: # of Communication Functions Mastered	0.35	1, 21	0.56
Treatment (ABA vs. DIR)	4.04	1, 21	0.06

Table 22 (Continued)*Analysis of Covariance (2) Natural Language Training Forms: Research Question 2*

Natural Language Training Form Variables	<i>F</i>	<i>df</i>	<i>p</i>
<u>Highest Levels, Child Responses</u>			
Covariate: Biomedical Interventions	2.60	1, 25	0.12
Treatment (ABA vs. DIR)	3.84	1, 25	0.06
Covariate: Demonstration Of Echolalia	0.93	1, 25	0.34
Treatment (ABA vs. DIR)	2.96	1, 25	0.10
Covariate: Use of Words/Sentences	0.39	1, 25	0.54
Treatment (ABA vs. DIR)	2.98	1, 25	0.10
Covariate: Ability to pull others	1.75	1, 25	0.20
Treatment (ABA vs. DIR)	2.16	1, 25	0.15
Covariate: Child lines things up	0.76	1, 25	0.39
Treatment (ABA vs. DIR)	2.71	1, 25	0.11
Covariate: Overall Cognitive Ability	0.99	1, 23	0.33
Treatment (ABA vs. DIR)	2.07	1, 23	0.16
Covariates: # of Communication Functions Mastered	3.24	1, 23	0.09
Treatment (ABA vs. DIR)	3.25	1, 23	0.09
<u>Lowest Levels, Child Responses</u>			
Covariate: Biomedical Interventions	3.86	1, 23	0.06
Treatment (ABA vs. DIR)	4.49	1, 23	0.05*
Covariate: Demonstration Of Echolalia	3.72	1, 23	0.07
Treatment (ABA vs. DIR)	3.03	1, 23	0.10
Covariate: Use of Words/Sentences	1.12	1, 23	0.30
Treatment (ABA vs. DIR)	1.75	1, 23	0.20
Covariate: Ability to Pull Others	4.65	1, 23	0.04*
Treatment (ABA vs. DIR)	2.01	1, 23	0.17
Covariate: Child Lines Things up	1.05	1, 23	0.32
Treatment (ABA vs. DIR)	2.31	1, 23	0.14
Covariate: Overall Cognitive Ability	1.85	1, 21	0.19
Treatment (ABA vs. DIR)	2.58	1, 21	0.12
Covariates: # of Communication Functions Mastered	3.09	1, 21	0.09
Treatment (ABA vs. DIR)	3.99	1, 21	0.06

*Note: * $p \leq .05$*

The Johnson-Neiman procedure was used to look at the relationships between covariates in closer detail to determine if there was an interaction effect between treatment group and levels of the covariates. If an interaction was found (see Table 23-24 below), the levels at which the covariates had significant differences between the treatment groups were examined further. Covariates that did not show interaction effects are not reported. Given the small sample size in the study, a .10 significance level was utilized.

Table 23
Johnson-Neiman Analysis (2) Natural Language Training Form Highest Score: Research Question 2

Covariate/ Dependent Variable	<u>Significance Levels</u>			Cov. Values of Signif.	Highest Group?
	Inter- action	Co- variate	Treatment Group		
<u>Demonstrates Echolalia^a</u>					
Total Child Initiations	0.002*	0.402	0.001*	1	DIR
<u>Child Pull You In</u>					
Total Child Initiations	0.034*	0.567	0.012*	1	DIR
<u>Use of Words/Sentences^b</u>					
Total Child Initiations	0.033*	0.794	0.184*	3, 4, 5	DIR

^aValue of covariate: 1-Yes 2- No

^bWords/Sentences Rating Scale- 1- Non-Verbal 2- Less than 25 words and sounds 3- More than 25 single words 4 – Two word combinations 5 – Simple sentences 6 –Complex sentences.

* $p \leq .10$

When a youngster demonstrated echolalia, differences in treatment groups on Child Initiations were seen in both the *highest and lowest* scores. Other interaction effects between the treatment groups score measures and several of the covariates were seen only for the *highest* score outcome measure in Child Initiations. If a subject used echolalia, spoke in words or sentences, pulled people towards them, and was not on

psychotropic medications differences on this outcome measure were observed in favor of the DIR treatment ($p \leq .10$).

Table 24
Johnson-Neiman Analysis (2) Natural Language Training Form Lowest Scores: Research Question 2

Covariate/ Dependent Variable	Significance Levels			Cov. Values of Signif.	Highest Group?
	Inter- action	Co- variate	Treatment Group		
<u>Demonstrates Echolalia^a</u>					
Total Child Initiations	0.017*	0.776	0.007*	1	DIR

* $p < .10$

^aValue of covariate: 1-Yes 2- No.

Part B: Functional Emotional Assessment Scale

Tables 25-26 illustrate the relationships between treatment group means on the FEAS accounting for covariates included in Research Question 2. As noted previously, without accounting for these covariates, no significant differences were found between the mean scores of the treatment groups for either the highest and lowest scores

ANCOVA results found a significant difference in favor of the DIR treatment for both the highest and lowest scores for the Total FEAS and FEAS Rating outcomes when each of the covariates was accounted. Of note is the highly significant relationship ($p < .01$) in favor of the DIR treatment accounting for the covariates of Overall Cognitive Ability and the Number of Communications Mastered. These highly significant differences were also seen for lowest score Total FEAS and FEAS rating outcomes favoring the DIR treatment when each of the designated covariates was accounted for.

Table 25*Analysis of Covariance with Functional Emotional Assessment Scale Total: Research Question 2*

FEAS Total	<i>F</i>	<i>df</i>	<i>P</i>
<u>Highest Levels, Total FEAS</u>			
Covariate: Biomedical Interventions	0.77	1, 24	0.39
Treatment (ABA vs. DIR)	5.44	1, 24	0.03*
Covariate: Demonstration Of Echolalia	1.02	1, 24	0.32
Treatment (ABA vs. DIR)	6.35	1, 24	0.02*
Covariate: Use of Words/Sentences	0.28	1, 24	0.60
Treatment (ABA vs. DIR)	5.40	1, 24	0.03*
Covariate: Ability to Pull Others	4.52	1, 24	0.04*
Treatment (ABA vs. DIR)	6.26	1, 24	0.02*
Covariate: Child Lines Things Up	3.72	1, 24	0.07
Treatment (ABA vs. DIR)	6.84	1, 24	0.02*
Covariate: Overall Cognitive Ability	1.43	1, 22	0.25
Treatment (ABA vs. DIR)	9.43	1, 22	0.01*
Covariates: # of Communication Functions. Mastered	0.32	1, 22	0.58
Treatment (ABA vs. DIR)	8.82	1, 22	0.01*
<u>Lowest Levels, Total FEAS</u>			
Covariate: Biomedical Interventions	0.04	1, 24	0.84
Treatment (ABA vs. DIR)	6.79	1, 24	0.02*
Covariate: Demonstration Of Echolalia	1.21	1, 24	0.28
Treatment (ABA vs. DIR)	7.35	1, 24	0.01*
Covariate: Use of Words/Sentences	0.39	1, 24	0.54
Treatment (ABA vs. DIR)	6.17	1, 24	0.02*
Covariate: Ability to pull others	5.89	1, 24	0.02*
Treatment (ABA vs. DIR)	7.47	1, 24	0.01*
Covariate: Child lines things up	1.84	1, 24	0.19
Treatment (ABA vs. DIR)	7.47	1, 24	0.01*

Table 25 (Continued)*Analysis of Covariance with Functional Emotional Assessment Scale Total: Research Question 2*

FEAS Total	<i>F</i>	<i>df</i>	<i>P</i>
Covariate: Overall Cognitive Ability	0.52	1, 22	0.48
Treatment (ABA vs. DIR)	10.47	1, 22	<.01*
Covariates: # of Communication Functions Mastered	0.28	1, 22	0.60
Treatment (ABA vs. DIR)	10.29	1, 22	<.01*

Note: $p \leq .05$ **Table 26***Analysis of Covariance (2) Functional Emotional Assessment Scale-Total Rating: Research Question 2*

FEAS Total Rating	<i>F</i>	<i>df</i>	<i>p</i>
<u>Highest Levels, Total Rating</u>			
Covariate: Biomedical Interventions	1.01	1, 24	0.33
Treatment (ABA vs. DIR)	5.25	1, 24	0.03*
Covariate: Demonstration of Echolalia	0.84	1, 24	0.37
Treatment (ABA vs. DIR)	6.19	1, 24	0.02*
Covariate: Use of Words/Sentences	1.01	1, 24	0.32
Treatment (ABA vs. DIR)	4.92	1, 24	0.04*
Covariate: Ability to Pull Others	5.74	1, 24	0.03*
Treatment (ABA vs. DIR)	6.25	1, 24	0.02*
Covariate: Child Lines Things Up	3.54	1, 24	0.07
Treatment (ABA vs. DIR)	6.65	1, 24	0.02*
Covariate: Overall Cognitive Ability	1.73	1, 22	0.20
Treatment (ABA vs. DIR)	9.47	1, 22	0.01*
Covariates: # of Communication Functions Mastered	0.15	1, 22	0.70
Treatment (ABA vs. DIR)	8.38	1, 22	0.01*
<u>Lowest Levels, Total Rating</u>			
Covariate: Biomedical Interventions	0.28	1, 24	0.60
Treatment (ABA vs. DIR)	9.71	1, 24	0.01*
Covariate: Ability to pull others	5.20	1, 24	0.03*
Treatment (ABA vs. DIR)	11.17	1, 24	<.01*

Table 26 (Continued)

Analysis of Covariance Functional Emotional Assessment Scale-Total Rating: Research Question 2

FEAS Total Rating	<i>F</i>	<i>df</i>	<i>p</i>
Covariate: Child lines things up	1.06	1, 24	0.31
Treatment (ABA vs. DIR)	10.82	1, 24	<.01*
Covariate: Overall Cognitive Ability	1.48	1, 22	0.24
Treatment (ABA vs. DIR)	13.80	1, 22	<.01*
Covariates: # of Communication Functioned Mastered	0.73	1, 22	0.40
Treatment (ABA vs. DIR)	13.51	1, 22	<.01*

* $p \leq .05$

The Johnson-Neiman procedure was used to look at the relationships between the seven covariates listed above in closer detail to determine if there was an interaction effect between treatment group and levels of the covariates. If an interaction was found (see Table 27 below), the levels at which the covariates had significant differences between the treatment groups were examined further. Covariates that did not show interaction effects are not reported. Given the small sample size in the study, a .10 significance level was utilized.

When the covariate levels indicating that a youngster demonstrated echolalia, and used at least single words, a treatment effect in favor of the DIR group was present for both the Total FEAS and Total FEAS Rating outcome measures in both the *highest and lowest* scores. When a child demonstrated the motor planning skill of pulling a person over to get what they wanted was present (Value 1 of the covariate Child Pulls You In), the DIR treatment group fared better for the lowest scores.

Table 27

*Johnson-Neiman Analysis (2) Functional Emotional Assessment Highest Scores
Research Question 2*

Covariate/Dependent Variable	Significance Level			Cov. Values of Signif.	Highest Group?
	Inter- action	Co- variate	Treatment Group		
<u>Use of Biomedical Intervention?</u> ^a					
Total Rating	0.086*	0.555	0.356*	2	DIR
<u>Demonstrate Echolalia</u>					
Total FEAS	0.0310*	0.2360	0.0050*	1	DIR
Total Rating	0.023*	0.268	0.004*	1	DIR
<u>Use of Words/Sentences</u> ^b					
Total FEAS	0.025*	0.659	0.249*	3, 4, 5	DIR
Total Rating	0.081*	0.353	0.465*	3, 4	DIR

^aValue of covariate: 1-Yes 2- No; ^bWords/Sentences Rating Scale- 1- Non-Verbal 2- Less than 25 words and sounds 3- More than 25 single words 4 – Two word combinations 5 – Simple sentences 6 – Complex sentences
p ≤ .10

Table 28

*Johnson-Neiman Analysis (2) Functional Emotional Assessment Scale Lowest Scores:
Research Question 2*

Covariate/ Dependent Variable	Significance Levels			Cov. Values of Signif.	Highest Group?
	Inter- action	Co- Variate	Treatment Group		
<u>Demonstrates Echolalia</u> ^a					
Total FEAS	0.012*	0.180	0.002*	3,4,5	DIR
Total Rating	0.014*	0.208	0.001*	3,4,5	DIR
<u>Child Pull You In</u> ^a					
Total FEAS	0.075*	0.018	0.013*	1	DIR
Total Rating	0.129*	0.028	0.015*	1	DIR
<u>Use of Words/Sentences</u> ^b					
Total FEAS	0.030*	0.592	0.308*	1	DIR

^aValue of covariate: 1-Yes 2- No; ^bWords/Sentences Rating Scale – 1 – Non-Verbal 2 – Less than 25 words and sounds 3 – More than 25 single words 4 – Two word combinations 5 – Simple sentences 6 – Complex sentences
**p* ≤ .10

Part C. Play Observation Scale

Tables 29 and 30 depict the relationships between the treatment groups and covariates for Research Question 2 on the Play Observation Scale Outcome Measure. No treatment group differences were indicated for either C1 or C2. Some relationships were seen for the combined groups on these covariates. However, C1 is the section of the POS where the parent does not interact with the child unless the child interacts either verbally or non-verbally with the parent first. When the Average Number of Communication Functions Mastered was accounted for in both the Sensory Motor Play Level and the Total Play Level scores in C1 of the POS, differences were seen in the scores combined groups scores. However, this difference was not seen for the combined groups in these same levels in C2, where the parent initiated play interactions with the child. In C2 combined group scores in the Symbolic Play Substitute Level suggested a relationship with the covariate of the Child’s Ability to Pull People In, (a motor planning skill) was accounted for.

Table 29
Analysis of Covariance Play Observation Scale C1 and C2: Research Question 2

Play Observation Scale	<i>F</i>	<i>df</i>	<i>p</i>
<u>C1, Sensory Motor Average Complexity.Level</u>			
Covariate: Biomedical Interventions	2.08	1, 21	0.16
Treatment (ABA vs. DIR)	0.19	1, 21	0.66
Covariate: Demonstration Of Echolalia	0.92	1, 21	0.35
Treatment (ABA vs. DIR)	0.33	1, 21	0.57
Covariate: Use of Words/Sentences	1.60	1, 21	0.22
Treatment (ABA vs. DIR)	0<.01	1, 21	0.96
Covariate: Ability to Pull Others	0.02	1, 21	0.90
Treatment (ABA vs. DIR)	0.30	1, 21	0.59

Table 29 (Continued)*Analysis of Covariance Play Observation Scale C1 and C2: Research Question 2*

Play Observation Scale	<i>F</i>	<i>df</i>	<i>p</i>
<u>C1, Sensory Motor Average Complexity Level</u>			
Covariate: Child Lines Things Up	0.00	1, 21	0.99
Treatment (ABA vs. DIR)	0.32	1, 21	0.58
Covariate: Overall Cognitive Ability	1.33	1, 20	0.26
Treatment (ABA vs. DIR)	0.02	1, 20	0.89
Covariates: # of Communication Functions. Mastered	11.08	1, 20	<.01*
Treatment (ABA vs. DIR)	0.53	1, 20	0.48
<u>C2, Sensory Motor Average Complexity Level</u>			
Covariate: Biomedical Interventions	0.15	1, 18	0.70
Treatment (ABA vs. DIR)	0.03	1, 18	0.86
Covariate: Demonstration Of Echolalia	2.04	1, 18	0.17
Treatment (ABA vs. DIR)	0.08	1, 18	0.78
Covariate: Use of Words/Sentences	0.18	1, 18	0.67
Treatment (ABA vs. DIR)	0.07	1, 18	0.79
Covariate: Ability to pull others	1.51	1, 18	0.23
Treatment (ABA vs. DIR)	0.18	1, 18	0.68
Covariate: Child lines things up	0.24	1, 18	0.63
Treatment (ABA vs. DIR)	0.08	1, 18	0.78
<u>C1, Symbolic Play Agent Level</u>			
Covariate: Biomedical Interventions	2.30	1, 21	0.14
Treatment (ABA vs. DIR)	0.20	1, 21	0.66
Covariate: Demonstration Of Echolalia	0.10	1, 21	0.76
Treatment (ABA vs. DIR)	0.33	1, 21	0.57
Covariate: Use of Words/Sentences	0.87	1, 21	0.36
Treatment (ABA vs. DIR)	0.03	1, 21	0.86
Covariate: Ability to Pull Others	0.79	1, 21	0.39
Treatment (ABA vs. DIR)	0.25	1, 21	0.62

Table 29 (Continued)*Analysis of Covariance Play Observation Scale C1 and C2: Research Question 2*

Play Observation Scale	<i>F</i>	<i>df</i>	<i>p</i>
Covariate: Child Lines Things Up	0.43	1, 21	0.52
Treatment (ABA vs. DIR)	0.33	1, 21	0.57
Covariate: Overall Cognitive Ability	3.02	1, 20	0.10
Treatment (ABA vs. DIR)	0.01	1, 20	0.93
Covariates: # of Communication Functions Mastered	2.56	1, 20	0.13
Treatment (ABA vs. DIR)	0.03	1, 20	0.87
<u>C2, Symbolic Play Agent Level</u>			
Covariate: Biomedical Interventions	0.74	1, 18	0.40
Treatment (ABA vs. DIR)	0.03	1, 18	0.87
Covariate: Demonstration Of Echolalia	0.35	1, 18	0.56
Treatment (ABA vs. DIR)	0.00	1, 18	0.96
Covariate: Use of Words/Sentences	0.01	1, 18	0.92
Treatment (ABA vs. DIR)	0.01	1, 18	0.94
Covariate: Ability to Pull Others	1.04	1, 18	0.32
Treatment (ABA vs. DIR)	0.05	1, 18	0.82
Covariate: Child Lines Things Up	0.13	1, 18	0.72
Treatment (ABA vs. DIR)	0.00	1, 18	0.99
Covariate: Overall Cognitive Ability	0.16	1, 17	0.69
Treatment (ABA vs. DIR)	0.06	1, 17	0.82
Covariates: # of Communication Functions Mastered	0.65	1, 17	0.43
Treatment (ABA vs. DIR)	0.43	1, 17	0.52
<u>C1, Symbolic Play Agent Average Complexity</u>			
Covariate: Biomedical Interventions	2.79	1, 21	0.11
Treatment (ABA vs. DIR)	0.01	1, 21	0.91
Covariate: Demonstration Of Echolalia	0.10	1, 21	0.75
Treatment (ABA vs. DIR)	0.07	1, 21	0.79

Table 29 (Continued)*Analysis of Covariance Play Observation Scale C1 and C2: Research Question 2*

Play Observation Scale	<i>F</i>	<i>df</i>	<i>p</i>
Covariate: Use of Words/Sentences	2.02	1, 21	0.17
Treatment (ABA vs. DIR)	0.09	1, 21	0.77
Covariate: Ability to Pull Others	0.23	1, 21	0.63
Treatment (ABA vs. DIR)	0.05	1, 21	0.82
Covariate: Child Lines Things Up	0.18	1, 21	0.68
Treatment (ABA vs. DIR)	0.07	1, 21	0.79
Covariate: Overall Cognitive Ability	2.72	1, 20	0.12
Treatment (ABA vs. DIR)	0.04	1, 20	0.84
Covariates: # of Communication Functions Mastered	3.89	1, 20	0.06
Treatment (ABA vs. DIR)	0.34	1, 20	0.57
<u>C2, Symbolic Play Agent Average Complexity</u>			
Covariate: Biomedical Interventions	0.39	1, 18	0.54
Treatment (ABA vs. DIR)	0.23	1, 18	0.64
Covariate: Demonstration Of Echolalia	1.03	1, 18	0.33
Treatment (ABA vs. DIR)	0.37	1, 18	0.55
Covariate: Use of Words/Sentences	0.10	1, 18	0.76
Treatment (ABA vs. DIR)	0.26	1, 18	0.61
Covariate: Ability to Pull Others	1.46	1, 18	0.24
Treatment (ABA vs. DIR)	0.14	1, 18	0.71
Covariate: Child Lines Things Up	0.31	1, 18	0.58
Treatment (ABA vs. DIR)	0.39	1, 18	0.54
Covariate: Overall Cognitive Ability	0.10	1, 17	0.76
Treatment (ABA vs. DIR)	0.23	1, 17	0.64
Covariates: # of Communication Functions Mastered	0.31	1, 17	0.59
Treatment (ABA vs. DIR)	0.00	1, 17	0.97

Table 29 (Continued)*Analysis of Covariance (2) Play Observation Scale C1 and C2: Research Question 2*

Play Observation Scale	<i>F</i>	<i>df</i>	<i>P</i>
<u>C1, Symbolic Play Substitute Level</u>			
Covariate: Biomedical Interventions	1.68	1, 21	0.21
Treatment (ABA vs. DIR)	0.34	1, 21	0.56
Covariate: Demonstration Of Echolalia	0.16	1, 21	0.69
Treatment (ABA vs. DIR)	0.49	1, 21	0.49
Covariate: Use of Words/Sentences	2.83	1, 21	0.11
Treatment (ABA vs. DIR)	0.00	1, 21	0.98
Covariate: Ability to Pull Others	2.90	1, 21	0.10
Treatment (ABA vs. DIR)	0.35	1, 21	0.56
Covariate: Child Lines Things Up	0.01	1, 21	0.92
Treatment (ABA vs. DIR)	0.48	1, 21	0.49
Covariate: Overall Cognitive Ability	1.00	1, 20	0.33
Treatment (ABA vs. DIR)	0.10	1, 20	0.75
Covariates: # of Communication Functions Mastered	4.35	1, 20	0.50
Treatment (ABA vs. DIR)	0.04	1, 20	0.85
<u>C2, Symbolic Play Substitute Level</u>			
Covariate: Biomedical Interventions	0.16	1, 18	0.70
Treatment (ABA vs. DIR)	0.82	1, 18	0.38
Covariate: Demonstration of Echolalia	0.49	1, 18	0.49
Treatment (ABA vs. DIR)	0.80	1, 18	0.38
Covariate: Use of Words/Sentences	0.11	1, 18	0.75
Treatment (ABA vs. DIR)	0.67	1, 18	0.42
Covariate: Ability to Pull Others	4.49	1, 18	0.05*
Treatment (ABA vs. DIR)	0.37	1, 18	0.55
Covariate: Child Lines Things Up	0.15	1, 18	0.70
Treatment (ABA vs. DIR)	0.64	1, 18	0.43

Table 29 (Continued)*Analysis of Covariance (2) Play Observation Scale C1 and C2: Research Question 2*

Play Observation Scale	<i>F</i>	<i>df</i>	<i>P</i>
Covariate: Overall Cognitive Ability	0.05	1, 17	0.82
Treatment (ABA vs. DIR)	0.40	1, 17	0.54
Covariates: # of Communication Functions. Mastered	0.52	1, 17	0.48
Treatment (ABA vs. DIR)	0.00	1, 17	0.96
<u>C1, Symbolic Play Substitute Average Level</u>			
Covariate: Biomedical Interventions	1.21	1, 21	0.28
Treatment (ABA vs. DIR)	0.18	1, 21	0.68
Covariate: Demonstration Of Echolalia	0.00	1, 21	0.99
Treatment (ABA vs. DIR)	0.28	1, 21	0.61
Covariate: Use of Words/Sentences	2.78	1, 21	0.11
Treatment (ABA vs. DIR)	0.02	1, 21	0.90
Covariate: Ability to pull others	0.65	1, 21	0.43
Treatment (ABA vs. DIR)	0.21	1, 21	0.65
Covariate: Child lines things up	0.01	1, 21	0.91
Treatment (ABA vs. DIR)	0.28	1, 21	0.61
Covariate: Overall Cognitive Ability	2.36	1, 20	0.14
Treatment (ABA vs. DIR)	0.00	1, 20	0.95
Covariates: # of Communication Functions Mastered	4.17	1, 20	0.06
Treatment (ABA vs. DIR)	0.13	1, 20	0.72
<u>C2, Symbolic Play Substitute Average Level</u>			
Covariate: Biomedical Interventions	0.21	1, 18	0.65
Treatment (ABA vs. DIR)	2.24	1, 18	0.15
Covariate: Demonstration Of Echolalia	1.23	1, 18	0.28
Treatment (ABA vs. DIR)	2.70	1, 18	0.12
Covariate: Use of Words/Sentences	0.34	1, 18	0.57
Treatment (ABA vs. DIR)	2.21	1, 18	0.15

Table 29 (Continued)*Analysis of Covariance (2) Play Observation Scale C1 and C2: Research Question 2*

Play Observation Scale	<i>F</i>	<i>df</i>	<i>P</i>
Covariate: Ability to pull others	2.28	1, 18	0.15
Treatment (ABA vs. DIR)	1.92	1, 18	0.18
Covariate: Child lines things up	0.05	1, 18	0.83
Treatment (ABA vs. DIR)	2.28	1, 18	0.15
Covariate: Overall Cognitive Ability	0.48	1, 17	0.50
Treatment (ABA vs. DIR)	2.44	1, 17	0.14
Covariates: # of Communication Functions Mastered	0.25	1, 17	0.63
Treatment (ABA vs. DIR)	0.60	1, 17	0.45
<u>C1, Social Communication Total</u>			
Covariate: Biomedical Interventions	0.19	1, 21	0.67
Treatment (ABA vs. DIR)	1.71	1, 21	0.21
Covariate: Demonstration Of Echolalia	0.46	1, 21	0.51
Treatment (ABA vs. DIR)	1.64	1, 21	0.22
Covariate: Use of Words/Sentences	0.44	1, 21	0.51
Treatment (ABA vs. DIR)	2.06	1, 21	0.17
Covariate: Ability to pull others	1.85	1, 21	0.19
Treatment (ABA vs. DIR)	2.05	1, 21	0.17
Covariate: Child lines things up	0.53	1, 21	0.48
Treatment (ABA vs. DIR)	1.64	1, 21	0.21
Covariate: Overall Cognitive Ability	2.53	1, 20	0.13
Treatment (ABA vs. DIR)	3.43	1, 20	0.08
Covariates: # of Communications Functions Mastered	0.18	1, 20	0.68
Treatment (ABA vs. DIR)	2.46	1, 20	0.13
<u>C2, Social Communication Total</u>			
Covariate: Biomedical Interventions	0.47	1, 18	0.50
Treatment (ABA vs. DIR)	0.05	1, 18	0.83

Table 29 (Continued)*Analysis of Covariance (2) Play Observation Scale C1 and C2: Research Question 2*

Play Observation Scale	<i>F</i>	<i>df</i>	<i>P</i>
Covariate: Demonstration Of Echolalia Treatment (ABA vs. DIR)	0.01 0.09	1, 18 1, 18	0.92 0.77
Covariate: Use of Words/Sentences Treatment (ABA vs. DIR)	0.17 0.06	1, 18 1, 18	0.68 0.81
Covariate: Ability to pull others Treatment (ABA vs. DIR)	2.00 0.01	1, 18 1, 18	0.18 0.93
Covariate: Child lines things up Treatment (ABA vs. DIR)	0.03 0.07	1, 18 1, 18	0.86 0.79
Covariate: Overall Cognitive Ability Treatment (ABA vs. DIR)	0.05 0.14	1, 17 1, 17	0.82 0.71
Covariates: # of Communication Functions Mastered Treatment (ABA vs. DIR)	1.66 0.33	1, 17 1, 17	0.22 0.57
<u>C1, Total Play Level</u>			
Covariate: Biomedical Interventions Treatment (ABA vs. DIR)	2.22 0.64	1, 20 1, 20	0.15 0.43
Covariate: Demonstration of Echolalia Treatment (ABA vs. DIR)	0.31 1.12	1, 20 1, 20	0.59 0.30
Covariate: Use of Words/Sentences Treatment (ABA vs. DIR)	1.88 0.32	1, 20 1, 20	0.19 0.58
Covariate: Ability to pull others Treatment (ABA vs. DIR)	2.09 1.11	1, 20 1, 20	0.16 0.30
Covariate: Child lines things up Treatment (ABA vs. DIR)	0.00 1.17	1, 20 1, 20	0.97 0.29
Covariate: Overall Cognitive Ability Treatment (ABA vs. DIR)	1.62 0.42	1, 19 1, 19	0.22 0.53
Covariates: # of Communications Functions Mastered Treatment (ABA vs. DIR)	6.83 0.02	1, 19 1, 19	0.02* 0.89

Table 29 (Continued)*Analysis of Covariance (2) Play Observation Scale C1 and C2: Research Question 2*

Play Observation Scale	<i>F</i>	<i>df</i>	<i>P</i>
<u>C2, Total Play Level</u>			
Covariate: Biomedical Interventions	0.11	1, 17	0.75
Treatment (ABA vs. DIR)	0.54	1, 17	0.47
Covariate: Demonstration of Echolalia	0.50	1, 17	0.49
Treatment (ABA vs. DIR)	0.43	1, 17	0.52
Covariate: Use of Words/Sentences	0.06	1, 17	0.81
Treatment (ABA vs. DIR)	0.42	1, 17	0.52
Covariate: Ability to Pull Others	2.01	1, 17	0.17
Treatment (ABA vs. DIR)	0.28	1, 17	0.61
Covariate: Child lines things up	0.03	1, 17	0.87
Treatment (ABA vs. DIR)	0.46	1, 17	0.51
Covariate: Overall Cognitive Ability	0.47	1, 16	0.50
Treatment (ABA vs. DIR)	0.13	1, 16	0.72
Covariates: # of Communication Functions Mastered	0.93	1, 16	0.35
Treatment (ABA vs. DIR)	0.05	1, 16	0.83

 $p \leq .05$

The Johnson-Neiman procedure was used to look at the relationships between covariates listed above in closer detail to determine if there was an interaction effect between treatment group and levels of the covariates. If an interaction was found (see Table 30 below), the levels at which the covariates had significant differences between the treatment groups were examined further. Covariates that did not show interaction effects are not reported. Given the small sample size in the study, a .10 significance level was utilized. Treatment group differences were seen only when the Use of Words/Sentences was accounted for on the Symbolic Plays Substitute and Symbolic Play Substitute Average Levels in C2 on the POS outcome measure.

Table 30

Johnson-Neiman Analysis (2) Play Observation Scale (C2) Highest Scores: Research Question 2

Covariate/ Dependent Variable	Significance Levels				Highest Group?
	Inter-action	Co-variate	Treatment Group	Cov. Values of Signif.	
<u>Use of Words/Sentences^a</u>					
Symbolic Play Substitute Level	0.024*	0.307	0.065*	4,5	DIR
Symbolic Play Substitute Average Level	0.036*	0.225	0.148*	3, 4, 5	DIR

^aWords/Sentences Rating Scale -1– Non-Verbal 2 – Less than 25 words and sounds 3 – More than 25 single words 4 – Two word combinations 5 – Simple sentences 6 – Complex sentences.

* $p \leq .10$

Research Question 3

To what degree do the assessments utilized in this study measure the same construct both within and across treatments?

The three outcome measures in this study claim to measure the affective variables that are the core deficits of autism- social interaction, communication and play skills. The methods, by which they do so however, are quite different. The Natural Language Training Form takes frequency counts of discreet behaviors (Child Initiations and Child Responses) associated with this construct. The Functional Emotional Assessment Scale utilizes qualitative interpretation based on defined criteria of emotional relating and play, with points assigned accordingly. The Play Observation Scale uses both a frequency counts and qualitative judgment in the context of the child's interactions to determine scores.

Since the instruments measure the same constructs, the scores on these outcome measures should be related. For example, one would expect that if a youngster earns a high score on the Natural Language form, than he should also earn a high score on the POS and on the FEAS. If the scores are not related, the outcome measures might be looking at different constructs, and therefore differences in the outcomes between groups might be related to differences on the second construct being measured as opposed to actual differences in skills involving social interaction/communication and play. This section will report only the areas where significant correlations occurred. The complete correlation matrix is available for review in (Appendix L). Tables 31-35 illustrate the correlations for each outcome measure for the combined treatment groups as well as the highest and lowest scoring ABA and DIR treatment group scores as indicated.

Part A. Natural Language Training Form and Functional Emotional Assessment Scale

When the ABA and DIR treatment groups are combined, a strong correlation is present between both of the FEAS scores and Child Initiations score on the Natural Language Training Form for both the highest and lowest scoring samples. When broken down into treatment groups however, the relationship between the outcome measure scores is no longer seen for the ABA group. For the DIR treatment, both the highest and lowest scoring outcomes showed a positive and strong relationship between the FEAS and the Natural Language Child Initiation Score. Data are displayed in Table 31, below.

Table 31*Natural Language Form and FEAS Correlations: Research Question 3*

Natural Language Form Highest Scores	Highest Scores		Natural Language Form Lowest Scores	Lowest Scores	
	Total FEAS	FEAS Rating		Total FEAS	FEAS Rating
Combined Groups			Combined Groups		
Total Child Initiations	.73	.70	Total Child Initiations	.68	.68
Total Child Responses	.29	.29	Total Child Responses	.47	.55
ABA Treatment Group			ABA Treatment Group		
Total Child Initiations	.55	.49	Total Child Initiations	.38	.43
Total Child Responses	.13	.12	Total Child Responses	.27	.43
DIR Treatment Group			DIR Treatment Group		
Total Child Initiations	.85	.84	Total Child Initiations	.82	.82
Total Child Responses	.24	.26	Total Child Responses	.46	.50

Note. Values in Bold = $p < .05$

Part B. Natural Language Form and Play Observation Scale

No significant correlations were seen between the Child Initiations and Child Responses on the Natural Language Form and the C1 scales scores for the combined groups or the ABA treatment outcomes (highest and lowest). Therefore these scores are not reported. However, significant correlations on C1 were observed in the DIR treatment group between the highest and lowest NLT Child Responses and Play Observation Scale scores in the areas of Sensory Motor Complexity Level and Symbolic Play Agent, Symbolic Play Agent Complexity, and Symbolic Play Substitute Complexity Level. See

Table 32

*Natural Language and Play Observation Scale- C1- Correlations:
DIR Treatment Group, Research Question 3*

<u>Play Observation Scale - C1</u>	NLT Highest Scores	
	Total Child Initiations	Total Child Responses
Sensory Motor Level	.39	.04
Sensory Motor Complexity Level	-.05	-.60
Symbolic Play Agent Level	.19	-.51
Symbolic Play Agent Complexity Level	.26	-.58
Symbolic Play Substitute Level	.22	-.30
Symbolic Play Substitute Complexity Level	.25	-.52
Social Communication Total	-.09	.19
Total Play Level	.30	-.37

Note. Values in Bold = $p < .05$

Significant correlations between the highest and lowest Natural Language Child Initiation Scores and Play Observation Scale C2 were seen in the areas of Symbolic Play Substitute and Symbolic Play Complexity Level and Social Communication Total for the combined treatment groups. (See Table 33 below)

Table 33*Natural Language and Play Observation-C2 – Correlations: Research Question 3*

Combined Groups	NLT Highest Scores		NLT Lowest Scores	
	Total Child Initiations	Total Child Responses	Total Child Initiations	Total Child Responses
<u>Play Observation Scale - C2</u>				
Sensory Motor Level	-.13	-.17	-.04	.01
Sensory Motor Complexity Level.	-.12	-.04	-.02	.12
Symbolic Play Agent Level	.25	.06	.30	.09
Symbolic Play Agent Complexity Level	.32	.11	.39	.13
Symbolic Play Substitute Level	.44	.37	.42	.43
Symbolic Play Substitute Complexity Level	.52	.28	.62	.31
Social Communication Total	.54	.32	.50	.37
Total Play Level	.29	.22	.30	.30

Note. Values in Bold = $p < .05$

Part C. Functional Emotional Assessment / Play Observation Significant Correlations

When the treatment groups were combined, minimal relationships were indicated with the lowest FEAS scores, but moderate correlations were seen with the *highest* FEAS scores on C1 of the Play Observation scale. Table 34 below illustrates these statistics.

Table 34*FEAS and POS Combined Groups C1- Correlations; Research Question 3*

Combined Groups	Highest Scores		Lowest Scores	
	Total FEAS	FEAS Rating	Total FEAS	FEAS Rating
<u>Play Observation Scale – C1</u>				
Sensory Motor Level	.24	.29	.22	.12
Sensory Motor Complexity Level	.11	.13	.02	.02
Symbolic Play Agent Level	.40	.38	.35	.31
Symbolic Play Agent Complexity Level	.37	.35	.30	.26
Symbolic Play Substitute Level	.44	.46	.40	.40
Symbolic Play Substitute Complexity Level	.44	.42	.39	.34
Social Communication Total	.05	.06	.10	.16
Total Play Level	.50	.50	.46	.40

Note. Values in Bold = $p < .05$

Minimal relationships were between the Play Observation Scales and the Functional Emotional Assessment Scales were present for the ABA treatment group at both the highest and lowest scores for both the C1 and C2 outcome measures. In contrast, the DIR treatment group scores did show a moderate to strong relationship with selected POS subtests in C1 and C2 at both the highest and lowest scores. In the DIR group, a moderate relationship was seen with the FEAS and the Total Play Level score correlations with Total Play Level, as well as the Symbolic Play Substitute and Symbolic Play Level. Indeed, DIR group outcomes measures had stronger relationships with some of the POS subtests than they did when the two groups were combined. See Table 35.

Table 35*FEAS and POS Correlations with DIR treatment: Research Question 3*

DIR Treatment Group	Highest Scores		Lowest Scores	
	Total FEAS	FEAS Rating	Total FEAS	FEAS Rating
<u>Play Observation Scale - C1</u>				
Sensory Motor Level	.47	.49	.50	.49
Sensory Motor Complexity Level	.02	-.05	-.05	-.01
Symbolic Play Agent Level	.44	.41	.36	.41
Symbolic Play Agent Complexity Level	.44	.39	.35	.39
Symbolic Play Substitute Level	.50	.50	.44	.50
Symbolic Play Substitute Complexity Level	.53	.47	.44	.47
Social Communication Total	.31	.2:	.36	.28
Total Play Level	.62	.60	.54	.59
<u>Play Observation Scale - C2</u>				
Sensory Motor Level	.24	.29	.16	.16
Sensory Motor Complexity Level	.11	.13	.02	.04
Symbolic Play Agent Level	.40	.38	.48	.53
Symbolic Play Agent Complexity Level	.37	.35	.40	.46
Symbolic Play Substitute Level	.44	.46	.81	.86
Symbolic Play Substitute Complexity Level	.44	.42	.60	.66
Social Communication Total	.05	.06	.76	.80
Total Play Level	.50	.50	.74	.79

Note. Values in Bold = $p < .05$

Research Question 4

a) Are there differences between treatment groups' Estimated Communication Competency levels based on Rowland's Communication Matrix?

b) Were critical functions and levels of Social Interaction mastered by subjects in the study?

c) Are there differences between treatment groups in the mastery of the levels of Social Interaction when the covariates of Research Question 2 are accounted for?

Rowland's Communication Matrix attempts to classify communication outside of traditional language constructs. Four basic functions of communication are identified

1. Ways to REFUSE what you don't want
2. Ways to OBTAIN what you want
3. Ways to engage in SOCIAL INTERACTION
4. Ways to provide or seek INFORMATION

The functions are then cross referenced with the levels of communication the child is using with each function as follows:

Level 1- Pre-intentional Behavior and the state it reflects

Level 2- Intentional Behaviors – Communicative behavior is intentional, but child does not realize he can control another person's responses/behavior with it.

Level 3- Unconventional Communication (using pre-symbolic behaviors) - Child recognizes intention and power of communicative behavior, but does it in a manner not generally socially acceptable or understood (body movements, actions on objects, etc).

Level 4- Conventional Communication (using pre-symbolic behavior) - Socially acceptable gestures and vocalizations are used that will continue to augment symbolic behavior throughout life. Child has "dual orientation" - acting or orienting towards both a person and the object (or topic of conversation) at the same time. This level is critical as "conventional" implies that even if the child does not yet use language, the social world at large can "read" the intent of the communication through facial expressions, body language, vocal tone, etc.

Level 5- Concrete Symbols- Child uses pictures/objects that represent the topics of their communication.

Level 6- Abstract Symbols- Use of speech, signs, words to represent specific referents.

Level 7- Language- Combining symbols through speech, signs, pictures, printed word according to syntax.

While the average number of communicative functions mastered was reviewed in Research Question 3, an indication of treatment success in affect for a child with autism would be the use of communication to engage in Social Interaction (i.e. function 3). It is conceivable that a child could master the other functions, but not the Social Interaction one.

The most critical Level of communication for a child with autism to master would be Level 4-Conventional Communication. This is the level where the rest of the world can understand the intention of what the child is saying because of the common or “conventional” use of non-verbal, tonal, facial expressions etc. that are recognized by society . This information need not be conveyed with spoken language. A child could master Level 7 and speak in fluent sentences, but still not use the conventional norms of behaviors that augment communication to make it understandable. Regardless of the level of language ability acquired, progress for a child with autism should reflect many functions mastered at Level 4. Higher total scores on this instrument are not as important as the mastery of the critical function and the critical level.

The critical function of engaging in Social Interaction was examined primarily at the Conventional Level 4, as well as Levels 5-7. The number of functions mastered at the critical Conventional Level 4, were also studied. No differences were observed between treatment groups on any of these scores as indicated in Table 36 below:

Table 36

Descriptive Statistics Communication Matrix Post-Treatment Social Interaction Level Scores: Research Question 4

Estimated Communication Competency (post-Trtmt)	N	ABA		N	DIR		<i>t</i> -test statistics		
		Mean	<i>SD</i>		Mean	<i>SD</i>	T	<i>df</i>	<i>p</i>
Total Score	14	0.81	0.16	14	0.87	0.14	1.13	26	0.27
Avg. Num. Levels Mastered	14	4.66	1.91	14	5.63	1.08	1.65	26	0.11
Functions Mastered Conventional Level	14	1.29	1.07	14	1.57	0.94	0.75	26	0.46
Social Interactions at Conventional.Level 4	14	1.07	0.62	14	1.14	0.36	0.37	26	0.71
Social Interactions Level 5	14	1.57	0.65	14	1.64	0.63	0.30	26	0.77
Social Interactions Level 6	14	1.29	0.73	14	1.43	0.76	0.51	26	0.61
Social Interactions Level 7	14	1.00	0.78	14	1.36	0.75	1.24	26	0.23

It is informative to look at the issue of the mastery of critical function and the critical level pre and post-treatment to see what changes did occur across treatments. (Note: two families did not have enough data to enable completion of the Matrix). At the Pre-treatment level, no subject had mastered Level 4, or any Levels above 4 prior to initiation of treatment. Furthermore, no subjects were communicating with the intention of engaging in Social Interaction (Function 3) indicated in Table 37, below.

The films of the subjects were scored using the matrix for post-treatment information. The results indicated approximately 47% of the youngsters had mastered only one of the four functions at the Conventional Level- and increase from the 26% pre-treatment., with only 25% of the children mastering two functions as opposed to 3% pre-treatment. Of interest however, is the fact the majority of youngsters in this study, regardless of treatment group, scored with mastery of only two functions after at least

two years of intensive program delivery.

Table 37

Pre-treatment Scores on Communication Matrix: Research Question 4

Treatment. Group		# of Functions Mastered at Conventional Level 4				
		0	1	2	3	4
ABA	N	7	6	0	0	0
	%	53.8	46.1	0	0	0
DIR	N	11	1	1	0	0
	%	78.6	7.1	7.1	0	0
Total	N	18	7	1	0	0
	%	69.2	26.9	3.8	0	0

Table 38

Post-treatment Communication Matrix Scores: Research Question 4

Treatment Group		Number of Functions Mastered at Conventional Level 4				
		0	1	2	3	4
ABA	N	3	7	1	3	0
	%	21.4	50	7.1	21.4	0
DIR	N	1	6	6	0	1
	%	7.1	42.9	42.9	0	7.1
Total	N	4	13	7	3	1
	%	14.3	46.4	25	10.7	3.6

Perhaps most interesting in light of the previous positive results of the other outcome measures utilized in this study, the critical skill of engaging in Social Interaction at a Conventional Level was *not* mastered by the majority of the children in the study, although many had acquired the language and symbolic communication requirements to pass Levels 6 and 7 (See Table 39 below).

Table 39
Communication Matrix Post-Treatment Scores
Number of Social Interaction Function Levels Mastered: Research Question 4

Treatment Group		Level 4 (Conventional)		Level 5		Level 6		Level 7	
		Yes	No	Yes	No	Yes	No	Yes	No
ABA	Number	3	11	5	9	8	6	10	4
	%	21.4	78.6	35.7	64.3	57.1	42.9	71.4	28.6
DIR	Number	2	12	4	10	8	8	7	7
	%	14.3	85.7	28.6	71.4	57.1	57.1	50	50
Total	Number	5	23	9	19	14	14	17	11
	%	17.9	82.1	32.1	67.9	50	50	60.7	39.3

ANCOVAs were run to see if there were differences on the Social Interaction Levels of the matrix accounting for the covariables utilized in Research Question 2. No treatment group differences were found at any of the levels when accounting for these variables. In the Social Interaction Level 4 (Conventional), a relationship between the use of Biomedical Interventions was found for the combined treatment groups, but this was not seen at any of the other levels. The Ability to Pull Others was found to be related for the combined groups across Social Interaction Levels 5, 6, and 7. The use of

Psychotropic Medication was related to Social Interaction at Level 5 (abstract symbols) for the combined group scores.

Table 40

Analysis of Covariance- Post-treatment Estimated Communication Competency Social Interaction Level Scores: Research Question 4

Estimated Communication Competency (Post-Treatment)	<i>F</i>	<i>df</i>	<i>p</i>
<u>Social Interactions at Conventional Level 4</u>			
Covariate: Biomedical Interventions	6.96	1, 25	0.01*
Treatment (ABA vs. DIR)	0.00	1, 25	0.96
Covariate: Demonstration Of Echolalia	1.95	1, 25	0.18
Treatment (ABA vs. DIR)	0.08	1, 25	0.78
Covariate: Use of Words/Sentences	0.04	1, 25	0.84
Treatment (ABA vs. DIR)	0.16	1, 25	0.69
Covariate: Ability to pull others	0.86	1, 25	0.36
Treatment (ABA vs. DIR)	0.06	1, 25	0.82
Covariate: Child lines things up	0.05	1, 25	0.83
Treatment (ABA vs. DIR)	0.14	1, 25	0.72
Covariate: Overall Cognitive Ability	1.37	1, 23	0.25
Treatment (ABA vs. DIR)	0.19	1, 23	0.67
Covariates: # of Communication Functions Mastered	0.00	1,23	0.96
Treatment (ABA vs. DIR)	0.14	1,23	0.72

Table 40 (Continued)

Analysis of Covariance- Post-treatment Estimated Communication Competency Social Interaction Level Scores: Research Question 4

Estimated Communication Competency (Post-Treatment)	<i>F</i>	<i>df</i>	<i>P</i>
<u>Social Interactions at Level 5</u>			
Covariate: Biomedical Interventions	0.17	1, 25	0.69
Treatment (ABA vs. DIR)	0.05	1, 25	0.83
Covariate: Demonstration Of Echolalia	0.03	1, 25	0.87
Treatment (ABA vs. DIR)	0.08	1, 25	0.78
Covariate: Use of Words/Sentences	0.11	1, 25	0.75
Treatment (ABA vs. DIR)	0.05	1, 25	0.83
Covariate: Ability to pull others	8.27	1, 25	0.01*
Treatment (ABA vs. DIR)	0.01	1, 25	0.93
Covariate: Child lines things up	0.18	1, 25	0.68
Treatment (ABA vs. DIR)	0.08	1, 25	0.77
Covariate: Psychotropic Drugs	10.50	1, 24	0.00*
Treatment (ABA vs. DIR)	0.26	1, 24	0.61
Covariate: Overall Cognitive Ability	1.26	1, 23	0.27
Treatment (ABA vs. DIR)	0.13	1, 23	0.72
Covariates: Number of Communication Functions Mastered	0.19	1, 23	0.67
Treatment (ABA vs. DIR)	0.04	1, 23	0.84

Table 40 (Continued)

Analysis of Covariance- Post-treatment Estimated Communication Competency Social Interaction Level Scores: Research Question 4

Estimated Communication Competency (Post-Treatment)	<i>F</i>	<i>df</i>	<i>P</i>
<u>Social Interactions at Level 6</u>			
Covariate: Biomedical Interventions	0.39	1, 25	0.54
Treatment (ABA vs. DIR)	0.15	1, 25	0.70
Covariate: Demonstration Of Echolalia	0.27	1, 25	0.61
Treatment (ABA vs. DIR)	0.29	1, 25	0.60
Covariate: Use of Words/Sentences	1.80	1, 25	0.19
Treatment (ABA vs. DIR)	0.06	1, 25	0.81
Covariate: Ability to pull others	5.45	1, 25	0.03*
Treatment (ABA vs. DIR)	0.04	1, 25	0.84
Covariate: Child lines things up	0.13	1, 25	0.72
Treatment (ABA vs. DIR)	0.25	1, 25	0.62
Covariate: Overall Cognitive Ability	0.60	1, 23	0.45
Treatment (ABA vs. DIR)	0.74	1, 23	0.40
Covariates: # of Communication Functions Mastered	1.76	1, 23	0.20
Treatment (ABA vs. DIR)	1.22	1, 23	0.28

Table 40 (Continued)

Analysis of Covariance- Post-treatment Estimated Communication Competency Social Interaction Level Scores: Research Question 4

Estimated Communication Competency (Post-Treatment)	<i>F</i>	<i>df</i>	<i>P</i>
<u>Social Interactions at Level 7</u>			
Covariate: Biomedical Interventions	0.19	1, 25	0.67
Treatment (ABA vs. DIR)	0.26	1, 25	0.27
Covariate: Demonstration Of Echolalia	0.01	1, 25	0.94
Treatment (ABA vs. DIR)	1.47	1, 25	0.24
Covariate: Use of Words/Sentences	5.23	1, 25	0.03*
Treatment (ABA vs. DIR)	0.73	1, 25	0.40
Covariate: Ability to pull others	4.08	1, 25	0.05*
Treatment (ABA vs. DIR)	1.00	1, 25	0.33
Covariate: Child lines things up	0.86	1, 25	0.36
Treatment (ABA vs. DIR)	1.52	1, 25	0.23
Covariate: Overall Cognitive Ability	1.43	1, 23	0.25
Treatment (ABA vs. DIR)	2.09	1, 23	0.16
Covariates: # of Communication Functions Mastered	2.80	1, 23	0.11
Treatment (ABA vs. DIR)	3.05	1, 23	0.09

* $p \leq .05$

The Johnson-Neiman procedure was used to look at the relationships between covariates listed above in closer detail to determine if there was an interaction effect between treatment group and levels of the covariates. If an interaction was found (see Table 41 below), the levels at which the covariates had significant differences between the treatment groups were examined further. Given the small sample size in the study, a .10 significance level was utilized. The only relationship noted was Social Interaction

Skills at Level 5 and 7. Children who started treatment younger than 38 months of age who were in the ABA group mastered Social Interaction at Level 5 and in direct contrast, children who started treatment when they were older than 41 months had a total higher estimated communication competency score if they were using language (Level 7) at the age they enrolled in the DIR treatment.

Table 41

Johnson-Neiman Analysis Estimated Communication Competency Scores: Research Question 4

Estimated Communication competency (Post- treatment)	Age at Treatment Initiation	
	Covariate values of significance	Which group is higher
Social Interactions at Level 5	<38 months	ABA
Social Interactions at Level 7	> 41 months	DIR

* $p \leq .10$

Supplementary Analysis

What is the relationship between the Child Autism Rating Scale and Vineland Adaptive Behavior Scales?

The Total Score on Childhood Autism Rating Scale ranges from 15 to 60 (15 categories are each scored in a range of 1 to 4), with the higher scores indicating more behaviors associated with autism in each of the fifteen categories measured on the instrument. These raw scores are then placed on a Rating Scale as follows: 1- Severely Autistic, 2- Mildly-Moderately Autistic, 3- Non-Autistic. Unlike the CARS Total score, on the CARS Rating Score a lower number indicates more severe symptoms of autism, the opposite of the Total Score.

The Vineland Adaptive Behavior Scale looks at the degree of supervision a youngster requires to function in the world at large. The domains measured in this instrument are Communication, Daily Living, and Socialization and are reported with standard scores ranging from 1-160. In addition, the sums of these domain standard scores are calculated into a total Adaptive Behavior Composite Standard Score.

The Vineland also includes a Maladaptive Behavior Rating section where percentile ranks corresponding to raw scores for this section were plotted and placed into the following Maladaptive Behavior Rating levels: Level 1-Significant, Level 2-Intermediate, Level 3- Non-Significant .

Similar to the CARS Rating score, lower scores on the Maladaptive Behavior Rating are associated with higher levels of adaptive behavior. This is the opposite of the other Vineland domain scores and Adaptive Behavior Composite scores where higher score numbers indicate more independent functioning.

Given the severe challenges that behaviors associated with autism impact the lives of children with this disability, it was expected that higher CARS Total scores would be associated with lower domain scores and Adaptive Behavior Composite scores on the Vineland (a negative slope on the correlation line). The analysis verified this with strongest correlations seen in the domains of Communication, Daily Living and the Adaptive Behavior Composite. Surprisingly the correlation was between the CARS Total and the Vineland Socialization Domain was only moderate, as was the relationship with the Maladaptive Behavior Rating. Given weak social skills are one of the hallmark features of the disability (and the topic of this paper), this was not expected.

The CARS Rating score was associated with higher Vineland domain scores with

correlations in the lower end of the strong range ($p \geq .70$) with the exception again of Socialization, where the correlation was moderate. While the narrow range of the CARS Rating (i.e., 1 to 3) may account for this discrepancy, the fact that both the CARS Total and Rating show only moderate relationships with this score warrants attention. It may be that the Vineland Socialization items measure skill sets that are not as impacted by the behaviors that are characteristic of Autism (according to the CARS), or perhaps for the children with autism in this study, greater amounts of such behaviors should not be automatically interpreted as meaning the children are “less socialized” or less capable of *learning the skills measured on the Vineland.

Of particular interest was the weak relationship seen between the Maladaptive Behavior Rating on the Vineland and the CARS Rating score. Both of these scores had the same narrow range bands (1 to 3). According to this analysis, the maladaptive behaviors measured on the Vineland are likely different than the autistic-like behaviors with minimal relationships between the two.

Table 42
CARS and Vineland Correlations: Research Question 5

		CARS		Vineland			
		Total	Rating	Communi- cation	Daily Living	Sociali- zation	Adaptive Behavior Composite
CARS	Total Rating	-0.88					
Vineland	Communication	-0.82	0.76				
	Daily Living	-0.75	0.70	0.83			
	Socialization	-0.65	0.53	0.82	0.83		
	Adaptive Behavior Composite	-0.82	0.72	0.94	0.90	0.91	
	Maladaptive Behavior Rating	-0.41	0.19	0.51	0.54	0.59	0.58

Chapter 5

Summary and Discussion

In “The Second Generation of Research” (1997) Michael Guralnick advocated a new philosophical and methodological direction in early childhood intervention research. As opposed to a focus on what works and what doesn’t, he advocated examining “how much, of what intervention, works for what degree, for what type of child” (Guralnick, 1997). as well as “for what skill area, and at what time in their development” (Tsakiris, 2000). “Treatment Effectiveness in Preschool Autism” attempted to embrace this philosophy for the critical needs of ever increasing population of children with this pervasive developmental disorder in this decade. .

Executive Summary:

This study investigated the effects of the two leading treatment programs for preschoolers with autism on the affective variables considered to be core deficits of autism as defined in the DSM-IV-TR. Numerous studies by proponents of these treatment programs, as well as of newly developed programs, claim progress of clients within their protocols on multiple outcomes, but seldom on affective and/or social outcomes in isolation (Solomon et al., 2004). The results of this study have implications both for parents selecting treatment programs for their children and providers who design, research, and implement such programs that want to focus on skills for social relatedness.

Both the DIR and ABA treatment models have claimed effectiveness based on data showing skill increases, such as increased vocabulary and language usage, the ability

to follow directions, reduction in self-stimulation behaviors and finally, placement in regular as opposed to special education classes. But what about the core deficit of autism? What about the deficits in social interaction?

Looking at progress in relation to the core deficit ultimately should encompass both quantitative measures of social skills and qualitative measures of relationship development as operationalized in the fields of education, psychology, and psychiatry—regardless of verbal ability or intelligence level.

This study examined the core deficit of autism with outcome measures that looked at social relatedness outside of the variables of IQ or verbal ability. None of the instruments selected in this study required verbal language of the participants in effort to isolate affective from other variables. The term affective variables was utilized to capture the DSM's definition of the core deficits in social relating more comprehensively. Prior to this research, no studies had been conducted that compared ABA and DIR treatment models with systematic data based measures of social interaction in isolation of other post treatment variables.

This study incorporated an original and unique methodology that included the following:

1. Random sample -28 diagnosed youngsters with autism who had received 20-30 hours of treatment per week between the ages of 2 and 4.
2. Retrospective Design- Record reviews and parent interviews were combined to determine individual child characteristics pre-treatment with current samples of

social interaction with family members.

3. Filming in the Natural Environment- Children were filmed in “real time” with their families (6 films each) as opposed to an artificial laboratory/clinical setting

4. Multiple Outcome Measures Across Disciplines- Both behavioral and qualitative psychiatric constructs of social interaction were measured with standardized, quantitative, and qualitative instruments, which were also analyzed for construct validity.

4. Blind scoring teams - Psychiatrists, social workers, speech pathologists, and interns were utilized and trained for reliability of scoring

5. Complex Data Analysis- ANCOVAS and Johnson-Neiman analysis to examine levels of pre-treatment child characteristic covariates.

When it comes to social interaction outcomes for preschoolers with autism, it was the type of child (i.e., child characteristic covariates)—not the treatment—that determined which group scored most favorably on the outcome measures in this research, as opposed to the treatment program in and of itself. Better outcomes on the measures of social interaction were associated for youngsters in the DIR group who were older than 30 months of age when they started treatment, who demonstrated echolalia, who were able to pull others to get what they wanted, and who were able to use more than 25 words when they started treatment. Better outcomes in social interaction on the instruments were associated across both treatment groups for children who able to pull others to get what they wanted when they started treatment.

Other results of interest included the following

1. Within the outcome measures themselves, the number of Child Initiations was consistently associated with progress in social relatedness in contrast to the number of Child Responses on both qualitative and quantitative measures.
2. Furthermore, other than a few subscales in symbolic play, play scale measures used in this study did not consistently correlate with high scores on the other affective variable measures, suggesting that the presence of symbolic play skills may not necessarily be consistently associated with social engagement /relatedness, although treatment goals work on this skill in a play context.
3. None of the children with autism in the study earned ratings of “conventional” communication post treatment in the areas of social interaction on the qualitative measure of communication competency. And none of the children in the study could engage in symbolic play at higher levels post treatment unless the parent initiated such interaction first. This held true even for the children who had made significant gains in the areas of social relating and affective variables based on the retrospective data.

Comparison with Related Research Studies

Szatmari, Bryson, Boyle, Streiner, and Duku (2003) have suggested that among children with autism, “optimal” outcome is not a unitary construct, and the explanatory power of pretreatment variables, while fairly good for communication skills, is much

weaker with regards to social skills, and extremely poor for autistic behavior symptoms. This study, however, did not look at treatment group interaction effects as a component of the explanatory power of the pre treatment variables, as was done in my study.

Current research (McConnell 2002; Stichter, Randolph, Gage, & Schmidt, 2007; White, Koenig, & Scahill, 2007) has attempted to examine this issue under the terms social skills or social competencies for current interventions in the field. This terminology is problematic, as social skills usually imply the presence of expressive verbal language to demonstrate such skill. While there are treatment programs that do operationalize social skills to include nonverbal/gestural/gaze components, as well as those that look at relationship development (Gutstein, 2000; Rogers, 2000) in broader terms, there are still no treatment comparison studies, even within these expanded definitions. Complicating matters is the lack of quantitative metrics to evaluate treatment effectiveness (Bellini et al., 2007) that have concurrent validity for outcome measures purported to measure “social skills.” Most programs operationalize this term so researchers rely on the conclusions drawn by the studies’ authors (who generally design the treatments) to determine treatment effectiveness versus using a measure commonly agreed upon in the field. Furthermore, when only qualitative review is utilized, it is difficult, if not impossible, to determine the setting, participants, and procedural features that led to the best outcomes in relating socially, thus limiting relative comparisons across different treatment programs.

In 2001 Bruce Wampold examined the issue of therapy effectiveness in general for a wide variety of mental health disorders. His research concluded that the interpersonal qualities/characteristics of the therapist was the critical variable associated

with treatment success, as opposed to the treatment programs themselves. While research in autism has looked at therapist training levels, it has not yet examined the characteristics of treatment providers as a variable which might impact treatment outcomes. Certainly in regards to skills in social relatedness, the issue of whether or not a therapist has unique/exceptional relationship abilities for working with children with autism must be accounted for. The issue is more cogent given the limited competencies of children within the area of affect and relationship skills.

Discussion of Covariates

This discussion section will first examine the covariate analyses in depth. This will be followed by the correlations of the outcome measures to look at construct validity for the treatment groups. Post-treatment scores on the Functional Communication Matrix will then be examined. Finally, a supplementary analysis between the Childhood Autism Rating Scale and Vineland Adaptive Behavior Scales will follow the discussion.

Average Level of Communication and Age at Treatment Initiation

Analyses accounting for the combined covariates of Ages at Treatment Initiation and the Average Level of Communication mastered indicated that a treatment differential was present for all DIR scoring groups on the Natural Language Training Form outcome measures for Child Initiations. No differential treatment effect was present for Child Responses. In addition, a differential treatment effect was also present for all DIR scoring groups on the FEAS. No effects on the POS scale were seen for the combined covariates with the exception of the Symbolic Play Substitute Scale C2 for the highest

scoring DIR groups. Further Johnson-Neiman analysis showed an interaction effect in particular for children older than 36-39 months of age in the DIR treatment group on selected scales of each major affective outcome measures in the study. This suggests that children who started treatment when they were older than age three had better scores on affective outcome measures if they were in the DIR treatment. While this may seem to contradict the widely held belief supporting starting treatment for autism earlier than later, a more critical look is warranted.

No existing literature compares treatments in regards to their effectiveness while accounting for age. It would not be ethical to assign children to control groups not receiving treatment in a true experimental design. Rather, the literature looking at the age differential in intensive treatment has generally compared youngsters who were in specific treatment programs or a wide range of treatment programs with children who were not enrolled in any treatment program (Corsello, 1992, 2005; Harris & Handelman, 2000; Lovaas, 1987; Scheinkopf & Siegal, 1998). These studies generally compared youngsters who were younger or older than ages four and/or five. Measures of post-treatment effectiveness included school placement (special education and regular education) at school age or else a multitude of other language, achievement, and behavioral variables. None of these studies isolated the core symptoms of autism in social relatedness as an indication of success.

One study that did compare children younger than 3 years with those older than 3 did not find age differences in improvement (Luiselli, Cannon, Ellis, & Sisson, 2000), suggesting that age four may still be young enough to lead to significant gains.

The results of the age differential in the present study lend support to the M.I.N.D.

Institute of Davis, California, research that suggests later intervention in the preschool years is not necessarily less effective than early intervention (Rogers, 2007), at least in regards to affective variables and social relatedness. The results of this study imply that for youngsters starting treatment at age three or older, the DIR program may lead to greater improvement in many affective outcomes associated with social relationships (initiating interaction, symbolic play, and reciprocal interaction). The fact that a child might be older than age three when diagnosed with autism does not mean such children are untreatable, nor that their prognosis is necessarily worse than that of other children when it comes to affective development. Future research should consider addressing the age differential over time with check points during treatment and comparisons to baseline levels to determine at the “rate and amount” of learning that has occurred in regards to social relatedness.

The Average Level of Communication refers to a level of communication competency. It is important to note that these levels may or may not include the presence of verbal language, and are not based on a hierarchical rating system with one being higher than the other. Rather, competencies in the functions of communication—refusing, requesting, getting information, and obtaining social interaction—are determined regardless if demonstrated verbally, nonverbally, with pictures, or body movements, etc. A child could be at various levels for different functions. For example, a child may be able to request what he or she wants using language at a Conventional Level, but may only be able to initiate social interaction at an Unconventional Level nonverbally. Each function is placed on a level and assigned numerical value to compute the average competency score for each child.

The favoring of the DIR group for the combined covariates may be related to the fact that during the mid-1990s when the youngsters in this study were in treatment in the ABA group, functional communication skills were not emphasized or taught. Rather, prompts to get motor and vocal imitation were emphasized, followed by words, phrases, sentences in a traditional developmental linguistic sequence. Such sequences were taught as imitation, not as communication. A 2007 study by Szatmari also found that treatments that focused on language linguistics alone may not have a significant impact on social skills in youngsters.

Today, ABA programs in general have broadened their skill curriculum to include these functions across levels, as well as incorporate the use of nonverbal and picture communication and signing to demonstrate skill competency (Michaels, 1993; Schreibman & Ingersoll, 2005).

The DIR treatment from its inception viewed communication from both a verbal and nonverbal perspective, with treatment goals that emphasized striving for reciprocal interaction regardless of the output form the child used. For example, the simple act of a child shaking head could be viewed as the communicative function of Seeking Information or Trying to Obtain Social Interaction. Treatment focused on increasing this behavior, as opposed to necessarily shaping it into a more “appropriate” or conventional action. The treatment differential observed in this study may be accounted for by the specific DIR treatment strategies this group of youngsters underwent, in contrast to the ABA group, where instruction on the “how to” communicate was the treatment focus. There is a need to look at communication competency as a covariate for children with autism who are enrolled in current state-of-the art ABA programs, especially Verbal

Behavior Analysis (Partington & Sundberg, 1998) and Pivotal Response Training (Koegel & Koegel, 1995) to determine if a treatment program difference accounting for this covariate would continue to be found.

No comparison treatment studies look at levels of communication competency as treatment predictors. However, studies do exist where the treatment utilized involved an emphasis on interactive nonverbal and verbal sequences where the child's behaviors were treated as communicative and then expanded—similar to the DIR model. These studies took baseline data using a variety of scales (Keen, Sigafos, & Woodyatt, 2001; Temple, 2007) to determine the form, content, and functions of pre-treatment communication and then compared this base-line data with post-treatment measures of social interaction. Higher scores in communication initiation and parent-child interaction post-treatment were seen compared to non treatment groups.

The use of Functional Communication scales as pre-treatment indicators (irrespective of treatment) that predict social competence outcomes is supported in the literature. Luyster, Shanping, Lopez, and Lord (2007) used the MacArthur-Bates Communicative Inventory to show that pre-speech sounds and/or nonverbal gestures at ages 2-3 predicted outcomes at age nine for a sample of 62 children diagnosed with autism, regardless of the treatment program. In another study (Drew, Baird, Taylor, Milne, & Charman, 2007) that used the Social Communication Assessment for Toddlers with Autism (SCATA,) the form, function, and complexity of communicative acts (verbal or nonverbal) better predicted association with child initiations versus child responses. This is consistent with this study, as results consistently showed higher scores in child initiations over child responses on the Natural Language Scale.

Other Language and Communication Covariables

How a child with autism communicates with vocalizations or words (in contrast to the function of their communication described previously) is a critical component to affective development. The population of the world at large responds to what they hear/and interpret as a demonstration of affect and social relatedness. Thus, the degree to which such vocalizations/verbalizations are closer to the norm influences how others perceive the degree of affect a child with autism demonstrates at face validity. Echolalia in autism differs from the norm in the degree, intensity, and duration/course over development.

When Demonstration of Echolalia pre-treatment was accounted for, children in the DIR treatment group did better on the NLT Child Initiations and FEAS Total and Rating Scores when echolalia was present. The result is more robust because it was seen for both the high and low scoring groups on both outcome measures. In contrast, the Demonstration of Echolalia did not account for outcome measure performance on the Play Observation Scales.

Early ABA programs focused on echolalia as a behavior to be decreased/eliminated, as did many in the field of speech pathology who viewed it aberrance and not in the normal trajectory of language development. Barry Prizant's research from 1981 to 1984 was the first to provide conclusive data that the Demonstration of Echolalia was indeed how many children and adults maintained social interaction skills in the absence of language-based conversation ability. His echolalic sample data indicated that immediate and delayed echolalia could be validly interpreted as conversational and reciprocal—i.e. fitting aspects of the normal trajectory of language/communication

development /skill, but being very different from the norm. A study by Maria Rhode of London (1999) looked at affective variables more specifically with three 6-8-year-old boys and postulated from her findings that the repetition of words implied many nuances of emotional relationship that ranged from simple assertion of identity with another to genuine internalization of emotional experience. Several current research studies (Sullivan, 2003) have replicated these findings and extended them into treatment strategies that both DIR and ABA treatment programs incorporate within their philosophies.

This research supports the findings of Dobson, Perkins, and Boucher (2003) that echolalia might actually be a predictor of treatment success in affective and social relatedness as well as a stepping stone into verbal language acquisition. More recent adaptation of ABA programs (Michaels, 1988, 1993) has integrated these research findings by “shaping” echolalia into more traditional forms of communication (verbally and nonverbally). The children participating in this study did not have the advantage of this proactive strategy, and this may account for the treatment group differential favoring the DIR model.

At the same time, echolalia has also been documented in the literature as interfering with symbolic language and play, and only “semi-communicative” in nature, with a more “situation association” interaction function (Schuler, 2003; Sullivan, 2003). Schuler’s research in particular notes that symbolic play was absent in her case studies of children using echolalia before intervention. This study found a similar result where scores on the Play Observation scale were not predicted, regardless of treatment group membership, when Demonstration of Echolalia pre-treatment was accounted for. .

Stone and Yoder (2001) define verbal language as the “culturally defined code whereby ideas about the world are conveyed.... there is consensus that spoken language is most widely understood modality of communication.” Use of Words and Sentences as a covariate represents the more conventional usages of verbal language outside of the echolalia form. However, it did not exclude Demonstration of Echolalia, and thus many of the subjects indeed demonstrated both co variables pre-treatment based on parent reports and record reviews.

The Use of Words/Sentences covariate accounted for a treatment group effect in favor of DIR when a youngster was speaking with more than 25 single words, two-word combinations, or simple sentences—but not when a child was nonverbal or using less than 25 words. This was present for the highest scoring DIR sample in the NLT Child Initiations, and for both high and low scoring groups on both the total FEAS and FEAS Rating scores. The presence of these same skill levels resulted in better outcomes on the Play Observation Scale Symbolic Play Substitute scores in C2, where the parent interacted with the child during play. In contrast to the Demonstration of Echolalia, the pre-treatment Use of Words/Sentences did account for symbolic play ability in this study for children in the DIR treatment group, but only in the subtest where the adult interacted with the child in play, consistent with the 2003 research of Shuler and Sullivan described previously.

Results of other studies using expressive language as predictors of treatment outcome in general are not consistent, and are hampered by a lack of consensus in how the construct should be measured (i.e., parent report, observation, etc.) and at what age. This study compiled parent interview and record review information to estimate the Use

of Words/Sentences prior to treatment when the youngsters were between the ages of 18 months and 4 years old.

There is some indication that expressive language levels at age two for children with autism are not as predicative of treatment outcome as those at the ages of three or five (Gilberg, 2008; Charman et al., 2006) A recent study replicated these findings using aggregate measures of pre-treatment expressive language levels that combined both parent report, observations across settings, and standardized assessment within a true experimental design in a clinical population (Gabriels, Hill, Pierce, Rogers, & Werner, 2009).

The Ability to pull others to get needs met. - A motor planning skill

One of the more puzzling characteristics of children with autism is that they will often pull others to get something they want as opposed to getting it for themselves. While this behavior is no doubt communicative in intent, why a youngster would “use” someone to get what they want when grabbing it for themselves seems so much easier and immediately gratifying may be more significant than meets the eye.

Twelve of the children in this study who were unable to point or imitate simple motor movements were able to pull others to get what they wanted. This is consistent with current research which now indicates that the very ability to organize the hand and fingers to reach and then to grasp objects with respect to size and distance is impaired at an early age, as is the ability to manipulate the hands and fingers into a point (Mari, Castiello, Marks, Marraffa, & Prior, 2003; Huges, 1996; Masterson & Biedeman, 1983) for children with autism.

A correlation with the ability to initiate joint attention with pointing at an early age with social competence at 30 months has been suggested (VanHecke, 2009). More definitive research now indicates that the development of such joint attention skills is a pivotal and prerequisite foundation for future language and social relatedness for children with autism (Dawson et al., 2005, Stone and Yoder, 2001; Wetherby, Watt, & Morgan, 2007) as are motor imitation skills (McDuffie, Turner, Stone, Yoder, Wolery, & Ulam, 2009; Landa, 2007). The physical ability to integrate vision and motor skills to reach and adjust the fingers to grasp is the logical prerequisite for motor imitation.

As only eight of the children in this study demonstrated pointing or motor imitation skills prior to treatment, the Ability to Pull Others to get what one wants could be the “best alternative” a child with autism may have to interact with his world if their hands/fingers are not able to do so efficiently and effectively. It is surprising that no current studies look at this covariate as a predictor of treatment outcome, despite the fact that it is commonly noted in the literature, parent reports, and case studies.

The low scoring samples of children in the DIR treatment group scored higher on the Child Initiations of the NLT, the FEAS Total and Rating scores, and the POS Symbolic Play Substitute score when the presence of the Ability to Pull Others was accounted for. The symbolic play skill is consistent with research (Rogers & Pennington, 1991; Smith & Bryson, 1994) that indicates motor planning skills and the ability to physically access another person is a critical social-cognitive prerequisite for meaningful object play.

The covariate also accounted for better Child Response scores on the NLT in both the highest and lowest scoring groups, regardless of treatment group membership, but not

Child Initiations for the highest samples of either treatment group. Stone and Yoder (2008) also found that the ability to respond to bids of others is a more sensitive measure than the ability to initiate getting attention with others for children with autism at younger ages.

Overall, the results suggest that youngsters with autism who can pull others to get what they want may be able to respond better to social overtures of the adults who work with them, although not necessarily initiate more complex overtures themselves. This may be particularly true for children with autism who are not able to point or imitate simple motor movements and/or are nonverbal. Data review indicates five of the youngsters in this study who were able to pull others were indeed nonverbal.

Overall Cognitive Ability and the Number of Communication Functions Mastered

Only one child in the study (DIR treatment group) had an overall pre-treatment estimate of cognitive ability in the average range, and all others were equally divided between treatment groups to function at least 7 months to 2 years below age level. When accounting for the Overall Cognitive Ability estimate, a treatment effect for the DIR over the ABA treatment group was indicated for both the highest and lowest scores on the NLT Child Initiations scores, as well as the FEAS Total and Rating scores for both high and low scoring samples. No treatment effect or treatment group differential was present for any of the Play Observation Scale outcomes.

However, even though seven levels of cognitive ability estimates were defined in this covariate, Johnson-Nieman analysis did not find an interaction effect with the DIR treatment and any of the specific levels, making interpretation of these results more

difficult.

The research regarding cognitive ability as a predictor variable in autism is controversial. The most frequently cited issue is the difficulty of obtaining an estimate of intelligence score at early ages, particularly when the means to demonstrate intellectual ability—language and motor skills—are now known to be impacted by the disorder. A “pure” measure of intelligence that does not require such output in responding is not available. Indeed, 20 out of 28 participants in this study were unable to point (a typical response requirement in assessment) prior to beginning a treatment program. Gabriels and colleagues (2002) have proposed that one way to define early cognitive ability for children with autism would be to compare measures of specific task learning rates, which might help differentiate subgroups so that affective and social relatedness outcomes could be studied. Wetherby and Gaines (1987) have also suggested using a framework similar to Piaget’s theories to differentiate developmental stage differences in cognition.

No research studies look at only affective variables as a treatment outcome with autism when accounting only for cognitive levels. Rather, the studies that do exist account for multiple variables or regular education placement to describe “optimal outcome.” Numerous studies with this broader (albeit possibly more ambiguous) definitions of outcome do show cognitive level to have a significant effect (Fen et al., 1999; Gabriels, Hill, Pierce, Rogers, & Wehner, 2001). Far more studies exist regarding this covariate with ABA participants than other programs.

The most recent research with ABA participants (Ben-Itzhak & Zachor, 2007) divided 25 children into two groups based on IQ scores and noted that children with higher initial cognitive levels (but lower measured early social interaction deficits)

showed better acquisition of skill in receptive and expressive language and play. Both groups showed progress in receptive language skills, but only progress in play skills was significantly related to pre-intervention IQ scores. The study isolated several developmental outcome areas including social reciprocal interaction. Of interest in this study is that when both groups of youngsters were divided into those with poor social skills and with those with better social reciprocal skills at the outcome, both groups showed the same significant improvement in IQ scores (close to 16 points). Another 2-year control group study with an ABA experimental group found the impact of behavioral intervention was almost exclusively in children's cognitive and language abilities, and adaptive functioning. Less improvement in the joint attention or ritualistic behaviors was associated with social emotional competence in a school setting versus parent report. These studies suggest that pre-treatment cognitive levels for students in ABA treatment groups are not necessarily associated with progress on affective variables when these are isolated as an outcome measure.

Research also suggests cognitive ability estimates made at age 2 are not as predictive as those at age 3 (Charmon, Baron-Cohen, Swettenham, et al., 2003). Eighteen of the 28 children in this study were age 3 or above when treatment was initiated. In a study using generic/eclectic treatment groups, cognitive change over time sampling during treatment was also found to be more predictive of outcome than single pre-treatment scores (Charon et al., 2005; Gabriels et al., 2008). Finally, cognitive ability estimates combined with language ability have been found to be better predictors of general outcomes (Lord & Schopler, 1989) although still not specifically affective/social ones.

Several limitations were present in the current study when accounting for this variable. First, cognitive ability estimates were based on retrospective review of multiple sources (parent interview, test scores in record, pediatrician reports, etc.) that were compiled into a rating, as opposed to a standardized instrument that would ensure internal consistency and make valid comparison of scores possible. Second, we were unable to make a reasonable estimate of the overall cognitive ability for 7 of the 29 participants, even with the extensive information provided by parents and reports, which greatly reduces the power of this analysis. Finally, this study did not separate nonverbal and verbal cognitive ability, although estimates of both were often available. Recent studies suggest that making this distinction gives better predictive ability for improvement in bids for joint attention (an affective variable) and social improvement. (Bone, Daley, & Sigman, 2004; Carman et al. 2006; Charman et al., 2005; Fein, 1990). Szatmari and colleagues (2003) concluded that, surprisingly, nonverbal skills do predict outcome in symptoms of autism among children with PDD in general, and among those with higher functioning autism or Asperger's disorder in particular. These populations tend to have intact expressive language abilities. Despite the fact that that language and nonverbal skills are highly correlated, the predictive ability was independent of the variance shared by each factor in Szatmari's 2003 study.

It will be important that future research determines better ways to assess specific qualitative cognitive differences among children, not only for purposes of determining subgroups and predicting outcomes, but also so that other treatment outcome variables—such as the affective ones in this study—can be compared by these subgroups as well (Gabriels et al., 2008).

The Number of Communications Mastered refers to the four functions of requesting, obtaining, informing, and initiating social interaction across all seven levels of communication defined previously in Research Question 4 in Chapter 4. Mastery of function means a child was competent with that function across all seven levels of communication and demonstrated this competency across all environments. The average mastery level of all the participants was 50%, with scores evenly distributed across both treatment groups. No treatment group differences were present for the NLT Child Initiations and Responses accounting for this covariate. However, the DIR group was favored for both the highest and lowest scores on the FEAS Total and Rating Scores when the Number of Communication Functions Mastered was accounted for.

It was expected, however that this treatment differential would be seen in both the FEAS and NLT, given the consistency seen between these outcome measures with other covariates, as well as the fact that NLT specifically measures Child Initiations, one of the communication functions. Inspection of the data indicated that none of the participants mastered all of the functions at the Conventional Level, even those with the highest average number of functions mastered. It is possible that since the function of initiation was not expressed in a socially conventional format, the raters may not have rated it as such. In contrast to the NLT, the FEAS also allows for more subjective rater interpretation of behaviors as “relational” or “engaged,” without categorizing them into communicative functions.

In contrast, the Number of Communication Functions Mastered did predict scores irrespective of treatment group membership on the POS Sensory Play Level and Total Play Level where the child played alone (C1) without any parent interactions, and the

burden to engage the parent was on the child. One possible explanation for this finding may be that in this subtest, there was no demand for Child Responses (as in the NLT) or consistent adult interaction that would facilitate more Child Initiations. This resulted in an inverse relationship—high levels of sensory play may have been seen because a child demonstrated few communicative functions across levels as there was no “press” on the child to respond or initiate to require the child do so in the C1 condition.

Critical Functions and Levels of Social Interaction on the Communication Matrix

One of the most interesting findings in the study was that while all of the participants in the study made gains in the numbers of communication functions they mastered regardless of treatment, none of the participants mastered the function of Social Interaction at the critical Conventional Level 4, despite the years of intensive treatment. Even though many children had mastered Level 7 to speak in fluent sentences, none were using the conventional norms/behaviors that augment communication for social purposes across all functions. The Conventional Level of communication is the common use of nonverbal, tonal, facial expressions, etc. that are recognized across society. Indeed, only 26% of the children in the study had mastered two of the four functions, regardless of treatment group membership. While this was an increase from the 3% at this level before treatment, it was expected that more children would have mastered more functions in the conventional level given the other favorable scores on the affective variable outcome measures in this study, even when the small sample size is taken into consideration. Clark McKown (2007) studied measures of social-emotional cognition for children with autism, and found that the magnitude of the relationship between social emotional cognition and

social functioning was only modest. Certainly a lack of mastery of the Conventional Means of Social Interaction communication for all of the children in this study (even those with positive outcomes on the other affective measure.) would negatively impact social functioning, regardless of which intervention the children had received.

In looking at the function of Social Interaction across all levels of communication, no treatment group differences were found. However, when the Ability to Pull Others was accounted for, there was a relationship between post-treatment levels of Social Interaction functions that were mastered across groups. The relationship occurred for Levels 5 through 7, which involved the use of concrete (picture) symbols, abstract symbols, and language—but, again, not the critical Conventional Level 4. The Ability to Pull Others is not always considered a conventional level of communication, as one would not expect a child to use it if he or she had sufficient language skills. The participants in the study who had the ability to communicate in language or symbols were also demonstrating this nonverbal communication skill simultaneously with spoken language post-treatment. It may be that no one was rated at Level IV because the Ability to Pull Others was perceived as conventional when a child was nonverbal, and unconventional if a child had fluent language. The variation in rater perception may unwittingly be a social validation for the fact that the ability to use spoken language alone does not make a child with autism more socially related in the way society at large might interpret social relatedness.

The only association with ABA treatment in this study occurred when the Age at Treatment Initiation was accounted for with Social Interaction skills at Level 7 (use of language). At this level, membership in the ABA group was favored for children younger

than 38 months.

Although the outcome measure was different, the finding parallels this research finding that children older than 39 months in the DIR group were associated with higher Child Initiation scores on the NLT. A close review of these items on the films corroborates that the Child Initiations demonstrated would likely be scored on the Communication Matrix as a Social Interaction function.

Concurrent Validity among Outcome Measures

All of the outcome measures in this study purport to measure affective variables and/or social relatedness, and all did so within the format of play interactions between the child and his caregiver/parent. The Play Observation Scale expanded the outcomes to identify levels of play (sensory symbolic agent, symbolic) in which social interaction did/did not occur.

Research on social skill interventions in autism (McConnell, 2002) have commented on the lack of multiple measures of the same outcome in many of the studies, and the need to effectively use both qualitative and quantitative measures. The overall significant, but moderate, correlations between the FEAS and NLT Child Initiations outcome measures for the combined treatment groups suggests these two measures have potential for use in future studies that seek to broaden the perspective of measuring social relatedness in a more “aggregate” manner. This study’s use of raters who were blind to the treatment group membership and trained for interrater reliability with periodic checks also ensured against the bias that has been noted to be a problem in many autism studies over the past decade (Wolery & Garfinkle, 2002).

When the treatment groups were separated however, the DIR group demonstrated stronger correlations with both measures for both high and low scoring samples, while the ABA correlations dropped to the moderate for the highest scores and to the weak level for the lowest score samples. As the FEAS was developed by Dr. Stanley Greenspan and colleagues, the founders of the DIR treatment program, a strong bias potential towards the DIR group is inherent. Because the goals of DIR treatment are specifically those skills that are measured on the FEAS, the DIR program could be said to “teach to the test.” In contrast, the ABA treatment goals are based on numerous lists of skills that are not the same as the criteria used in scoring the FEAS. A closer look at the data indicates that only 68% of the variance on the FEAS for the ABA group can be explained by true score differences, in contrast to 87% for the DIR group. The FEAS likely measures a different behavior/construct for the ABA group than it does for the DIR group. Although ABA proponents claim their treatment program increases social relatedness and interaction, the DIR model (and therefore FEAS outcome measure) definition of social relatedness is likely operationally different than the ABA one.

In contrast the NLT Child Initiations and Child Responses outcomes are defined behavioral indices that were developed by a professional with no allegiance to any treatment program. This lack of bias contributed to adequate and similar variance levels that explained the score differences for each treatment group on the NLT.

The minimal correlation between the NLT Child Responses score and the FEAS outcomes (in contrast to the Child Initiations) for the combined and individual; treatment groups is consistent with research by Drew, Baird, Taylor, Milne and Chairman (2007) that used the Social Communication Assessment for Toddlers with Autism (SCATA) to

show that the complexity of communicative acts (verbal or nonverbal) better predicted association with child initiations versus child responses.

Minimal relationships were also present between the NLT outcome measures and the C1 segment of the Play Observation Scale for the combined groups and the ABA group. As the C1 segment involves no bids for interaction from the parent unless the child initiates them, the lack of correlation between Child Initiations and play levels is consistent with Dr. Ozonoff's 1994 research indicating that children with autism do not show their highest levels of play when they are playing by themselves. In contrast, when parents played with their children in the POS C2 segment, significant correlations, albeit in the moderate range, were seen with the NLT Child Initiations scores and higher level symbolic play skills (Symbolic Play Substitute and Symbolic Play Complexity) as well as the Social Communication Total Score for both high and low scoring samples of the combined groups. No significant correlations were evident between the Sensory Motor and Symbolic Play Agent Levels as well as the NLT Child Initiation scores for the combined or separate treatment groups.

The Symbolic Play Substitute Level involves the child using an object to represent something that it is not (i.e., a red wood block to be a hot dog to eat) or use an imaginary object (i.e. pretend be holding and waving a wand with nothing in one's hand). Every child in the study who reached this level did so only in the C2 segment, and only when the skill was first modeled by a parent. In none of the films did the child initiate the Symbolic Play Substitute skill before parent had done so first. Rather, the children would first respond to the parent's play bid at this level symbolically, and then initiate the next play bid to the parent within the Symbolic Play Substitute Level. This symbolic level of

play may lend itself to more social interaction as it usually involves giving the representational object (or imaginary) to or within interaction with another person. Symbolic play is not as easily observed (as it must be more inferred for youngsters without language) as often in solitary play—the POS C1 segment—and it may well have not occurred because a parent could not initiate the start of the sequence in the C1 segment.

The results suggest that the children with autism may be able to engage in symbolic play at a higher level when their parents initiate this level of play first so the child can respond to or imitate the bid, regardless of treatment group membership. On these outcome measures, there may also be an association between symbolic play skills and the ability of the child to initiate interactions. This has implications for treatment programs, as it may not be possible to determine if a child with autism has higher level symbolic play skills if the child does not have the skill of initiating interactions—both verbally and nonverbally. While it is not clear if there is a causal relationship between these two skills, the possibility that more proficiency in one of these areas could be a catalyst or a foundation to support skills in the other should be explored.

When the relationship between the POS and the FEAS was analyzed, moderate correlations were seen for the combined groups in the same play levels noted above, but minimal relationships were present for the ABA groups between both C1 and C2 outcome measures and the FEAS. The moderate to strong correlations between the POS Symbolic Play Substitute and Substitute complexity scores were present for both the high and low DIR group score samples, as well as the Total Play Level. The FEAS uses symbolic play skills as part of its scoring criteria, and children earn higher total as well as

rating scores based on their ability to be symbolic. Once again, the DIR treatment's thrust to teaching and interacting in the context of symbolic play as a means of social relatedness likely accounts for the correlation of these instruments for the DIR group members as opposed to the ABA participants.

However, as all eight levels of play in the POS were engaged in by parents in the test administration, one would have expected other levels of play to have correlations with the NLT and FEAS for at least the DIR group—not just the higher level symbolic play substitute ones. It may be that the levels and corresponding examples of “symbolic” play as defined by the POS (as well as the DIR treatment model) are different than constructs offered by other theorists or instruments in the field of child development. The difference between being play being “abstract” and/or “symbolic” as well as whether or not pre-requisite cognitive abilities are required to achieve various levels of play skills is not clearly defined in the child development literature. If a lack of symbolic play is one of the diagnostic criteria for autism, then it is important specialists in child development define a universally agreed upon construct of symbolic/abstract play and its corresponding levels for future research in treatment effectiveness as well as autism diagnoses.

Problematic, however, was the fact that when the FEAS was examined for reliability, neither the ABA, DIR, nor combined groups had coefficients greater than .49. When the Total FEAS score was removed however, the Total Rating score had coefficients above .90.

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Supplementary Analysis

The strong correlations between the CARS and Vineland Adaptive Behavior Scales continue to indicate that high total scores of autistic behavior are associated with adaptive skill functioning, regardless of a youngster's language or cognitive skills. A review of raw data shows that many youngsters who were indeed verbally fluent with at least average estimates of cognition and scored high on the CARS (for levels of autism) also earned lower scores on the Adaptive Behavior Scale domains of Communication, Daily Living, and Socialization, as well as Adaptive Behavior. However, no significant correlation was present between the CARS test results and the Adaptive Behavior Rating, as one might have expected. It is possible that maladaptive behaviors scored on the Vineland are not necessarily the maladaptive behaviors that are often associated with autism.

Implications of Findings

When it comes to social interaction outcomes for preschoolers with autism, it was the type of child (i.e., child characteristic covariates)—not the treatment—that determined which group scored most favorably on the outcome measures in this research. Children in this sample who were older than 30 months when they started treatment, demonstrated echolalia, and had the ability to pull others had better affective and social interaction skills outcomes on the measures in this study when they were enrolled in the DIR treatment. The ability to use more than 25 words, as well as estimates of cognitive ability also was associated with better outcomes for the DIR group.

This research opens up the door to hypothesize that “social relatedness” may not

necessarily be synonymous with “conventional” forms of social interaction both verbally and nonverbally with regard to children with autism. It also leads to questions as to the nature of the relationship of symbolic play and social relatedness if they are dependent on parent initiation. This certainly fits with the changing perspectives since the 1990s where the focus was on “curing” autism (Sigman, Spence, & Wang, 2006). Current research now suggests that reducing or modifying symptomatology is a more appropriate goal of intervention, while leaving room to respect individual differences in the “unconventional” nature of relationship style and communication, and perhaps the “how to” of play. Indeed, many adults with autism insist that while their relationship style and communication is unconventional, they do indeed relate socially—they just do it differently (Sinclair, 2007) and may have more circumscribed as well as unique areas of interest and talent that warrant respect as “strength based” for research purposes that are the subject of current research at the National Institutes of Health (2008).

Rutter (1996), a leading researcher in the field, stated that research in general, and in autism in particular, is a process of problem solving, and not, “the mere provision of a set of factual answers.” If, despite improvement, social relatedness was still rated as unconventional in this study, it is worth asking whether the type of skill and trajectory for development of social relatedness for children with autism might also not be conventional. That is, if a child does not use echolalia, or does not pull people to get what he or she wants, is it possible that these are foundational skills that need to be taught before social relatedness can improve—even if these skills are not conventional?

The idea that development for children with autism occurs on a trajectory very different than for typical children is now supported by research in the speech/language

field, with a corresponding philosophy that “forcing” a child to reach normal developmental milestones in the trajectory associated with typical peers may not facilitate optimal or appropriate progress.

In the spirit of research as problem solving, additional issues require examination. Would one treatment program be able to teach social and affective skills better on such a different developmental trajectory if specific foundations were lacking? Could or should such skills be taught differently within different treatment models? Or should one program be used, followed by another as children change in various skill areas ?

Certainly the treatment models studied have expanded their programs to incorporate more of each other’s strategies. The DIR model has added the Affect Based Language Curriculum (Lewis, 2003), which uses systemic instruction preceded and followed by Floortime play. The ABA models now incorporate Verbal Behavior Analysis (Partington & Sundburg 1998), which emphasizes relationships as the primary reinforcers while still separating learning tasks into discrete steps for mastery in the much broader array of language and learning skills. Other research in both behavioral and relationship interventions has determined some skills to be “pivotal” foundations in communication and social interaction, and adapted interventions strategies to emphasize them accordingly (Gutstein, 2001, Koegel, Carter, & Koegel, 2003, Wieder, 2001).

But in the “real time” in the world at large, parents and school systems are often faced with the choice of a “package” in the form of a “curriculum” that yields an approach to treatment that can be hit and miss with regard to social relatedness and affect, as well as other specific skills areas. Improvement in one area of functioning does not necessarily lead to improvement in another (Goldstein & Hockenburger, 1991), even

within the cross-modal developmental effect of early childhood interventions that makes intervention as a whole better than no intervention.. While one might argue for a more eclectic approach that pulls from the best of numerous strategies, this also has risks.. Eclectic approaches can compromise treatment fidelity and expertise. Multi-treatment programs can then become a matter of “pot luck” in regards to skill expertise. Most treatment specialists, teachers, etc. receive intensive training to become proficient in one approach, as opposed to multiple ones. An eclectic approach, if not expertly supervised, could lead service providers to become “jack of all trades and master of none,” compromising treatment fidelity and the effectiveness of strategies, no matter which intervention model they are derived from.

The problem-solving process must continue to maintain a focus on individual child characteristics in autism research, yet not discriminate in regards to language or cognitive abilities when it comes to looking at the core deficit. This study’s use of the broad sample of the true range of characteristics with autism, despite the small sample size, will hopefully contribute to generalization of results across the population of children with autism. At the same time, the emergence of subgroups of children with autism makes it critical to determine intervention efficacy more specifically. These may emerge clearer and become better defined through the use of random samples of the broader range of children similar to those in this study. The importance of the use of echolalia may not have been determined as a possible indicator of treatment prognosis in this research with a more circumscribed sample.

There is a strong tendency in the field of autism to inadvertently practice discrimination against the so-called doubly vulnerable children (Guralnick, 1998; Rutter,

1999) with autism who are nonverbal, may have seizure disorders, dysmorphology, appear to have cognitive limitations, as well as other biological vulnerabilities. These select child characteristics are then viewed as evidence of poor outcomes within a selected intervention or are categorized as “responders”. Such terminology is in contrast to saying that the intervention was “ineffective” for that particular child, or that the child may need a different intervention. Once such children are determined to have poor outcomes, they are often eliminated from clinical samples, despite the fact the behavioral phenotype for the disorder is the same, and that the DSM does not differentiate the phenotype based on different etiologies. This practice is ironic, as the inclusion of these children in initial research studies has been largely responsible for identification of the predictor variables and intervention targets for the very youngsters who now have better outcomes. Indeed, in obtaining participants for this study, the leaders of each treatment group made efforts to refer children to the study with substantially stronger language skills, probably to promote these children as “successful” because of their respective treatments.

Often the implied assumption is that “nonresponders are destined to respond poorly to all treatments. This is simply not true (Ozonoff, Schere, & Scheibman, 2005). In this study, the four most challenged children did show progress in social interaction variables, even if it may not have been entirely related to treatment. To date, research effort in how and what to teach such children is limited in comparison to youngsters who have better prognostic indicators.

This discriminatory effect for more challenged youngsters must be averted. As the core deficit areas in autism are the same for all children with autism, research with the

most challenged youngsters offers the opportunity to precisely identify sub skills within deficit areas and develop detailed and more specific interventions to tackle them. We need to determine the obstacles to making such progress more efficient and effective for specific deficit areas by maintaining a focus on “what works for what child, for what skill, and to what degree.” The use of technology and augmentative communication is beginning to address these issues for nonverbal children (Black, 2008; Mirenda, 2001) as well as work on dyspraxia and motor planning (Gernsbacher & Goldsmith, 2003, Smith, 2002, Wieder, 2001) and the behavioral research of Tristin Smith (2002), Andrew Bondy (2001), and Vincent Carbonne (2001) The predictor variables identified in this study will help provide material for such work in the future.

Limitations of Study—Internal Validity

The retrospective design of this study could not rule out all rival variables that may have influenced treatment outcomes other than the ones accounted for, placing limits on its internal validity. A large database of more of the child pre-treatment characteristics has been assembled in this study (Appendix M) which researchers may want to take advantage of in the future. However, as this data has been gathered retrospectively from parent reports and records, it is not as valid as a true pre-post test experimental design where the pre-treatment data was obtained controlling for setting, instrumentation, and administration.

Social system variables as defined by Horowitz (1975) were not accounted for. These include socioeconomic variables of the families, respective communities of residence, parent educational and stress levels, number of siblings, other disorders in

family, as well as a host of setting variables with the potential to provide both risks and opportunities that could certainly have impacted the outcome measure results in this study. The sample also did not match the ethnic and racial characteristics of the population at large in the respective states they came from.

Both ABA and DIR treatment are complex and require specific and rapid discrimination by the adult delivering them. This leads to questions regarding whether the programs were administered with integrity and consistency, let alone with skill. This study did not control or account for treatment fidelity and integrity that may have occurred during the interventions. No information was collected regarding the training of staff who administered the interventions, the training of parents, and the qualifications of the individuals who trained the families to administer the respective strategies. Given the outcome variability in this study, intervention implementation could have accounted for outcome measure differences. This study is no exception to the lack of measures of treatment fidelity that seriously compromise the validity of autism intervention research in general (Wolery & Garfinkle, 2002).

Although every attempt was made to make subject selection as random as possible in each treatment group, the selection was done based on referrals from the respective treatment organizations. Although they were instructed to refer families based on treatment intensity and age at initiation (as opposed to current outcome status), a tendency to refer what the organizations perceived as their “best “ outcomes was seen, which makes the study vulnerable to a selection interactions. However, the random sampling did indeed represent the range of individual differences of children with autism for each treatment group, even for this small sample size.

Instrumentation effects were held to a minimum with the use of blind assessors who were trained by experts for rater reliability that was checked periodically according to the 2003 guidelines of the National Research Council. The filming sessions, however, were conducted at random times, within the wide variation of the home settings of the participants

Limitations of Study— External Validity

As the FEAS was designed by the DIR intervention founders, a strong bias effect likely influenced the scores on this instrument for this treatment group, as well as the stronger correlations for the DIR group with the other outcome measures. Of more importance, however, was the lack of internal consistency and appropriate level of variance of the FEAS with the ABA group. The FEAS may accurately measure affective variables and social relatedness for children in the DIR treatment, but something different for those enrolled in ABA—or the definitions of each might be defined differently within each intervention. The difference highlights the need for universal definitions of affective variables in outcome measures that are valid for any intervention.

The operational definitions of social relatedness and affective variables in this study were defined in the outcome measures based on the number of child initiations/responses, qualitative judgment of interactions during play, as well as the level of symbolic play skills during interaction sequences. Since the inception of this study, it has now become evident that the “qualitative impairment in social interaction” of autism involves a large number of cognitive, behavioral, and emotional processes must be integrated that will have varying operational definitions. The goal of intervention in this

deficit area, however, remains the same: to foster the long-term capacity of quality relationships with peers and adults.

Although both social behaviors and the quality of relationships are required for social relating, differentiation between social behaviors and the quality of relationships is important and would have facilitated generalization of the results as well as replication efforts. The lack of strong correlations between the outcome measures, particularly for the ABA group, may reflect this lack of differentiation. In hindsight, the validity of the construct of social relatedness may have been better measured by separating these definitions as opposed to putting them under one umbrella. Child Initiations and Child Responses as measured in the NLT area would be considered social behavior and perhaps an index of engagement. In contrast, the FEAS measures relationship quality including engagement and extends into a wider range of complex interactions with a variety of emotional states. In the Play Observation scale subtests, play itself could be viewed as a social behavior, although the quality of the relationship between those playing impacts the play scores, as does the amount of initiative behavior the child engages in. At the present time, there are more valid measures for assessing the presence of social interaction behaviors than relationship quality, although promising efforts are in development (Rogers, 2000).

Despite the representative nature of the sample, the small sample size greatly limits the statistical power of the results, as well as the ability to generalize them to specific subgroups and the population of children with autism at large. This study included a large descriptive bank of the pre-treatment characteristics of the children, their interventions, medical profiles, as well as ancillary service history that can be used for

future research that has not been as extensive in previous studies, and is now considered essential. Homogeneity in any one these areas (i.e., age at onset, sex, etc.) would have enabled more explanatory power for the public at large. Replication of this study with a larger sample size is necessary to tease out the complex interactions of the characteristics of children with autism, their subtypes, and the interaction with interventions that target the deficit area of social relating.

The lack of a control group also limits generalization of these results. An attempt to secure such a group with local public school systems who were not using the 20-hour-week intensity model of the interventions studied was not successful. This was due to the political ramifications if children in the treatment groups made substantially more improvement than those in the public school. The use of a control group would have enabled more generalization of the results to the population of children with autism at large, as it would have provided information regarding progress in social relatedness outside of the intensive interventions. This information would help determine more conclusively if the child characteristics accounted for improved affective variables as a result of the DIR treatment, or a result of other factors such as development and maturation or even traditional special education.

Finally, it is important to remember that these results for preschoolers do not imply sustained improvement in social relatedness and affect for individuals with autism through school age and adolescence, let alone for a lifetime. They also do not imply improved social relatedness with peers or adults other than their parents/caregivers, or even other settings than the homes in which these skills were measured. As the home and the family provide the foundation of the primary relationship for almost all children, the

results do suggest that intervention in social relatedness can improve outcomes for certain children where it is most critical.

Future Directions

In addition to the implications for research efforts noted above, it will be important to look at a more recent cohort of children who have received Verbal Behavior Analysis, an expanded and more defined model of Applied Behavior Analysis, to determine if a treatment effect is present in regards to affect variables on the outcome measures in this study. Separating children into subgroups based on the predictor variable characteristics in future studies should be considered to “fine tune” intervention strategies based on child characteristics (as opposed to only treatment philosophy), as well as to provide information of how to intervene with children who seem to reach a plateau in their level of social relatedness within different intervention models.

A critical element to address in future research would be the use of multiple comparisons across time where intervention outcomes are measured to determine if there are critical points in skill development, age, or skill trajectory that influence social relatedness within or between groups and treatments. Finally, for improvement in social interaction to be socially valid and truly benefit children with autism, it must generalize across people and settings. Future research needs to incorporate comparison of outcomes across a variety of settings (home, school, and playground) and with a variety of adults and peers for interventions to be truly meaningful.

The single most defining feature of autism is the qualitative impairment in social interaction. Despite decades of research, and identification of multiple subtypes and etiologies, this criterion has not changed since Kanner's original definition in 1943. Although improvement in social functioning is considered one of the most important intervention outcomes, efficient and effective measurement tools for assessing outcomes in this area in the natural environment and within natural interactions are lacking (Rogers, 2000). This research contributes to this much needed area with a large databank of child characteristics and a combination of both quantitative and qualitative outcome measures. Given the lack of intervention comparison studies in autism, this study adds important information to the field. This research is a part of the ongoing effort towards gaining a full understanding of the disorder and the interventions that impact its symptomatology. Understanding the interactions between multiple characteristics of children with autism, the components of social interaction with corresponding foundation/ pivot skills, as well as the trajectory of acquisition has become far more complex than researchers even a decade ago anticipated. Truly effective and enduring intervention strategies to improve this defining deficit across the lifespan for children with autism depend on increasing the comprehension of these processes and components.

Appendix A: Sample Lovaas Drill

DRILL FORMAT

NAME: Tell Me About...

PURPOSE OF DRILL: To elicit consecutive descriptive sentences about pictures in books, topics, or objects.

MATERIALS: Picture books, story books, toys, and photos of places and people.

Sd: "Tell me about _____."

RESPONSE: Two or more sentences describing the stimuli presented.

PROMPTS: Verbal (begin the sentence), model, pointing

PREREQUISITE SKILLS: Child uses sentence structure (2-3 words) to describe stimuli.

DIALOGUE:

INCREASING CRITERIA: Move toward descriptive language on a topic without visuals (e.g., "Tell me about school today").

NOTES:

The Functional Emotional Assessment Scale Administration and Scoring Form

Age: _____
Behaviors: **Child**
Name of Child: _____ Date of Testing: _____
Age of Child: _____
Person Playing With Child: Mother: ___ Father: ___
Caregiver: ___ Examiner: ___

General Scoring

- Scoring is on a two-point scale for most items, except where indicated, and is:
 - 0 = not at all or very brief
 - 1 = present some of time, observed several times
 - 2 = consistently present, observed many timesIndicate N/O for behaviors that are not observed.

Where indicated to convert a score, transform the scoring as follows:
0 becomes a 2
1 = 1
2 becomes a 0

Scores for symbolic play should be entered in the SYM column and scores for sensory play entered in the SENS column. When the examiner facilitates play with the child, enter scores in the EXAM column. The last column may be used for entering scores for additional caregivers (e.g., mother, father, foster parent, babysitter) observed playing with the child.

Scores are interpreted for the primary caregiver playing with the child for the symbolic and sensory play situations. If scores do not differ for symbolic and sensory play, then only one score is interpreted. However, if behaviors differ for the different play situations, then two scores are calculated, one for symbolic play, one for sensory play. These are interpreted using the cutoff scores presented in the profile form.

Age: _____

Child's Name: _____

Behaviors: **Child**

Key: SYM = Symbolic; SENS = Sensory; EXAM = Examiner

	SYM	SENS	EXAM
SELF-REGULATION AND INTEREST IN THE WORLD			
1. Is interested and attentive to play with toys.			
2. Explores objects freely without caution.			
3. Remains calm for play period with no signs of distress (crying or whining), showing appropriate frustration.			
4. Is comfortable touching textured toys and in being touched by caregiver.			
5. Shows happy, content affect. <i>Scoring:</i> 0 = flat, somber, or depressed affect. 1 = content but neutral. 2 = happy and content, robust smiles, warm and engaging affect.			
6. Remains focused on objects or caregiver without being distracted by sights or sounds. <i>Scoring:</i> 0 = distracted frequently; no focused play for more than a few seconds at a time. 1 = distracted some of the time with brief periods of focused play. 2 = remains focused in play most of the time with only brief distractibility.			
NOTE: SCORE ONLY ITEM 7 OR 8, WHICHEVER APPLIES.			
7. Underreactivity: Appears sluggish or withdrawn. <i>Scoring:</i> 0 = withdrawn, difficult to engage. 1 = sluggish or slow-paced in actions but can eventually be aroused or engaged. 2 = shows a bright, alert state with focused play throughout.			
8. Overreactivity: Appears overaroused by toys and environment. <i>Scoring:</i> 0 = very active, moves quickly from one toy to the next or wanders away from caregiver and toys constantly. 1 = moderately active, occasional bursts of changing activity quickly or wandering away, then settles into play with one toy for short period. 2 = well-modulated in pace and activity level, focusing on a toy or caregiver for long periods before changing activity.			
Total For Self-Regulation and Interest in the World			
FORMING RELATIONSHIPS, ATTACHMENT, AND ENGAGEMENT			
9. Shows emotional interest and connection with caregiver by vocalizing and smiling at her.			

Age: _____
 Behaviors: **Child**

Child's Name: _____

	SYM	SENS	EXAM
10. Evidences a relaxed sense of security and/or comfort when near caregiver. If child is active and moves away from caregiver, he references her from across space and shows relaxed security in distal space.			
11. Anticipates with curiosity or excitement when caregiver presents an interesting object or game.			
12. Displays signs of discomfort, displeasure, or sadness during interactive play if caregiver should become unresponsive or engage in anticontingent behaviors. - (If caregiver is responsive or contingent, note that this was not observed with "N/O," then assign 2 points.)			
13. Initiates physical closeness to caregiver but is not clingy; if child is active and moves away from caregiver, child maintains a visual or verbal connection with caregiver.			
14. Turns head away, averts gaze, moves away, or sits facing away from caregiver without social referencing caregiver. Appears indifferent, aloof, withdrawn, or avoidant of caregiver. Converted Score* Score of 0 converts to 2			
15. Social references caregiver while playing with toys.			
16. After moving away, communicates to caregiver from across space by looking, gestures, or vocalizations.			
Total for Forming Relationships, Attachment, and Engagement			
TWO-WAY, PURPOSEFUL COMMUNICATION			
17. Opens circles of communication: Initiates intentional actions with objects while also engaged in interactions with caregiver (i.e., manipulates object then looks at mother and smiles or vocalizes).			
18. Gives signals: Initiates purposeful and intentional actions in play with objects. Scoring: 0 = needs considerable help to get started in play or to engage in purposeful actions; no clear gestures or organized intent. 1 = initiates play but engages in stereotypic actions; i.e., lining toys up, mouthing toys for long periods of time, banging toys without engaging in any other actions with the same toy OR initiates play but actions appear aimless or disorganized. 2 = play shows intentionality and variety, engaging in two or more different behaviors with a given toy or activity. Gestures are specific and activity is functionally tied to objects.			

Age: _____
 Behaviors: **Child**

Child's Name: _____

	SYM	SENS	EXAM
19. Closes circles: Responds to caregiver's cues in contingent manner (i.e., mother offers toy, baby takes it and puts it in a container). <i>Scoring:</i> 0 = does not notice caregiver's response. 1 = notices caregiver's response and looks, but does not respond contingently through actions; instead does something that has nothing to do with what caregiver did (i.e., mother holds toy out for child; child looks at mother and toy, then returns to what he was doing before). 2 = notices caregiver's response, then responds contingently by elaborating on what caregiver did, by taking toy held by caregiver and examining it, by imitating her, or some other response that is clearly linked to what caregiver did.			
20. Uses language (e.g., sounds, words, and/or gestures) during interactions. Circle which ones were used.			
Total for Two-Way, Purposeful Communication			
BEHAVIORAL ORGANIZATION, PROBLEM-SOLVING, AND INTERNALIZATION (A Complex Sense of Self)			
21. Engages in complex patterns of communication stringing together several circles of communication with caregiver (initiated and elaborated on by child) using gestures, vocalizations, and/or words. <i>Scoring:</i> 0 = 0 to 2 circles. 1 = 3 to 5 circles. 2 = 6 or more circles.			
22. Imitates or copies something new that the caregiver introduces, then incorporates idea into play (i.e., caregiver feeds doll; child copies this).			
Total for Behavioral Organization, Problem-Solving, and Internalization			
REPRESENTATIONAL CAPACITY (Elaboration)			
23. Engages in symbolic play with the various toys or equipment (e.g., plays out cars racing), going beyond simple concrete actions (e.g., feeding self with cup).			
24. Engages in pretend play patterns of at least one idea in collaboration with caregiver (e.g., one part of a script or scenario played out).			
25. Uses language or pretend play (e.g., playing out with doll figures) to communicate needs, wishes, intentions, or feelings.			
26. Uses pretend play to express themes around closeness or dependency (e.g., putting dolls to sleep next to one another; feeding caregiver and dolls).			
27. Uses pretend play to express themes around pleasure and excitement around humorous theme (e.g., imitating humorous behaviors).			

Age: _____
 Behaviors: **Child**

Child's Name: _____

	SYM	SENS	EXAM
28. Uses pretend play to express themes around assertiveness (e.g., cars facing).			
29. Creates pretend drama with two or more ideas that are not related or logically connected.			
Total for Representational Capacity (Elaboration)			
REPRESENTATIONAL DIFFERENTIATION (Building Bridges Between Ideas and Emotional Thinking)			
30. Pretend play, however unrealistic, involves two or more ideas, which are logically tied to one another. Child may build on adult's pretend play idea.			
31. Elaborates on pretend play sequence of two or more ideas, which are logically connected and grounded in reality. There is a planned quality and child can elaborate to "how," "why," or "when" questions, giving depth to drama.			
32. Uses pretend play or language to communicate themes containing two or more ideas dealing with closeness or dependency (e.g., doll gets hurt, then gets kiss from daddy, then plays ball together).			
33. Uses pretend play or language to communicate themes containing two or more ideas dealing with pleasure and excitement in humorous game (e.g., imitates funny word heard, watches how caregiver reacts, then laughs).			
34. Uses pretend play or language to communicate themes containing two or more ideas dealing with assertiveness (e.g., soldiers search for missing person, find her, then battle to save her again)			
Total for Representational Differentiation (Emotional Thinking)			
Total Child Score			
TOTAL FEAS SCALE SCORE (add Caregiver and Child scores)			

Age: _____
 Behaviors: **Child**

Child's Name: _____

Functional Emotional Assessment Scale
Profile Form

Child's Name: _____

Subtest	Score			Normal	At Risk	Deficient
	SYM	SENS	EXAM			
Caregiver						
Self-Regulation and Interest in the World				4-6		0-3
Forming Relationships, Attachment, and Engagement				7-8	6	0-5
Two-Way, Purposeful, Communication				9-10	8	0-7
Behavioral Organization, Problem-Solving, and Internalization				12-14	11	0-10
Representational Capacity				6-10	5	0-4
Representational Differentiation				2-6		0-1
<i>Total Caregiver Score</i>				42-54	40-41	0-39
Child						
Self-Regulation and Interest in the World				12-14	11	0-10
Forming Relationships, Attachment, and Engagement				14-16	13	0-12
Two-Way, Purposeful, Communication				8-10	7	0-6
Behavioral Organization, Problem-Solving, and Internalization				2-4		0-1
Representational Capacity				8-14	7	0-6
Representational Differentiation				2-10		0-1
<i>Total Child Score</i>				48-66	46-47	0-45
Total FEAS Scale				93-120	86-92	0-85

Key: SYM = Symbolic; SENS = Sensory

Appendix C: Play Observation Scale

<i>Play Observation Scale</i>	<i>Scoring Intervals</i> <i>30 seconds each</i>									
	<i>5 minute intervals</i>									
	1	2	3	4	5	6	7	8	9	10
<i>Sensory-Motor Level</i>										
No score	0	0	0	0	0	0	0	0	0	0
Simple Manipulation- <u>Primary Circular</u>	1	1	1	1	1	1	1	1	1	1
Functional Manipulation - <u>Secondary Circular</u>	2	2	2	2	2	2	2	2	2	2
Two objects /two steps- goal in mind <u>Cause -Effect</u>	3	3	3	3	3	3	3	3	3	3
Trying Out/Experimenting- <u>Trial and Error</u>	4	4	4	4	4	4	4	4	4	4
<u>Sensory Motor Complexity</u> 1= Discreet Act 2= Single Scheme Combinations 3= Multi-scheme combination										
Total Sensory-Motor Scores in 5 minutes	Total Sensory-Motor Level					Total Sensory Motor-Level Complexity Score-				
<i>Symbolic Play Agent Level</i>										
No score	0	0	0	0	0	0	0	0	0	0
Self- as Recipient-i.e. feeds self w/play spoon	1	1	1	1	1	1	1	1	1	1
Others/ objects as Recipient of child's actions- feeds doll w/spoon	2	2	2	2	2	2	2	2	2	2
Child has objects take roles ie. makes baby cry/dance etc.	3	3	3	3	3	3	3	3	3	3
Stage manager - plays scenes w/assigned roles	4	4	4	4	4	4	4	4	4	4
<u>Symbolic Complexity</u> 1= Discreet Act 2= Single Scheme Combinations 3= Multi-scheme combination 4= Ordered Mult-Schems Combination										
Total Symbolic Play Agent Level Scores	Total Symbolic Play Agent Level Score-					Total Symbolic Play Agent Level Complexity Score-				
<i>Symbolic Play Substitute Level</i>										
No Score	0	0	0	0	0	0	0	0	0	0
Uses Real Life Objects - drinks from play cup	1	1	1	1	1	1	1	1	1	1
Uses similar to real life object as such	2	2	2	2	2	2	2	2	2	2
Uses ambiguous objects to represent real ones	3	3	3	3	3	3	3	3	3	3
Uses imaginary items to represent real ones.	4	4	4	4	4	4	4	4	4	4
<u>Symbolic Complexity</u> 1= Discreet Act 2= Single Scheme Combinations 3= Multi-scheme combination 4= Ordered Mult-Scheme Combination										
Total Symbolic Play Substitute Level Scores	Total Symbolic Substitute Level Score-					Total Symbolic Substitute Level Complexity Score				
<i>Social Communication Level</i>										
No Score	0	0	0	0	0	0	0	0	0	0
Awareness of other- (looking, reaching)	1	1	1	1	1	1	1	1	1	1
Attempts to engage others – vocalizing, touching.	2	2	2	2	2	2	2	2	2	2
Tries to continue interaction w/ looks, words, etc.	3	3	3	3	3	3	3	3	3	3
Understands and expresses /verbal =nonverbal communication in play	4	4	4	4	4	4	4	4	4	4
Engages in turn-taking games	5	5	5	5	5	5	5	5	5	5
Plays with others in shared play schema.	6	6	6	6	6	6	6	6	6	6
Coordinates play w/others using meta-communications in goal directed play.	7	7	7	7	7	7	7	7	7	7
Total Social Communication Level Score	Total Social Communication Score-									

Appendix D: Natural Language Training Observation Forms

Natural Language Training Observation Form

Name of DVD: _____ Name of Rater _____

10 minute duration 15 scoring intervals

Key: **V** _____ - Verbal Language or vocal sounds

S/G _____ - Sign language and gestures where communicative meaning is not always clear to outside observer--- **Examples:** . head nod, shrug,, hit fist on table. , head turn to look at someone, smile, e

P- _____ - Physical Actions towards a person, symbol , or object that have a clear communicative meaning to an outside observer

These include Pointing to something or someone . Touching something or someone. Pulling someone's hand , picking up a PCS symbol, picking up a toy in response to a request to do so.

15 second intervals <small>(make any comments in this section)</small>	Parent Initiation	Parent Response		Child Initiation	Child Response
	V S G P	V S G P		V S G P	V S G P
	V S G P	V S G P		V S G P	V S G P
	V S G P	V S G P		V S G P	V S G P
	V S G P	V S G P		V S G P	V S G P
	V S G P	V S G P		V S G P	V S G P
	V S G P	V S G P		V S G P	V S G P
	V S G P	V S G P		V S G P	V S G P

Appendix E: Introductory Recruitment Letters

DATE

Dear Parents and Supporters of Autism Research:

I am conducting an exciting research project that I hope will interest your support and participation. There is a paucity of research in the field of autism that compares specific treatment approaches for autism (such as the Lovaas behavioral methods and the Greenspan Developmental Individual Relationship therapy models). In particular, there is a limited, if any formal data concerning the improvement that is made in relationships between parents and children, the social-emotional affect of the youngster with autism, as well as improvement in play skills. Instead, research has focused on skill acquisition, IQ scores, language acquisition, and other traditional test measures as indices of progress.

Many parents, staff, and professionals however, remark that as their child makes progress in skills, he/she often becomes more relaxed, social and connected emotionally with their main caregivers as well as the world around them. My research project is an attempt to measure these “qualitative” aspects of improvement. These gains and changes are more subtle, but are also true markers of treatment effectiveness for you, the families, and all the professionals who work in the field of autism.

This project is different from most of the previous research endeavors in the past – because it does not look at levels of intelligence. That is, it does not matter what a child’s IQ level was (or is) or how much language was (or was not) present when treatment began. Rather, in this study, the focus is on the changes that happen affectively between the children and their families and caregivers: the differences in eye contact, spontaneous interactions, smiles, initiation of affection/play, etc. Even if a child with autism does not show improvement in language skills, many professionals in the field ascertain that successful treatment at the very least should be able to show differences in these social-emotional skill areas.

This research project is looking for children who have had or continue to have a formal diagnosis on the Autism Spectrum who have completed 2 to 2 ½ years of a Lovaas ABA or Greenspan DIR (formerly Floor-Time) treatment programs at the recommended intensity level of close to 30 hours per week. Such a child must have also initiated this treatment regime prior to age 4 ½, and must have engaged in the ABA or DIR programs exclusive of each other (i.e. at no time did a child in ABA undergo Floor Time treatment simultaneously. and vice versa). Candidates who began one program briefly, and then switched to the other in isolation will be considered on a case by case basis.

The project includes an informal parent interview that reviews a child’s diagnostic and developmental history as well as parent perception of their progress over time. The caregivers are then requested to join in play activities with their children for two videotape sessions at the child’s home. These sessions involve parents playing with their children in their favorite activities, as well as some slightly more directed play activities--but no fancy tests/instruments, etc. All tapes are of the parent/caregiver and child interacting together, not an outside therapist or researcher. This is because we want to see the child at his best as opposed to in a contrived setting. Thus the filming is done with the people who care about the child the most in the place he/she is the most familiar and will be the most secure. The sessions are informal, and designed in such a way to be fun for all involved. An informal

interview and completion of simple rating scales are also included in the study.

These play activities are videotaped in two 35-minute sessions, and then scored by professionals in the field with three instruments that measure affect and engagement. The scores on the instruments are compiled with the interview and informal rating scales to give an estimate of a child's current affective development and capacities in relationships on each of the three instruments. Subsequently, the scores on each measure will be examined both between treatment groups as well as within treatment groups for individual child characteristics that could influence progress.

In return for your participation, all families will be entitled to a written evaluation of the interaction tapes based on the instruments used to evaluate the levels of affective development, play and emotional relatedness. This evaluation will be written by a certified school psychologist with a Master's degree in both special education and school psychology as well as over 10 years of experience working with children with autism. In addition, a master summary of the results of the study will be made available to all participants.

Should your child meet the criteria for entry into the study, and you are interested in more information, please complete the form below. PLEASE NOTE: This form is not an official consent form to participate in the study, but an indication of interest only. All information is of course, kept confidential. If you have any additional questions, or simply would like to discuss this project, please do not hesitate to contact me at the address and phone number listed below.

Thank you again for your continued support on behalf of children with autism and their families. Sincerely,

Elizabeth Tsakiris,
M. Ed. 20241 Red
Buckeye Ct.
Germantown, Md.
20876

Phone: 301-540-0265 Cell phone: 240-426-6475 E-mail: tsquared3@verizon.net

Yes, I'm interested in learning more about/participating in the autism research study looking at changes in social-emotional and relationship skills after intensive treatment.

Child's Name: _____

Birthdate: _____ **Type of**

Treatment: _____ **Treatment**

Duration: _____ **Approximate Hrs. per**

Week: _____ **Date of Treatment**

Initiation: _____ **Other treatments utilized during this**

time period: _____

Is your youngster currently still in treatment, and if so how much?

Parent Name: _____

Address: _____ **Phone**

Numbers: _____ **Best time to**

contact: _____

Signature: _____

Date: _____ **Additional**

Concerns/Questions: _____

Appendix F: Procedures For Autism Research Study

This study will be comparing the effectiveness of two different treatment formats for youngsters with autism who participated in primarily in one type of treatment format during their preschool years for a two year time period at a high level of intensity (i.e. minimum of 20 hours per week). The study will look at the following outcomes: Parent-Child Communicative Interaction, Functional-Emotional Maturity Level, Symbolic Play Level and Social Communication Competency.

These skill areas will be measured with videotapes of you and your child interacting in enjoyable play and communication activities. This will involve two 35-minute taping sessions in your home in an area you and your child are most comfortable. Each session will involve three segments that vary between ten and fifteen minutes in length.

SESSION I: (35 minutes)

ACTIVITY A1: 10-minute segment

Select an activity that you know to be particularly motivating for your child, and in which you can interact with him. Try to use activities that are fun and happy for both of you, whether this is roughhouse play, looking at books, building a tower, drawing, etc. Play with your child just as you normally would, while trying to elicit as much responsiveness as you can from your youngster, either verbally or non-verbally. **ACTIVITY B1: 15-minute segment**

Have available in the room of your choice some of your child's favorite toys and activities. In addition, you will be provided with three baskets of other toys/activities to use. Basket A contains toys that can be spun, are fun to feel/touch, and make interesting sounds. Basket B contains dolls, action figures, animal figures, puppets, trucks and cars. Basket C contains a toy phone, a toy microphone, toy dishes, toy food, toy tools, costume hats, and a set of keys.

During this time period, interact with your child in the way you feel most comfortable. Play with him/her the way you like. The toys in the baskets are provided for you to use if you wish, but are optional. You may want to use your child's own favorite toys, or decide on other forms of play/fun activities. If your child is verbal, you could also have a conversation about something new you have not talked much about previously.

If the research team feels your child is getting frustrated, or that using a different type of toy/activity might be helpful, we will make the following statement, "You might want to try again with _____". We may also encourage you to try some pretend play ideas. This is meant to be helpful to you to make the time period more fun and interesting for your child, and will be given only when needed and not more than once in a five minute time period. **ACTIVITY C1: 10-minute segment**

Select a room in your room where you and your child are comfortable and enjoy playing. It may be the same location used for other activities. You will be presented with a collection of dolls, toy dishes, plastic animals, cars, blocks, and a toy phone. Do not initiate playing with any of these objects. Rather, wait for your child to initiate playing with the toys, and then attempt to bring you into the play with him/her before you make any response. For example, if your child begins rolling a car on the floor, do not join him in this activity unless he gives you some signal to play with him. This could be just looking at you, touching you, bringing the car to you, or actually talking to you. Once your child initiates getting you to

play with him, join him in the activity, but do not initiate any new play with the same toy or start playing with a different toy unless the child does so first.

Should your child make it clear that he wants you to move away from him while he is playing, or that he wants to be left alone, move away to a different area of the room.

SESSION 2: (35 minutes)

ACTIVITY A2: 10-minute segment.

Same procedure as Activity A1 in Session 1. You may select different toys/activities if you wish. ACTIVITY C2: 10-minute segment

The same toys are used as for Activity C1 in Session 1. Your goal now is to try to get your child involved in the following types of play:

- Non-pretend play (ex. Just stacking blocks)
- Simple pretend play (rolling cars)
- Pretend play with real toys (feeding dolls, talking to grandma on the phone, animal fights, etc)
- Pretend play where toys represent other items (ex. A block is a piece of cake; a telephone is a microphone, etc.)
- Pretend play where imaginary items are used (magic wands, imaginary spoon to stir cake mix, give your child an imaginary cup of milk to drink etc.)

During this activity, watch your child first. If he starts playing with the blocks, cars, or any of the other toys, join him/her. If he does not initiate any play within the first few seconds, you start playing with the blocks (or whatever toy you feel might interest your child) yourself and encourage him/her to join you. If your child joins you, encourage him/her and have fun. Then switch to playing with the cars (or a higher level of pretend play if you started with the cars) and again encourage your child to join you with making car sounds, having races, etc. If your child does not join you, keep trying whatever it takes to get him/her interested in something.

Once you are having fun, gradually begin doing more pretend play activities (if your child is not doing so already with you) using the dolls dishes, animals, and phone and try to get your child to join into the drama. This might involve calling the dolls on the phone, feeding them, going on an animal hunt, visiting the zoo, calling grandma, etc. Use your imagination and think of what interests your child. Try to model these pretend activities first, and then suggest that your child join in them with you (ex. “Come on, let’s have your doll blow out the birthday candles” or “It’s your turn to call daddy on the phone!”) .

Make your first pretend games using the toys that are present (ex. A phone for a real phone), your next ones a toy to represent a real object (ex. A block for a piece of cake), and then proceed to add pretending with no associated toy (pretending to mop a floor, read a book, be a cat, etc.). A member of the research team will hold up a sign or else tell you to “pretend with a toy”, or “pretend with no toy” to help you in this regard if it is necessary. They will also provide more specific guidance in you get really stuck.

If you start playing with blocks (no pretending involved) or cars, and your child begins using the more pretend toys—immediately join him/her in the higher level pretend activities, and eventually try an make them more complex by adding more objects and imaginary props as described above. On the other hand, if your child cannot handle or join in the more complex

levels of play, drop to the lower ones. The important thing is to keep your youngster involved and having fun, while occasionally challenging him.

ACTIVITY B2: 15-minute segment Same procedure as Activity B1 in Session 1.

Appendix G: Participant Consent

Project Title: Treatment Effectiveness in Preschool Autism: A Look at Affective Variables I state that my child, _____, is in good physical health and give permission for him/her and myself to participate in a program of research being conducted by Elizabeth Ann Tsakiris, M.Ed. of the University of Maryland at College Park, Department of Counseling and Personnel Services. Purpose: The purpose of this research is to compare the effects of different types of intensive treatment for autism and special education on improving the social-communicative, play, and relationship competencies for youngsters who began such programs in their preschool years. Procedures: The procedures involve two 35-minute videotaping sessions, not more than two weeks apart, during which I will play with my child in structured and unstructured play activities that have been described to me in both verbal and written form. In addition, I agree to participate in a parent review. I also agree to allow a review of my child's records for designated specific information noted in the attached AUTHORIZATION FOR RECORD REVIEW. I understand that this form allows me to choose under how such a review will take place, including allowing me to select the documents to be reviewed and provide them myself. Confidentiality: All information collected in this study is confidential and the name of my child, my family, or me will not be identified at any time in any form. The data I provide will be grouped with data others provide for reporting and presentation, and my name will not be used in this information. Risks: I understand that because of the nature of autism, there is a slight chance that my child may get frustrated during some of the play sequences, even though they are designed in such a way so that this will not occur. I understand that the research team will intervene to help prevent and/or stop this from occurring, and end a session if this cannot be done within a ten minute time period, or upon my request at any time. I understand that this experiment is not designed to help me personally, but that the investigator hopes to learn more about the effectiveness of various treatment programs in ameliorating the core deficits of autism. I understand that I am free at any time to withdraw from participation in this study without penalty. If you have questions about your rights as a research subject or wish to report a research-related injury, please contact: Institutional Review Board Office (e-mail) irb@deans.umd.edu

Name of Child: _____ Name of Parent: _____
Parent: _____
Signature: _____ Date: _____

University of Md. College Park, Md. 20742 Phone: 301-405-4212

Name and Address of Investigator:

Dr. William Strein University of Md. College Park, Md. 20742 strein@umd.edu Phone: 301-405-2869

Elizabeth Tsakiris, M. Ed. 20241 Red Buckeye Ct. Germantown, Md. 20876 tsquared3@verizon.net Phone: 301-540-0265

Appendix H: Authorizations

I hereby give permission for Elizabeth Tsakiris, to review the confidential educational, medical, and psychological records of my child, _____ to obtain the following information: Measured IQ scores or cognitive competencies prior to treatment initiation Level of Language competency prior to treatment initiation Approximate age of onset of autism symptoms and age at diagnosis Severity and type of autistic symptoms at time of treatment initiation Check one: ____ I will provide Ms. Tsakiris with copies of the above records that contain this information. ____ I give Ms. Tsakiris permission to contact the schools and medical establishments that hold these records. Check one: ____ I must be present with Ms. Tsakiris when she obtains the above information from my child's records. ____ I do not wish to be present with Ms. Tsakiris when she reviews my child's records for the above information.

I understand that all information obtained will be kept confidential and at no time will my child's nor my child's family members, nor treatment providers names be made available. I further understand that this information will be used only for the purposes of the research project in which I am currently participating. Should I withdraw my participation to participate in this project, this permission is automatically revoked.

Should Ms. Tsakiris be provided with a copy of my child's records, I understand that they will be destroyed after the above information is obtained from them, within two weeks after their receipt.

This authorization will expire on _____.

Signature of Parent: _____

Date: _____

Appendix I: Parent Interview

Parent Interview Questions

1. Describe when and how you first became aware that there was something "different" about your child. What kind of behaviors did you notice?
2. When and how did the formal diagnosis of autism/pervasive developmental disorder occur?
3. Before he/she began treatment, how did your child communicate? Did your child use any language? For example, if he/she wanted something that was not within his reach (like juice in the refrigerator), what would your child do to let you know this?
4. Before she/he began treatment did your child imitate any actions/sounds (clapping hands, two-step actions, animal sounds, vocal sounds, etc.) If he did some imitation, describe what he/she did? How well does your child imitate at the present time?
5. Before he/she began treatment, would your child point to something to get you to look at it or call your attention to it? Would your child point to something he/she wanted your child to get for them?
6. During your youngster's early years, and before he/she began treatment, describe how he/she reacted to the following: (Please note any particular likes/dislikes and changes that have occurred in these areas over the years).
 - a. loud/soft sounds, music, different vocal tones
 - b. different types of touch/textures/blankets/stuffed animals/sticky foods, etc.
 - c. different types of lighting/colors/visual input
 - d. large/small amounts of activity/stimuli going on in his/her immediate environment
 - e. different kinds of smells/tastes
 - f. different types of movement (rocking, rough housing, fast/slow motion etc.) What are his/her reactions to these stimuli today? Which have stayed the same/changed?
7. Before he/she began treatment what kind of motor play did your child engage in? Did your child throw/bang objects? Was your child able to push a toy car? Could he/she complete a basic shape sorter puzzle? Could he/she perform two step related actions, such as pushing a truck into a garage and then closing the door, etc.?
8. Describe the type of language, if any, your child used before he began treatment. (Ex. echolalia, singing songs, babbling, sentences, reciprocal conversations, etc.) When did your child use these verbalizations?
9. Describe how your child would play before beginning treatment (toys used, self-stim behaviors, ability to pretend, interact, take turns, physical play, etc). Could your child pour a pretend cup of milk/tea to drink using play dishes?
10. What other treatment approaches, if any, had you tried before using _____? Were any successful in any way?
11. What led you to use the _____ treatment?
12. What were your expectations of this treatment program? What changes did you expect to see in your child because of this treatment?
13. Describe how your child has or has not changed since entering this treatment program? Were your expectations met? What changes have you not seen that you would have liked to have seen?
14. Describe how much treatment your child received in a typical week from both yourself and any additional professionals or helpers. Be specific. For how long did this occur?

15. At the present time, if your child sees an interesting toy, animal, etc. while you are shopping or outside, what does he/she do? (laugh, say the name, squeal, run up and touch it, actively begin playing with it, etc.) Does your child look at you to attempt to share this interest with you or give some verbal comment about it?
16. At the present time, if your child wants something (like juice in the refrigerator), but it is out of his immediate reach/access, what does he/she do? How does your child tell you what he/she wants?
17. Describe how your child plays at the present time. (toys used, self-stim behaviors, ability to pretend and interact, take turns, physical play, etc.)
18. Describe the type of language your child uses at the present time. (Ex. echolalia, songs, sentences, reciprocal conversations, labeling, etc.)
19. Briefly describe the amounts and types of other related services/therapies your child has received since entry into the treatment program to the present time.

TOY LIST

White Basket Sensory

Toys

Koosh Balls Hair Balls Purple Ball Wind up toys Busy Box (Shape Sorter)
Small cuddly animals (lion, elmo) Large soft stuffed animal Cymbals
Bubbles Box of Blocks Slinky

Blue Basket Toys that represent what they are, but also require imagination

Cars and trucks Disney Characters (plastic Pooh, Tiger, Mermaid, Flounder)
Arthur and Family Small Doll Family Large Baby Doll Toy Story figure
(Buzz Lightyear) Barney stuffed animals Super heroes Bag of plastic animal
figures Thomas the Tank Little Mermaid Doll and/or Boyfriend
Lizards/alligators

Green Basket Toys that require most imagination

Doctor kit Cheerleading gizmo Bags of Food and Dishes Swords, Helmet,
and cape Microphone Toys phones and Keys Crown Magic Wand Puppets
(Bird and 2 dalmatians, bumble bee)

Toys to Take out for Activity C

Blocks, Telephones, Cars and Trucks, Large baby dolls, Food and Plastic
Dishes, Busy Box and Shape sorter Please label Tapes as Activity A-1
(Activity a, session 1) Activity B-1 (Activity b, session 1) Activity C-1
(Activity C, session 1) Do not rewind tapes after Session 1, because we will
tape and label Activity A-2, on the same tape after A-1, etc. for all taping for
Session 2---The total number of tapes will then be 3, (A-1, and A-2 on first
tape, B-1 and B-2 on second tape, etc.)

Appendix K: Record Review

Code Number # _____

1. Age at when symptoms first appeared _____ Observed by? _____
2. Symptoms first observed
3. Age at formal diagnosis _____ Date _____
4. How diagnosis was made Examiner
qualifications _____
Instruments utilized and scores _____

Symptoms Noted

IQ/cognitive competencies/developmental levels reported

Language competencies and means of communication

Description of play skills and interpersonal relationship competencies

1. Number/age of siblings in immediate family

2. Type of treatment

Hours of treatment per week per provider (Ex. parent-5 hours, tutor 10 hours) and provider qualifications/training

How many other individuals besides the parents administered the treatment program? _____ Documentation of progress/lack of progress in treatment

. Current education program (special ed., fully integrated with aide, etc.)

1. Current amount of treatment provided (in addition to education placement) _____
—

2. Educational Level of parents

3. Approximate socio-economic level of family

Appendix L: Correlations Between Outcomes

Combined Group	Parent Child Communicative Competency - highest measures		Functional Emotional Highest measures		Symbolic Play/Social Interaction Communication Level - C1					Symbolic Play/Social Interaction Communication Level - C2										
	Total Child Initiations	Total Child Responses	Total FEGS	Total Rating	Sensory Motor Level	Sensory Motor Compl. Level	Sensory Motor Agent Level	Sensory Motor Compl. Level	Sensory Motor Subst. Level	Sensory Motor Total	Sensory Motor Level	Sensory Motor Compl. Level	Sensory Motor Agent Level	Sensory Motor Compl. Level	Sensory Motor Subst. Level	Sensory Motor Total				
Parent Child Communicative Competency - highest measures	1.00																			
Total Child Initiations	1.00																			
Total Child Responses	0.18	1.00																		
Total FEGS	0.73	0.29	1.00																	
Total Rating	0.70	0.29	0.96	1.00																
Sensory Motor Level	0.11	-0.21	0.25	0.29	1.00															
Sensory Motor Compl. Level	-0.12	-0.40	0.12	0.14	0.74	1.00														
Sensory Motor Agent Level	0.08	-0.20	0.41	0.38	0.48	0.57	1.00													
Sensory Motor Subst. Level	0.09	-0.28	0.37	0.35	0.52	0.67	0.94	1.00												
Sensory Motor Total	0.13	-0.10	0.44	0.46	0.58	0.71	0.76	0.82	1.00											
Symbolic Play/Social Communication Level - C1	0.10	-0.22	0.44	0.42	0.57	0.69	0.84	0.94	0.89	1.00										
Symbolic Play/Social Communication Level - C2	0.00	0.00	0.05	0.06	0.00	0.02	0.26	0.25	0.36	0.22	1.00									
Total Play Level	0.15	-0.15	0.50	0.50	0.75	0.76	0.90	0.91	0.93	0.92	0.24	1.00								
Sensory Motor Level	-0.14	-0.18	0.00	0.06	0.47	0.49	0.16	0.28	0.42	0.35	0.17	0.42	1.00							
Sensory Motor Compl. Level	-0.12	-0.05	-0.02	0.00	0.30	0.47	0.02	0.19	0.36	0.26	0.03	0.29	0.91	1.00						
Sensory Motor Agent Level	0.25	0.06	0.41	0.39	0.40	0.36	0.80	0.69	0.51	0.51	0.29	0.69	0.19	0.12	1.00					
Sensory Motor Subst. Level	0.32	0.12	0.38	0.39	0.38	0.26	0.73	0.61	0.41	0.40	0.04	0.60	0.03	0.00	0.90	1.00				
Sensory Motor Total	0.45	0.37	0.64	0.58	0.49	0.43	0.64	0.67	0.78	0.74	0.25	0.81	0.30	0.30	0.67	0.64	1.00			
Symbolic Play/Social Interaction Communication Level - C2	0.52	0.28	0.56	0.56	0.44	0.27	0.54	0.52	0.55	0.48	-0.09	0.63	0.16	0.19	0.68	0.84	0.79	1.00		
Symbolic Play/Social Interaction Communication Level - C1	0.54	0.32	0.63	0.66	0.43	0.17	0.57	0.58	0.59	0.53	0.28	0.65	0.28	0.21	0.75	0.72	0.75	0.76	1.00	
Total Play Level	0.29	0.22	0.55	0.52	0.63	0.54	0.72	0.72	0.75	0.73	0.28	0.84	0.52	0.46	0.85	0.72	0.92	0.74	0.78	1.00

DR Group	Parent Child Communicative Competency - highest measures		Functional Emotional Maturity Level - highest measures		Symbolic Play/Social Interaction Communication Level - C1						Symbolic Play/Social Interaction Communication Level - C2									
	Total Child Initiations	Total Child Responses	Total FEAS	Total Rating	Sensory Motor Level	Sensory Motor Compl. Level	Sensory Motor Level	Sensory Motor Compl. Level	Sensory Motor Level	Sensory Motor Compl. Level	Sensory Motor Level	Sensory Motor Compl. Level	Sensory Motor Level	Sensory Motor Compl. Level	Sensory Motor Level	Sensory Motor Compl. Level				
Parent Child Communicative Competency - highest measures	1.00	0.43	1.00	0.99	1.00	0.44	1.00	0.30	0.55	1.00	0.21	0.64	0.93	1.00	0.34	0.72	0.66	0.72	1.00	
Functional Emotional Maturity Level - highest measures	0.85	0.24	1.00	0.99	0.39	0.04	0.47	0.49	-0.05	-0.60	0.02	-0.01	0.20	-0.52	0.44	0.41	0.26	-0.58	0.44	0.39
Symbolic Play/Social Interaction Communication Level - C1	Sensory Motor Level	0.39	0.04	0.47	0.49	1.00	0.44	1.00	0.30	0.55	1.00	0.21	0.64	0.93	1.00	0.34	0.72	0.66	0.72	1.00
	Sensory Motor Compl. Level	-0.05	-0.60	0.02	-0.01	0.44	1.00	0.30	0.55	1.00	0.21	0.64	0.93	1.00	0.34	0.72	0.66	0.72	1.00	0.44
Symbolic Play/Social Interaction Communication Level - C2	Sensory Motor Level	0.20	-0.52	0.44	0.41	0.30	0.55	1.00	0.20	-0.52	0.44	0.41	0.30	0.55	1.00	0.30	0.55	1.00	0.30	0.55
	Sensory Motor Compl. Level	0.26	-0.58	0.44	0.39	0.21	0.64	0.93	1.00	0.26	-0.58	0.44	0.39	0.21	0.64	0.93	1.00	0.26	-0.58	0.44
Symbolic Play/Social Interaction Communication Level - C1	Sensory Motor Level	0.22	-0.30	0.51	0.50	0.34	0.72	0.66	0.72	1.00	0.34	0.72	0.66	0.72	1.00	0.34	0.72	0.66	0.72	1.00
	Sensory Motor Compl. Level	0.25	-0.52	0.53	0.47	0.30	0.69	0.77	0.90	0.83	1.00	0.30	0.69	0.77	0.90	0.83	1.00	0.30	0.69	0.77
Symbolic Play/Social Interaction Communication Level - C2	Sensory Motor Level	-0.09	0.19	0.31	0.28	-0.17	-0.24	0.30	0.15	0.31	0.13	1.00	-0.17	-0.24	0.30	0.15	0.31	0.13	1.00	-0.17
	Sensory Motor Compl. Level	0.31	-0.37	0.62	0.59	0.59	0.72	0.89	0.87	0.90	0.88	0.25	0.59	0.72	0.89	0.87	0.90	0.88	0.25	0.59
Symbolic Play/Social Interaction Communication Level - C1	Sensory Motor Level	-0.03	0.01	0.13	0.18	0.36	0.49	0.15	0.25	0.47	0.41	0.18	0.42	0.36	0.49	0.15	0.25	0.47	0.41	0.18
	Sensory Motor Compl. Level	-0.03	0.00	-0.01	0.04	0.20	0.56	-0.02	0.15	0.44	0.30	-0.04	0.29	0.20	0.56	-0.02	0.15	0.44	0.30	-0.04
Symbolic Play/Social Interaction Communication Level - C2	Sensory Motor Level	0.39	-0.10	0.47	0.53	0.65	0.39	0.79	0.69	0.41	0.39	0.18	0.70	0.65	0.39	0.79	0.69	0.41	0.39	0.18
	Sensory Motor Compl. Level	0.45	-0.11	0.39	0.46	0.57	0.35	0.69	0.62	0.29	0.25	-0.09	0.57	0.57	0.35	0.69	0.62	0.29	0.25	-0.09
Symbolic Play/Social Interaction Communication Level - C1	Sensory Motor Level	0.68	0.25	0.83	0.86	0.69	0.46	0.55	0.88	0.79	0.79	0.21	0.86	0.69	0.46	0.55	0.88	0.79	0.79	0.21
	Sensory Motor Compl. Level	0.69	0.13	0.59	0.65	0.59	0.47	0.48	0.57	0.53	0.44	-0.15	0.63	0.59	0.47	0.48	0.57	0.53	0.44	-0.15
Symbolic Play/Social Interaction Communication Level - C2	Sensory Motor Level	0.73	0.27	0.74	0.80	0.77	0.33	0.60	0.63	0.56	0.51	0.14	0.74	0.77	0.33	0.60	0.63	0.56	0.51	0.14
	Sensory Motor Compl. Level	0.52	0.11	0.74	0.79	0.87	0.52	0.65	0.69	0.70	0.72	0.20	0.85	0.87	0.52	0.65	0.69	0.70	0.72	0.20
Symbolic Play/Social Interaction Communication Level - C1	Sensory Motor Level	0.37	0.60	0.59	0.59	0.41	0.37	0.60	0.59	1.00	0.05	0.00	0.93	0.41	0.37	0.60	0.59	1.00	0.05	0.00
	Sensory Motor Compl. Level	0.94	1.00	0.94	1.00	0.94	1.00	0.94	1.00	0.94	1.00	0.94	1.00	0.94	1.00	0.94	1.00	0.94	1.00	0.94
Symbolic Play/Social Interaction Communication Level - C2	Sensory Motor Level	0.20	0.06	1.00	0.20	0.20	0.06	1.00	0.20	0.06	1.00	0.20	0.06	1.00	0.20	0.06	1.00	0.20	0.06	1.00
	Sensory Motor Compl. Level	0.20	0.06	1.00	0.20	0.20	0.06	1.00	0.20	0.06	1.00	0.20	0.06	1.00	0.20	0.06	1.00	0.20	0.06	1.00

Special Diets	Speech Therapy	Occupational therapy	Vision/auditory Training	Physical Therapy	Biomedical Interventions	Cognitive Ability Estimates	Did the child have any of these Sensory Issues?	Did the child demonstrate any of these Affect Regulation Issues?	Language Issues	Settling Situations	Motor Planning Issues	Medical Issues
						Overall Total	Sounds	Under or over active?	Demonstrated Echolalia?		Did the child point to what	(psychotropic medications
						Overall Verbal	Taste/Sweet	Withdrawal/Unresponsive	Did child make Oda		Did child imitate noise	Other Medical
						Verbal	Touch	Excessive Crying	Words ** Sentences		Did child Pails Others To	Seizures
						Non-Verbal	Vision	Tantrums	Did child have		Did the child like to live	
						Adaptive	Under or over active?	Self Abuse	Did child have		Was the child able to lie	
							Movement		Comprehension problems?		Did child have 2 step play	

Post - Treatment Characteristics
 Subject _____ Group _____ Age at Filming _____

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