Language Intervention for Autistic Children: A Look at Where We Have Come in the Past 25 Years

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Introduction

Over the past 25 years, major advances have been made in both our knowledge of the syndrome of autism and our approaches to educating individuals with autism. These advances have been directed by more general advances in applied fields, particularly in the areas of normal child language and behavior analysis. This article will highlight major advances made in understanding the language problems of and teaching language to autistic children over the past two and a half decades. A thorough review of literature on language intervention with autistic children is beyond the scope of this paper. Instead, select studies will be reviewed to exemplify changes in approaches to language intervention with this population. Current conceptualizations of the syndrome of autism include language and communication impairments as a primary feature, placing the speech-language pathologist in a central role in the design and implementation of language intervention with autistic children (Prizant & Wetherby, 1988). Suggestions will be made about critical components of a "model" language intervention program for this population as we move into the 1990s.

Changes in Diagnostic Criteria and Symptomatology

The syndrome of autism was first identified as a clinical entity by Leo Kanner in 1943. Although 46 years have elapsed and a myriad of publications have appeared in the literature, Kanner's original reports (1943; 1946) continue to provide insightful and abundant descriptions of the behavioral characteristics of autism. Based on the developmental histories of 11 children, Kanner (1943) noted that the essential feature, pathognomonic to the syndrome, was the inability, from birth, to relate to people and situations. Kanner noted that the condition of autism differed from previously reported instances of childhood schizophrenia with respect to the age of onset, and postulated that the 11 children had "come into the world with innate inability to form the usual biologically provided affective contact with people, just as other children come into the world with innate physical or intellectual handicaps" (p. 250). Diagnostic criteria espoused by Kanner and changes in criteria in more current definitions of the syndrome are listed in Table 1. In a 30-year follow-up study of these 11 children, Kanner (1971) concluded that despite differences in outcome, the following two cardinal features were retained in adulthood: (1) the "extreme autistic aloneness" characterized by the inability to relate to people and situations, and (2) the insistence on sameness manifested by repetitive movements, ritualistic behaviors, abnormal preoccupations, and resistance to change. The most current definition in DSM III-R (American Psychiatric Association, 1987) is more consistent with Kanner's original description than with previous ones; it includes the two cardinal features of impairment in social interaction and insistence on sameness, along with impairments in verbal and nonverbal communication. It allows for the onset in childhood but indicates that most cases are from infancy.

The diagnostic labels of "autism," "childhood schizophrenia," and "childhood psychosis" were used interchangeably in the literature in the 1960s and 1970s, resulting in confusions over the boundaries between these disorders (Rutter, 1978). In DSM III (American Psychiatric Association, 1980), the term "infantile autism" was categorized as a "pervasive developmental disorder," instead of the previous status under childhood schizophrenia, which was, in turn, a subclass of psychosis. This distinction also is evident in the title change from the *Journal of Autism and Childhood Schizophrenia* to the *Journal of Autism and Developmental Disorders* in 1980. Thus, autism is no longer considered a childhood psychosis but is now viewed as a developmental disorder with multiple areas in which there is impaired development (i.e., cognitive, language, motor, and social skills).

Ritvo and Freeman (1978) reported that approximately 60% of autistic children have measured IQs below 50 and 20% have IQs between 50 and 70, indicating that autism and mental retardation coexist in the majority of cases. However, autistic children perform most poorly on tasks that involve abstract reasoning and symbolic or sequential information and best on tasks that involve visuospatial skills and rote memory (Dawson, 1983; Ritvo & Freeman, 1978; Rutter, 1985). Thus, autistic children display a scattered profile of development which can be differentiated from mental retardation. Rutter (1978) emphasized the need to consider the features characteristic of autism in relation to the child's mental age, rather than chron-

Table 1. Changes in Diagnostic Criteria for the Syndrome of Autism since Kanner.

Kanner (1943)
Inabilility to relate to people and situations
Insistence on the maintenance of sameness
Excellent rote memory
Monotonously repetitious in movements and sounds
Language characterized by delayed echolalia, extreme literalness, and pronoun reversals
Failure to use language to convey meaning to others
Overreaction with fear to loud noises and moving objects
Limited variety of spontaneous activity
Good relation to objects
Good cognitive potentialities
Onset from the beginning of life

Baltaxe & Simmons (1975)
Impairment of interpersonal relationships seen in aloofness, decreased physical contact, and lack of eye contact
Deficits in social behavior seen in limited play and self-care skills
Stereotyped activities including self-stimulatory behavior and preoccupation with sameness
Impairment of intellect manifested by concreteness of thought
Disturbances of speech and language seen in mutism, echolalia, and idiosyncrasies in word use, speech modulation, and content
Onset prior to 30 months of age

National Society for Autistic Children (Ritvo & Freeman, 1978)
Disturbances in developmental rates and sequences
Abnormal responses to sensory stimuli, including hypo- and hyperactivity
Disturbances in speech, language-cognition and nonverbal communication
Abnormalities in the capacity to relate to people, events and objects
Onset prior to 30 months

Rutter (1978)
Impaired development of social relationships
Impairments of prelanguage and language skills, including impaired understanding of speech and the use of echolalia
Insistence on sameness seen in limited play patterns, intense attachments to objects, unusual preoccupations, ritualistic and compulsive behavior, and resistence to change
Onset prior to 30 months

DSM III (American Psychiatric Association, 1980)
Pervasive lack of responsiveness to other people
Gross deficits in language development
Peculiar speech patterns, such as immediate and delayed echolalia, metaphorical language, and pronominal reversal
Bizzare responses to various aspects of the environment, such as resistance to change, peculiar interest in or attachments to animate or inanimate objects
Absence of delusions, hallucinations, loosening of associations, and incoherence as in schizophrenia
Onset before 30 months of age

DSM III-Revised (American Psychiatric Association, 1987)
Qualitative impairment in reciprocal social interaction seen in lack of responsiveness to people, failure to seek comfort, impaired imitation, impaired social play, and/or impairment in the ability to make peer friendships
Qualitative impairment in verbal and nonverbal communication seen in lack of communication, abnormal nonverbal communication, absence of imaginative activity, abnormalities in speech production, abnormalities in the form or content of speech, and/or impairment in the ability to initiate or sustain conversation
Markedly restricted repertoire of activities and interests seen in stereotyped body movements, persistent preoccupation with objects, marked distress over trivial changes in the environment, insistence in following routines, and/or restricted range of interests
Onset during infancy or childhood (only rarely after 5 or 6 years)

ological age, in the differential diagnosis of autism and mental retardation. Classical autistic children, as described by Kanner, make up only a small portion of the children that meet current diagnostic criteria, those that have measured IQs near or in the normal range.

Kanner (1943) indicated that the social behavior of autistic children changes as they get older. As autistic children reach adolescence, they may show improvements in social interaction as well as ritualistic and compulsive behaviors (Paul, 1987). However, the outcome for the majority of autistic children has been very poor in the past decades. Several long-term follow-up studies reported in the 1970s (see Lotter, 1978; and Paul, 1987 for a review) indicated that about half of the cases required residential care and about two-thirds could not live independently at follow-up. Only 20% of those followed were holding jobs. These findings reflect education efforts of the 1950s and 1960s. The outlook is hopefully much brighter for autistic adolescents and adults in the 1990s, based on education efforts of the past two decades.

What Have We Learned About the Cause of Autism?

The etiology of autism has perplexed professionals since the conception of the syndrome in the 1940s. Psychogenic theories of autism, which prevailed in the 1950s and 1960s, proposed that autism was caused by abnormal parent-child relationships. Bettelheim (1967), one of the strongest proponents of psychogenic theories, suggested that autism stemmed from parental pathology, particularly that of the mother, and parental failure to respond to the child, leading to the child withdrawing interest in the social world. It is interesting that Bettelheim concluded that the autistic child's use of pronoun reversals, the use of "you" in place of "I," indicated a lack of ego development. There has been little empirical support of psychogenic theories. Comparisons of parents of autistic children with parents of children with specific language impairments (Cox, Rutter, Newman, & Bartak, 1975) indicated that the parents of autistic children were as sociable and emotionally responsive. Comparisons of parents of autistic children with parents of normal children being treated in an adult psychiatric outpatient clinic (McAdoo & DeMyer, 1978) have demonstrated significantly more psychopathology in the latter group, failing to provide support for a psychogenic theory. In a review of literature on family factors, Cantwell, Baker, and Rutter (1978) concluded that parents of autistic children use unexceptional child-rearing practices, show normal empathy and sociability, and show no particular tendency toward psychopathology.

After several decades of wrongly blaming parents of autistic children for causing the disorder, research in the 1970s and 1980s has led to general agreement that autism is caused by brain dysfunction (Ornitz, 1985; Ritvo & Freeman, 1978). As delineated above, the primary impairments of autistic children involve the inability to engage in social interaction, to use communication conventionally, and to use symbolic representation in language and play. Therefore, understanding what is wrong with the brains of these children may bring understanding of what makes the human brain so special. There is now compelling evidence of a neurogenic origin of autism, although the specific mechanism is as yet unknown.

A few converging theories emerge from the current literature. First, autism is characterized by heterogeneity in symptomatology that has multiple etiologies (Reichler & Lee, 1987; Wetherby, 1984). Secondly, multiple systems in the brain are likely involved in many cases, with impairments in limbic system structures being one commonality and impairments in the brainstem and cerebellum being another possible common mechanism (Courchesne, 1989; Dawson & Lewy, 1989). Unravelling the neural substrate of autism makes this one of the most challenging of the neurodevelopmental disorders because of the complex interaction of etiological agents that may affect multiple levels of the nervous system as well as the developmental interplay between brain dysfunction and brain development.

The shift from psychogenic to neurogenic theories of the etiology of autism has greatly influenced the directions of intervention. First, rather than considering the parents the source of the problem and possibly removing the child from that source, the parents are now seen as playing a central role in the development of the autistic child and as partners with the education system (DeMyer, 1979; Marcus & Schopler, 1987). Parents are also provided with a support system to cope with the stress of autism on the family (Bristol, 1984; Marcus & Schopler, 1987).

Secondly, as we better understand the biochemistry of autism (see Elliot & Ciaranello, 1987; Gualtieri, Evans, & Patterson, 1987), medication is playing a bigger role in ameliorating some of the symptoms. The following is a summary of major findings that have been reported on the effects of medication in autism (for a review, see Gualtieri, et al., 1987; Holm & Varley, 1989): (1) numerous studies have demonstrated the results of haloperidol, a low-dose, high potency neuroleptic, in improvement of agitation, hyperactivity, aggression, stereotypic behaviors, and emotional lability; (2) in double blind studies involving several medical centers, fenfluramine, an anorectic drug, has been found to lower blood levels of serotonin (which had been found to be elevated in some autistic children); however, the behavioral effects have been conflicting, since this medication has been found to decrease hyperactivity and to increase social responsiveness and attention span in some children studied, but improved scores on formal measures of intelligence or language have only been demonstrated in a few of the studies; (3) preliminary study of naltrexone, an opioid antagonist, has suggested some beneficial effects on reducing hyperactivity and stereotypies and increasing social relatedness; however, double-blind studies with placebo controls are needed to verify these findings; (4) megadoses of vitamin B6 and magnesium have been reported to result in behavioral improvements, although these studies have methodological weaknesses and the safety of megadoses of vitamin B6 has recently been questioned; and (5) anticonvulsants are used with autistic children who have seizures (which may be as many as 40% to 75% by adolescence) and may also improve the management of behavior problems.

Thus, while there is a growing body of literature on the effects of medication in autism, the major results have been on hyperactivity and attention, and the impact on communication and language problems has been minimal. Although, at this time, medication is unlikely to directly enhance language and communication, the speech-language pathologist needs to be aware of medications taken by the autistic child and any possible side effects. Information about the child's adjustment and tolerance of medication (e.g., overly passive or active behavior) should be reported to the teachers and physician. Until proper medication levels are determined, intervention

goals may need to focus on behavior management, rather than language and communication enhancement.

The Nature of the Language and Communication Impairments in Autism

Disturbances of speech, language, and communication have always been considered a primary diagnostic feature of the autistic syndrome. In a review of the literature on autism in 1965, Savage stated that

> ...it is becoming increasingly apparent that the language disability is of considerable consequence in autism. Speech Therapy might come to be of paramount importance in the remedial programme for the autistic child. (p. 86)

This statement is an accurate portrayal of service needs 25 years later. However, professional preservice training in speech-language pathology may not be adequate for preparing clinicians to work with autistic children and must be upgraded in the 1990s.

The language disturbances of autistic children range from failure to develop any functional speech (i.e., nonverbal or mute) to functional but idiosyncratic use of spontaneous speech. Approximately 50% of autistic children never develop any functional speech (Rutter, 1978). The degree of language impairment is prognostic (Eisenberg, 1956; Rutter & Bartak, 1971). The prognosis is particularly poor for those who have not acquired any useful speech by the age of five (Eisenberg, 1956). Nevertheless, as many as 50 to 60% of autistic children that do not have functional speech before age five do acquire at least some single words in later childhood (Howlin, 1981).

Certain common characteristics have been identified among autistic children who develop speech. Kanner (1943; 1946) characterized the language deficits associated with autism in terms of immediate and delayed echolalia and resultant pronominal reversals, extreme literalness, private and original frame of reference, affirmation by repetition, and rejection of simple verbal negation. The vast majority of autistic children that do speak, go through a period of using echolalia, the imitation of the speech of others, either immediately or at some later time (Prizant, 1983a; Schuler & Prizant, 1985). The autistic child appears to use the echolalic utterance as a label for a situation or event, perhaps because of difficulties in decoding the utterance (Baltaxe & Simmons, 1975). Current understanding of echolalia indicates that it provides a language-learning strategy for autistic children through the gradual breakdown of echolalic utterances and eventual reformation of the constituent segments into new utterances (Baltaxe & Simmons, 1975; Prizant, 1983b). Thus, pronominal reversals are no longer interpreted as reflecting "weak ego development" but rather, are now viewed as a byproduct of echolalia. Idiosyncrasies in vocal delivery have been reported anecdotally throughout the literature, including such descriptions as "monotonous," "wooden," "mechanical," "flat," or "peculiar"; however, the ways in which the prosodic deficits of autistic children interact with other levels of language are just beginning to be explored (see Baltaxe & Simmons, 1985).

Autistic children show impairments in verbal and nonverbal communication, not just in speech and language (Ricks & Wing, 1975). Impairments in language and communication have been found to be related to deficits in social and cognitive development. Numerous studies have demonstrated impairments in symbolic play and imitation in autistic children (see Prizant & Wetherby, 1989). Speech and language problems are secondary to underlying impairments in reciprocal social interaction.

The failure to reciprocate in a social exchange was noted by Kanner (1946) in the autistic child's use of private, individualized references. Kanner demonstrated that the seemingly irrelevant utterances of the autistic child are metaphorical expressions which, despite the failure to use socially acceptable and conventional meanings, can often be traced to a specific source or personal experience of the child. In reflecting upon her clinical experience with autistic children, Creak (1972) commented that:

> ...they appeared not only to have nothing to communicate, and nothing to communicate with, but also seemed to have no urge or direction toward acquiring these elemental human attributes. (p. 6)

Anecdotal reports of the autistic child's failure to use speech and gestures for communicative purposes pervade the literature (e.g., Baltaxe & Simmons, 1975; Cohen, Caparulo, & Shaywitz, 1976; Creak, 1972; Kanner, 1943; Ricks & Wing, 1975; Rutter, 1978). Wing (1981) suggested that the autistic child may lack the innate capacity to modulate species—specific sounds and to recognize that people are potential partners in social interaction. Thus, the autistic child appears to lack the intentionality, awareness or competence to use language as a tool for conveying a message to others.

Advances in the field of developmental pragmatics have provided a useful framework for understanding the communication and language impairments of the autistic child. Bates (1976) introduced the term pragmatics to the study of child language and defined pragmatics as "rules governing the use of language in context." Prizant (1982) noted that the range of communication difficulties displayed by autistic individuals "practically defines the domain of pragmatic deficits."

Prizant and Wetherby (1987) proposed that the constructs of communicative intentionality and conventionality offer a

framework for understanding the social and communicative dysfunction in verbal and nonverbal autistic children. Based on the work of Bates (1976; 1979) in normal communication development, communicative intentionality refers to the ability to use signals deliberately to affect the behavior or attitudes of others, and conventionality refers to signals that have meanings which are shared or understood by a listener or a community of listeners. In normal development, children acquire intentional, conventional preverbal signals (i.e., gestures and sounds) which form the foundation for learning words. It is not that autistic children lack communicative intent, but rather that they show deficits in the ability to use communication for social purposes, that is, to direct another's attention to something for the purpose of sharing that thing (Mundy, Sigman, Ungerer, & Sherman, 1986; Wetherby & Prutting, 1984). They have particular difficulty following and using indicating strategies to establish a joint focus of attention (e.g., showing, pointing). The emerging intentional communication of autistic children appears to express primarily or exclusively nonsocial intentions, such as to request an object or request assistance. Autistic children develop idiosyncratic and unconventional means to communicate (e.g., self-injurious behavior, echolalia), which indicate that they are trying to communicate but do not know how to consider the needs of the listener. Even in older, higher functioning autistic individuals with advanced syntactic skills, problems in pragmatics persist (Baltaxe, 1977). Thus, rather than viewing autistic children as noncommunicative or noninteractive, current understandings suggest that the social deficits of autistic children result in particular difficulties acquiring social communicative intentions and conventional communicative means (Mundy & Sigman, 1989; Prizant & Wetherby, 1987; Wetherby, 1986).

Historical Perspective on Language Intervention with Autistic Children

There have been substantial changes in language intervention programs with autistic children over the past 25 years, which generally reflect progress in behavioral and developmental theories. A theory is a mental plan or philosophy that guides action. In underscoring the importance of language intervention being rooted in a sound theoretical framework, Prizant and Wetherby (1989) suggested that all clinicians abide by some theory in working with autistic children, whether that theory is derived from clinical experience or from theoretical literature. Most language intervention approaches described in the literature can be categorized as either behavioral or developmental. Behavioral approaches are interventions that are driven by theories of applied behavior analysis, while developmental approaches are interventions driven by theories of normal language development. This section will characterize changes in language intervention with autistic children by comparing behavioral and developmental language programs from the 1960s to the 1980s.

Behavioral and developmental theorists differ in their approach to the study of language intervention. Behaviorists generally utilize single subject research designs to study the effects of specific components of interventions while controlling as many other variables as possible. In contrast, developmentalists presume that an individual child interacts with many variables in the language-learning environment and that developmental outcomes are a result of the interplay between the child and the environment such that the child influences the environment and the environment influences the child (Sameroff & Chandler, 1975). Therefore, single subject research design is not viewed as a viable method of study, because it is does not allow the exploration of the interaction of variables. In other words, controlling the variables is stripping the context of what is meaningful in language learning, from the developmentalists' perspective. The developmental literature primarily consists of research designed to better understand the nature of language learning by autistic children, in relation to normal language development. Understanding how the autistic child learns language then provides guidelines for individualizing language intervention programs. Behaviorists generally are concerned with improving techniques for teaching autistic children language, while developmentalists are concerned with exploring how autistic children learn language and communication in order to optimize the language learning environment. Behaviorists have criticized developmental approaches for failing to demonstrate measurable gains from intervention. Developmentalists have criticized behavioral programs for failing to adequately describe and consider the child's foundation skills, such that intervention gains cannot be interpreted. While differences in philosophy have kept developmental and behavioral literature separated, there appears to be more impetus in the 1980s to blend these approaches.

Intervention programs for autistic children in the 1960s were derived from theories of etiology. Psychoanalytic treatment programs were the earliest developmental approaches described in the literature, and they predominated through the mid 1960s (see Ruttenberg, 1971). Based on the premise that autism is a disorder of emotional development interfering with the unfolding of the psychosexual progression, psychoanalytic treatment programs involved methods to activate arrested developmental processes. Individualized treatment programs were often carried out by a mother substitute, a "sensitive," "warm," and "accepting" child-care worker, guided by a psychiatric team, to foster the development of an object relationship, differentiation of self, and psychosexual and ego function development using normal developmental steps.

The emergence of neurogenic theories of the etiology of autism (e.g., Rimland, 1964) and the limitations in the effectiveness of psychoanalytic treatment programs paved the way for the acceptance of behavioral approaches, even with the use

of rather unorthodox procedures. Hewett (1965) was the first to report the use of a behavioral treatment approach to teach speech to a mute autistic child. Hewett constructed a special training booth in which the child was reinforced with candy, light, and music presented by the teacher for a correct response and was isolated from his teacher for an incorrect response. The training program proceeded from gestural and vocal imitation to speech training, and it took the child 6 months to acquire 32 words. In 1962 Lovaas (1971) initiated the application of reinforcement theory to the treatment of an echolalic autistic girl who displayed self-destructive behavior. Similar to the approach of Hewett, the treatment program described by Lovaas and his colleagues (Lovaas, Freitag, Gold, & Kassorla, 1965; Lovaas, Berberich, Perloff, & Schaeffer, 1966) involved the acquisitions of new behaviors with reinforcement and the elimination of problem behaviors by withdrawing attention or using punishment. Lovaas et al. (1966) described procedures for teaching speech to autistic children by first training verbal imitation and then establishing discriminations of meanings for words imitated. Lovaas, Schaeffer, and Simmons (1965) described the removal of an electric shock as a negative reinforcer to increase approach responses of autistic children with severe self-injury. The results demonstrated an increase in affection and prosocial behaviors directed to adults.

Lovaas (1977) provided the most detailed account of the procedures for language training that evolved out of his work in the 1960s in his book, titled *The Autistic Child: Language Development Through Behavior Modification*. His treatment program begins with general compliance training to get the child to sit in a chair, look at the clinician's face, and respond to nonverbal imitation. Then language behavior is trained using the following steps: (1) building verbal responses through verbal imitation; (2) labeling discrete events in response to questions like "What is it?" and "What are you doing?", first receptively then expressively; (3) teaching relationships between events (e.g., prepositions, time concepts, pronouns, same/different and yes/no); (4) conversation training to increase verbal exchanges; (5) giving and seeking information in a three-person interaction; (6) training grammatical skills; (7) teaching the child to recall and describe things in the past; and (8) increasing spontaneity. Rewards (i.e., a spoonful of the child's meal) were used throughout the program immediately following a correct response, and punishment (i.e., spanking, shouting by the adult) was used for inattention, self-injury, and tantrums. The program is very systematic in regard to stimulus presentation, prompting, and prompt fading; however, as described by Lovaas (1977), it is very time-consuming. The results were reported for two mute autistic children, who were trained for 6 days a week, 7 hours a day. After four weeks of imitation training, one child was able to imitate 38 different words or sounds, and the second child was able to imitate 19 different words or sounds. Rate of acquisition increased with each week of training. Lovaas also reported that the second child took over 90,0000 trials to learn the first correct labeling discrimination, although other children learned more quickly. Lovaas acknowledges in his book that a "...possible advantage of applying normal developmental sequences to language training for deviant children is that normal development seems more economical than the step-at-a-time program we propose" (p.130). However, Lovaas generally did not sequence the training steps based on the normal developmental progression, but rather on what he deems progresses from easy to hard.

By the late 1960s developmentalists strove to break away from psychoanalytic approaches and began to examine the language characteristics of autistic children in relation to the growing knowledge about normal child language. Much attention was given to understanding echolalia. Fay (1967; 1969) was a pioneer in attempting to compare autistic echolalia with imitation used by normal children. Fay (1969) compared the echolalia of an autistic child with two nonautistic developmentally delayed children that displayed echolalia. He demonstrated that in contrast to two nonautistic children, the autistic child used delayed echolalia and pronoun reversals and had a monotone voice. He concluded that the autistic child's use of echolalia was related to a severe language comprehension impairment, and in attempting to refute psychoanalytic interpretations, he stated that the pronoun reversals were linguistic in nature. Fay suggested that the clinician "look upon echolalia as an effort to remain within the verbal world" (p. 46). Continuing this line of thinking, Shapiro (1977) considered the communicative intentions of autistic children in the production of echolalic utterances and suggested that echolalia serves as a device for social closure. In other words, the autistic child knows that he/she is expected to take a turn but does not know how to respond other than to repeat what was said. Philips and Dyer (1977) took this point a step further and suggested that echolalia in autistic children is deviant in regard to how long the child remains at this stage, but is a necessary stage of language acquisition. They criticized the phasing out of developmental imitation in behavioral treatment programs and offered an alternate intervention strategy used successfully with one autistic child. Utilizing two clinicians, one served as the teacher asking the questions and the other as the prompter, offering the responses for the echolalic child to imitate. Using this method the child could experience the effect of his/her utterance by the questioner responding naturally to the child's imitated utterance. They reported that the child responded to the use of a prompter in group situations and that he began imitating peers as well as the clinician.

The developmental literature introduced new approaches to training nonverbal autistic children in the 1970s as an alternative to verbal imitation training. Miller and Miller (1973) described an innovative "cognitive-developmental" training program used with 19 mute autistic children to de-

velop the communicative foundation of language. The program was based on the normal developmental progression of children first learning to direct, first their body actions, then their distal senses (vision and audition), and finally their language, toward objects and events. Their program began by training directed body action as a first step in developing intentional behavior using obstacle courses set up on parallel 10-inch wide boards elevated three to six feet off the ground. They taught the use of sign language to correspond with actions used on the boards (e.g., walk, push, open, down), and then generalized the use of signs to situations on the ground. They reported that all of the children acquired at least several signs to communicate and seven of the children also acquired some spoken words related to the signs. McLean and McLean (1974) described a language training program to develop the use of symbols with three nonverbal autistic children who had shown no success after years of speech training. The procedures were based on those used by Premack in teaching language to chimpanzees. The children were trained to place discretely shaped wood symbols in specific order on a tray to convey meanings (e.g., Linda give ball) using different combinations of two agents, two actions, and three objects. They reported good success with two of the three children. These two studies mark the beginning of the application of nonspeech language systems with autistic children.

Investigations of behavioral treatment approaches with autistic children in the 1970s generally focused on studying aspects of behavioral technology, that is, exploring more effective teaching techniques by varying aspects of the stimuli, prompts, and consequences in discrimination learning. In a review of behavioral treatment approaches, Margolies (1977) identified the following difficulties in treating autistic children: finding appropriate reinforcers, reducing distraction during training, eliminating maladaptive behaviors, and expanding the child's behavioral repertoire. Programs generally involved training verbal imitation to mute autistic children and eliminating "psychotic" speech (including echolalia) with verbal autistic children. The 1970s marked movement away from hospital based intervention to school and home based education. Koegel and Rincover (1974) presented a procedure for moving autistic children into group classroom management. They taught eight autistic children classroom skills, such as attending to the teacher upon command, in a one to one student-teacher ratio. Then, because learning did not generalize to group activities, they faded in larger group ratios very gradually. An increasing number of programs were published in the 1970s that included a parent training component (e.g., Koegel, Glahn, & Nieminen, 1978; Lovaas, 1978).

A series of studies by Carr and colleagues exemplify the changing directions of behavioral approaches in the 1970s. Carr, Schreibman, and Lovaas (1975) found that echolalic autistic children were most likely to produce immediate echolalia in response to questions and commands for which they had not yet learned a response to, and they did not echo questions and commands for which they did have an appropriate response. They also found that once the child was taught an appropriate response to a previously echoed question, he/she no longer echoed that question. Schreibman and Carr (1978) taught two echolalic children to respond to a set of previously echoed questions (where, how, why) with the sentence, "I don't know," while maintaining the nonecholalic responses to questions for which they were able to give appropriate responses. They found that the children generalized the "I don't know" response to previously echoed questions that were not trained. The authors advocated teaching a generalized verbal response to eliminate echolalic responding. They suggested that this procedure would not interfere with imitation training if the child were rewarded for imitating a verbal stimulus only when that stimulus is preceded by a command to imitate (i.e., "Say_____").

By the 1980s the developmental literature offered new perspectives on the communicative value of previously considered deviant behavior. Echolalia was no longer considered a deviant or pathological behavior, but rather was viewed as the autistic child's effort to communicate (Schuler, 1979; Prizant & Duchan, 1981). Prizant and associates (Prizant & Duchan, 1981; Prizant & Rydell, 1984) examined the use of immediate and delayed echolalia by a small group of autistic children in natural interactions in reference to the linguistic, nonlinguistic, and social contexts. They identified numerous functions of echolalia, including request, protest, affirmation, declarative, calling, rehearsal, and self-regulatory. Furthermore, they found that a high proportion of echolalic utterances were produced with clear evidence of comprehension. They concluded that echolalic utterances should not simply be dismissed as pathological or nonfunctional, but rather should be viewed as a continuum of behavior ranging from automatic to intentional. Hurtig, Ensrud, and Tomblin (1982) analyzed the stereotypic question production of verbal autistic children and suggested that, rather than serving as a request for information, the communicative function of question production was to initiate or maintain social contact. Thus, autistic children appear to use certain verbal strategies in an effort to participate in social interaction, in spite of their limited repertoire of conventional means. Prizant (1983a) offered specific intervention strategies for helping the autistic child to break down echolalic utterances into meaningful units to enhance spontaneous, creative language use.

Another example of a new perspective from the developmental literature is with gaze behavior. Mirenda, Donnellan, and Yoder (1983) questioned the appropriateness of traditional eye-contact training with autistic children. In a review of literature on the function of gaze behavior in normal children and adults, they pointed out that it is used as a means of

initiating, regulating, and terminating interaction, and hence, is a foundation for conversational turn-taking. For example, when an infant directs eye gaze toward the caregiver, this is a signal to the caregiver to interact with the child. When the child is overstimulated, he/she averts eye gaze away from the caregiver, and the caregiver stops the interaction until the child signals readiness. They suggested that normal patterns of gaze behavior should be targeted in treatment with autistic children, rather than training eye contact for durations that exceed limits of normal children. Tiegerman and Primavera (1984) studied the effects of three procedures on the gaze behavior of six autistic children. During adult-child play interactions they used duplicate sets of objects and allowed the child to manipulate the objects. In the first procedure the clinician imitated the child's movements using the same object, in the second procedure the clinician performed a different movement using the same object, and in the third procedure the clinician performed a different movement using a different object than the child. They found that, although the subjects initially interacted with the objects without directing gaze toward the adult, the frequency and duration of directed gaze behavior increased during the first and second procedures, but did not change during the third procedure. The greatest increase was found during the first procedure. Tiegerman and Primavera suggested that the degree of control that the child had over the environment is a critical variable affecting gaze behavior.

Behavioral research in the 1980s also focused on communicative aspects of behavior. Two studies are exemplary of this change in behavioral research. Carr and Durand (1985) first identified situations in which maladaptive behaviors, including aggressive, self-destructive, and disruptive behavior, were displayed by four developmentally delayed children. They found that these children used frequent problem behaviors during conditions of either high level of task difficulty or low level of adult attention. Then they selected verbal replacements for these maladaptive behaviors and taught the children to solicit attention by saying "Am I doing good work?" and to solicit assistance by saying "I don't understand." They demonstrated that the behavior problems were reduced to low levels by teaching a child the communicative phrase that served the function of their problem behaviors, but remained high after teaching the child an irrelevant communicative phrase. They concluded that behavior problems may function as nonverbal communicative acts, and therefore, should be replaced by more appropriate verbal means for obtaining the desired result. Koegel, O'Dell, and Koegel (1987) described the use of a "natural language training" paradigm using a multiple baseline design with two nonverbal autistic children. This paradigm involved using functional and varied stimuli, using natural reinforcers, reinforcing communicative attempts, and conducting trials in a natural interchange. In contrast to traditional verbal imitation and discrimination training during baseline, they demonstrated generalization of spontaneous utterances outside of the clinical setting for both children using the natural language training paradigm.

The 1980s brought a much more critical look at traditional behavioral approaches. Behavioral interventions were criticized for the great variation in outcome of intervention, for example, some children make great gains after brief periods of intervention, while others show little improvement after extensive treatment (Carr, 1985; Howlin; 1981). Generalization of treatment gains has been limited in teaching language behaviors. Additionally, behavioral approaches have not provided guidelines for making curricular decisions. Carr (1985) discussed how behavioral technology can be applied in a more effective manner to enhance communication skills. He suggested utilizing psycholinguistic research as a basis for choosing curricular items, using multiple exemplar training to promote stimulus generalization, and using incidental teaching to promote the communicative use of language. Donnellan and Neel (1986) emphasized the importance of a functional curriculum for autistic students, which entails teaching skills that are required regularly in the student's everyday environments (i.e., home, school, and community). Lord (1985a) acknowledged the benefits that have been documented with behavioral treatment, but offered the following criticisms of behavioral approaches: the failure of behavioral approaches to place language within a broader framework of the child's development in other domains; the lack of controls or detailed subject description data to show that treatment effects were not due to pretreatment differences among subjects; the need to demonstrate that teaching children other behaviors did not result in the same improvement; and the failure to apply information from the literature on normal child development and parent-child interaction. Thus, there continue to be certain incompatible philosophies between behavioral and developmental approaches. Directions for the future include proponents of developmental approaches providing a stronger source of data to demonstrate intervention effectiveness and those of behavioral approaches demonstrating how behavioral techniques utilized with special populations can be applied not only to theories of normal child development, but also to decision making about the content and context of treatment.

Critical Components of a Model Contemporary Language Intervention Program

Autism is now understood to be a developmental disorder involving impairments of social interaction, communication, and symbolic abilities (Prizant & Wetherby, 1988). Therefore, language intervention should help the autistic child learn how to communicate, with verbal and/or nonverbal means, not simply learn a set of verbal behaviors. The most critical component of a model language intervention program for autistic children in the 1990s that differs dramatically from traditional behavioral programs is the emphasis on successful communi-

Table 2. Modification of Problem Behaviors (adapted from Evans & Meyer, 1986; Meyer & Evans, 1985).

I. Antecedent Approaches

Antecedent or "ecological" approaches prevent the occurrence of a problem behavior either by removing items associated with it, rearranging the physical environment, and/or changing the nature of the educational program.

A. Modify the setting by changing the materials, time schedule, seating, noise, lighting, etc.
B. Modify the task structure by changing the distribution of trials, task difficulty, level of boredom, functionality of task, performance criteria, etc.
C. Implement a response interruption procedure by using a prosthesis or protective clothing, manual restraint, and/or verbal cueing or other procedure that interrupts the child's ability to engage in the problem behavior prior to the occurrence of the behavior.

II. Curricular Approaches

"Curricular" approaches teach a socially acceptable behavior that is equivalent in function to a problem behavior. A functional analysis of the problem behavior should be conducted to determine whether the behavior serves a communicative function or as self-entertainment during unstructured time.

A. Teach alternative means to serve the communicative function of the problem behavior
B. Develop functional object use, appropriate toy play and leisure activities to provide productive self-entertainment

III. Consequential Approaches

Consequential approaches use a planned negative contingency that reduces the future occurrence of a behavior *and/or* a planned positive contingency that increases the future occurrence of a behavior

A. Negative Consequences
   1. verbal reprimands
   2. explanation of rules
   3. physical interruption and redirection
   4. loss of privileges/ response cost
   5. exclusion time-out from reinforcement
   6. seclusion time-out from reinforcement
   7. overcorrection
   8. physical restraint
B. Positive Consequences
   1. ignoring, redirection and positive reinforcement
   2. differential reinforcement of other (DRO) behavior
   3. differential reinforcement of competing behavior
   4. token economy
   5. contingency contracting

cative interactions. This emphasis is found in both behavioral and developmental contemporary literature.

Prioritizing communication affects all aspects of programming from targetting goals to designing the context of intervention. Following are some of the major issues that should be considered in communication programming with autistic children based on current developmental and behavioral literature.

Functional Analysis of Behavior

Communication programming should be fully integrated with the management of behavior problems with autistic individuals. The framework presented by Evans and Meyer (1985; Meyer & Evans, 1986) is useful for understanding the role of communication programming in the management of problem behaviors. This framework is outlined in Table 2.

Evans and Meyer presented a method for managing maladaptive or problem behaviors (e.g., self-injury, aggression, self-stimulation) in integrated educational and community settings. The first step is to identify the problem behaviors that warrant immediate change and to conduct a functional analysis of these behaviors. This entails formulating and testing hypotheses about the conditions under which the behaviors occur. They suggested that most problem behaviors serve one of the following three functions: (1) social communication, to indicate that the child wants attention, wants to be left alone, is frustrated with a task, and so on; (2) self-regulatory, to adjust arousal levels and focus of attention; and (3) self-entertainment, to occupy self during unstructured time. The child would need to be observed in a variety of settings with a variety of people to identify patterns in antecedents and consequences which initiate and maintain the maladaptive behavior.

Evans and Meyer outlined three major intervention procedures to select from (see Table 2) based on the information gathered in the functional analysis. If the behavior serves a purpose, either for communication or self-entertainment, then the child should be taught a socially acceptable positive behavior to replace the problem behavior and to serve as a functional equivalent. If the behavior serves no obvious function, antecedent approaches can be initiated which prevent the occurrence of these behaviors. The authors indicate that most programming would involve a combination of antecedent, curricular, and consequential approaches. However, they warn that antecedent and consequential approaches may lead to behavioral control in specific circumstances and may not necessarily lead to generalized changes in behavior across classes of behaviors or across settings. Teaching functional equivalence has been found to produce long lasting behavioral change. While there is continued controversy over whether punishment should be used at all with autistic children, the limitations of punishment should be understood. Alternatives

to punishment should be fully explored. The framework in Table 2 offers a host of alternatives to punishment. Teaching an appropriate communicative means to express the function served by problem behaviors is an important component of behavior management and is an effective alternative to punishment.

Normal Developmental Framework for Clinical Decision Making

Prizant and Wetherby (1989) identified three critical aspects of normal communication development to consider in communication programming for autistic children. First, there is developmental continuity from preverbal communication to the use of language, and preverbal communication is a necessary precursor to language acquisition. One important implication of this is that with nonverbal autistic children, intervention initially should target the use of preverbal gestures and/or sounds to communicate intentionally for a variety of purposes. Once the child has a repertoire of preverbal signals, then verbal means can be mapped onto preverbal communication to facilitate the spontaneous and functional use of language. Secondly, communicative competence is the developmental outcome of the interaction among social, cognitive, communicative, and language domains. Rather than simply teaching speech (i.e., sound or word production) as a behavior, the child's developmental profile across these domains should guide clinical decision making, particularly in selecting speech versus nonspeech communication systems and in prioritizing intervention goals. Thirdly, the development of communication should be systemic, rather than fragmented by teaching isolated behaviors. That is, the child's language should be considered in reference to his/her developing abilities across communicative, cognitive, and social domains. Emphasis should be placed on the development of more conventional means to communicate, with the conceptual understanding and social purpose of the behavior serving as the foundation.

Developmental information should not be used to form a checklist from which behaviors must be taught in a specified order, but rather it should provide a frame of reference for selecting and prioritizing communication goals (Prizant & Wetherby, 1989). Selecting developmentally appropriate communication goals should enhance active learning by the child, improve the efficiency and effectiveness of intervention efforts, and alleviate frustration for the child, parents, teachers, and speech-language pathologists (Marcus & Schopler, 1987; Prizant & Wetherby, 1989; Rutter, 1985; Wetherby, 1986). The reader should refer to Lord (1985b), Prizant and Schuler (1987), Prizant and Wetherby (1988; 1989), Schuler and Prizant (1987), Watson (1985), and Watson, Lord, Schaeffer, & Schopler (1989) for guidelines on targetting developmentally appropriate communication and language goals for autistic children.

Facilitating Child-Initiated Communication and Language

Both developmental and behavioral literature have emphasized the importance of child-initiated communication and language. The behavioral literature has described "incidental language teaching" as a method of achieving a more naturalistic approach to language training. Traditional behavioral approaches utilize a discrete trial format in which the clinician presents a stimulus, the child responds or is prompted to respond, and the clinician then presents a consequence. In contrast to a discrete trial format, an incidental teaching episode is initiated by the child. The adult waits for the child to initiate a communicative behavior (i.e., gesture, vocalization) and then focuses attention on the child and the child's topic. The adult then asks for a language elaboration or models a verbal response for the child to imitate. And finally the adult indicates the correctness of the child's language or gives the child what is asked for. The adult may arrange the environment to encourage the child to need assistance, and if the child does not initiate, the adult may use a verbal cue, such as "What do you need?". Incidental teaching was first described by Hart and Risley (1968; 1974) to teach language to disadvantaged preschool children and has been found to enhance generalization in teaching language to severely handicapped children, including autistic (see Hart, 1985 and Warren & Kaiser, 1986 for review).

The shift in the developmental literature from language structure to the communicative use of language in the 1970s led to techniques which *follow the child's lead* to develop conversational turn-taking (Bloom & Lahey, 1978; Fey, 1986; McLean & Snyder-McLean, 1978; MacDonald, 1985; MacDonald & Gillette, 1984). In a review of environmental effects on spontaneous language of normal and disordered children, Hubbel (1977) evidenced the detrimental effect of constraint, in the form of interrogatives and directives, on spontaneous talking, as well as the facilitative effect of nonconstraining activities that follow the child's lead. Numerous studies have demonstrated that the use of a "facilitative" interaction style with autistic children leads to higher rates of child-initiated interactions, asking of questions, initiation of conversational topics, and communicative eye gaze (Dawson & Adams, 1984; Mirenda & Donnellan, 1986; Peck, 1985; Tiegerman & Primavera, 1984). The developmental literature describes a facilitative style as involving waiting to allow the child to initiate a behavior, interpreting the child's behavior as communicative and meaningful, and then responding in a manner that will encourage continued communicative interactions (Fey, 1986; MacDonald, 1985; MacDonald & Gillett, 1984; Prizant & Wetherby, 1988).

Division TEACCH (Treatment and Education of Autistic and related Communication-handicapped Children), a statewide program that serves autistic children and their families in

North Carolina, developed a classroom curriculum for social skills, language and communication, and prevocational skills. The TEACCH communication curriculum (Watson, 1985) is an example of a curriculum that has a developmental focus and emphasizes spontaneous communication. It includes five aspects of communication: (1) communicative functions; (2) the contexts in which communication occurs; (3) semantic meanings; (4) specific words used; and (5) communicative means, whether verbal or nonverbal. The communication curriculum has recently been revised and expanded (see Watson et al., 1989).

Ecological Soundness

Both developmental and behavioral literature have discussed the importance of the ecological soundness of education or intervention efforts. Ecological theory of child development addresses the relationship between the child and his/her natural environment, and therefore has important implications for designing the context of language intervention. Children learn language in dyads involving people with whom they have meaningful relationships (MacDonald, 1985). Therefore, language learning should occur in the home, the classroom, and the community, involving significant people in the daily life of the autistic child (i.e., parents, siblings, teachers, and peers) because these are the natural environments in which the child will need to use language. Joint action between the child and adult forms the social context of language acquisition (Bruner, 1975; 1978). Joint action first appears as a give-and-take exchange format in which the child serves as both the agent and the recipient of action, and later exchanges roles (e.g., peek-a-boo). Joint participation in action serves to establish a concept of reciprocal roles, thus forming the groundwork for the conventional use of language in the regulation of joint action. Joint action routines provide an optimal context to foster reciprocal social interaction, and thus, to address the social and communication problems of autistic children (see Snyder-McLean, Solomonson, McLean, & Sack, 1984).

Dyad as the Minimal Unit of Communication

Traditional behavioral language treatment programs for autistic children have targeted changes in the child's behavior, either to reduce inappropriate behaviors and/or to increase desired behaviors. The introduction of pragmatics in the 1970s has led to movement away from focusing solely on the child. Communication involves the cooperative interaction of two members of a dyad. Therefore, communication goals should address changing the behavior of both members of the dyad. In addition to developmentally appropriate communication and language goals for the child, goals should be targeted to improve facilitative interaction styles of significant others. This may entail teaching significant others to read the communicative attempts of the autistic child and then to respond in a facilitative manner. The TEACCH curriculum is based on the principle that parents serve as "co-therapists," thus fostering the parent-professional collaboration (Watson, 1985). The Hanen Early Language Parent Program is an example of an intervention program that teaches a facilitative interaction style to significant others (Girolametto, Greenberg, Manolson, 1986; Manolson, 1985). This program has been adapted for use with parents of children with autism (Weitzman & Mayerovitch, 1987).

Concluding Comments

This article has traced some of the major changes in language intervention with autistic children over the past 25 years. These changes have placed the speech-language pathologist in a key role to facilitate not only language development in autistic children, but also communication and social interaction. However, traditional pull-out therapy in a therapy room two or three times a week is of limited value in addressing the communicative needs of autistic children.

A service delivery model in which the clinician not only provides direct service to the autistic child but also serves as a consultant to the teacher and parents is needed. As a consultant the clinician can evaluate the communication abilities of the autistic child, the quality of the interactions between the child and significant others, and the quality of the language learning environment. Intervention should include selecting developmentally appropriate communication and language goals for the child, fostering a facilitative interaction style used by significant others, and designing the language learning environment in the classroom, home, and community to encourage child-initiated communication.

Rutter (1985), a leader in the field of autism and developmental disorders, identified four major goals of treatment with autistic children: (1) to foster normal cognitive, language, and social development; (2) to reduce (not necessarily eliminate) the rigidity and stereotypy that pervades many aspects of autistic children's functioning; (3) to eliminate non-specific maladaptive behaviors; and (4) to alleviate family distress. A contemporary language program in which communication goals are targeted at the level of the dyad in natural language learning environments with the emphasis on the child's communicative intentions should address aspects of all of these goals.

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References

American Psychiatric Association (1980). *Diagnostic and statistical manual of mental disorders* (3rd ed.). Washington, DC: American Psychiatric Association.

American Psychiatric Association (1987). *Diagnostic and statistical manual of mental disorders* (3rd ed. - Revised). Washington, DC: American Psychiatric Association.

Baltaxe, C. (1977). Pragmatic deficits in the language of autistic adolescents. *Journal of Pediatric Psychology, 2*, 176-180.

Baltaxe, C., & Simmons, J. (1975). Language in childhood psychosis: A review. *Journal of Speech and Hearing Disorders, 40*, 439-458.

Baltaxe, C., & Simmons, J. (1985). Prosodic development in normal and autistic children. In E. Schopler & G.B. Mesibov (Eds.), *Communication problems in autism* (pp. 95-126). New York: Plenum Press.

Bates, E. (1976). *Language in context*. New York: Academic Press.

Bates, E. (1979). *The emergence of symbols: Cognition and communication in infancy*. New York: Academic Press.

Bettelheim, B. (1967). *The empty fortress: Infantile autism and the birth of self*. New York: The Free Press.

Bloom, L., & Lahey, M. (1978). *Language development and language disorders*. Cambridge, MA: MIT Press.

Bristol, M.M. (1984). Family resources and successful adaptation to autistic children. In E. Schopler & G.B. Mesibov (Eds.), *The effects of autism on the family* (pp. 289-310). New York: Plenum Press.

Bruner, J. (1975). The ontogenesis of speech acts. *Journal of Child Language, 2*, 1-19.

Bruner, J. (1978). From communication to language: A psychological perspective. In I. Markova (Ed.), *The social context of language* (pp. 17-48). Chichester: John Wiley & Sons.

Cantwell, D., Baker, L., & Rutter, M. (1978). Family factors. In M. Rutter & E. Schopler (Eds.), *Autism: A reappraisal of concepts and treatment (pp. 269-298). New York: Plenum Press.*

Caparulo, B., & Cohen, D. (1977). Cognitive structures, language, and emerging social competence in autistic and aphasic children. *Journal of the American Academy of Child Psychiatry, 15*, 620-644.

Carr, E.G. (1985). Behavioral approaches to language and communication. In E. Schopler & G. Mesibov (Eds.), *Communication problems in autism* (pp. 37-58). New York: Plenum Press.

Carr, E.G., & Durand, V. (1985). Reducing behavior problems through functional communication training. *Journal of Applied Behavior Analysis, 18*, 111-126.

Carr, E.G., Schreibman, L., & Lovaas, O.I. (1975). Control of echolalic speech in psychotic children. *Journal of Abnormal Child Psychology, 3*, 331-351.

Cohen, D., Caparulo, B. & Shaywitz, B. (1976). Primary childhood aphasia and childhood autism. *Journal of the American Academy of Child Psychiatry, 15*, 604-645.

Courchesne, E. (1989). Neuroanatomical systems involved in infantile autism: The implications of cerebellar abnormalities. In G. Dawson (Ed.), *Autism: Nature, diagnosis, and treatment* (pp. 119-143). New York: Guilford Press.

Cox, A., Rutter, M., Newman, S., & Bartak, L. (1975). A comparative study of infantile autism and specific developmental receptive language disorder: II. Parental characteristics. *British Journal of Psychiatry, 126*, 146-159.

Creak, M. (1972). Reflections on communication and autistic children. *Journal of Autism and Childhood Schizophrenia, 2*, 1-8.

Dawson, G. (1983). Lateralized brain dysfunction in autism: Evidence from the Halstead-Reitan Neuropsychological Battery. *Journal of Autism and Developmental Disorders, 13*, 269-286.

Dawson, G., & Adams, A. (1984). Imitation and social responsiveness in autistic children. *Journal of Abnormal Child Psychology, 12*, 209-226.

Dawson, G., & Lewy, A. (1989). Reciprocal subcortical-cortical influences in autism: The role of attentional mechanisms. In G. Dawson (Ed.), *Autism: Nature, diagnosis, and treatment* (pp. 144-173). New York: Guilford Press.

DeMyer, M. (1979). *Parents and children in autism*. New York: Wiley.

Eisenberg, L. (1956). The autistic child in adolescence. *American Journal of Psychiatry, 112*, 607-612.

Elliot, G.R., & Ciaranello, R.D. (1987). Neurochemical hypotheses of childhood psychoses. In E. Schopler & G. Mesibov (Eds.), *Neurobiological issues in autism* (pp. 245-262). New York: Plenum Press.

Evans, I.M., & Meyer, L.H. (1985). *An educative approach to behavior problems: A practical decision model for intervention with severely handicapped learners*. Baltimore: Paul H. Brookes.

Fay, W. (1967). Mitigated echolalia of children. *Journal of Speech and Hearing Research, 10*, 305-310.

Fay, W. (1969). On the basis of autistic echolalia. *Journal of Communication Disorders, 2*, 38-47.

Fey, M.E. (1986). *Language intervention with young children*. San Diego: College Hill Press.

Girolametto, L.E., Greenberg, J., & Manolson, H.A. (1986). Developing dialogue skills: The Hanen early language parent program. *Seminars in Speech and Language, 7*, 367-382.

Gualtieri, T., Evans, R.W., & Patterson, D.R. (1987). The medical treatment of autistic people: Problems and side effects. In E. Schopler & G. Mesibov (Eds.), *Neurobiological issues in autism* (pp. 245-262). New York: Plenum Press.

Hart, B. (1985). Naturalistic language training techniques. In S. Warren & A..K. Rogers-Warren (Eds.), *Teaching functional language: Generalization and maintenance of language skills* (pp. 63-88). Baltimore: University Park Press.

Hart, B., & Risley, T.R. (1968). Establishing the use of descriptive adjectives in the spontaneous speech of disadvantaged preschool children. *Journal of Applied Behavior Analysis, 1*, 109-120.

Hart, B., & Risley, T.R. (1974). Using preschool materials to modify the language of disadvantaged children. *Journal of Applied Behavior Analysis, 7*, 243-256.

Hewett, F.M. (1965). Teaching speech to an autistic child through operant conditioning. *American Journal of Orthopsychiatry, 35*, 927-936.

Holm, V.A., & Varley, C.K. (1989). Pharmacological treatment of autistic children. In G. Dawson (Ed.), *Autism: Nature, diagnosis, and treatment* (pp. 386-404). New York: Guilford Press.

Howlin, P. (1981). The effectiveness of operant language training with autistic children. *Journal of Autism and Developmental Disorders, 11*, 89-105.

Hubbell, R.D. (1977). On facilitating spontaneous talking in young children. *Journal of Speech and Hearing Disorders, 42*, 216-231.

Hurtig, R., Ensrud, S., & Tomblin, J. (1982). The communicative function of question production in autistic children. *Journal of Autism and Developmental Disorders, 12*, 57-69.

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

Kanner, L. (1946). Irrelevant and metaphorical language in early infantile autism. *American Journal of Psychiatry, 103*, 242-245.

Kanner, L. (1971). Follow-up study of eleven autistic children originally reported in 1943. *Journal of Autism and Childhood Schizophrenia, 1*, 119-145.

Koegel, R.L., Glahn, T.J., & Nieminen, G.S. (1978). Generalization of parent-training results. *Journal of Applied Behavior Analysis, 11*, 95-109.

Koegel, R.L., O'Dell, M.C., & Koegel, L.K. (1987). A natural language teaching paradigm for nonverbal autistic children. *Journal of Autism and Developmental Disorders, 17*, 187-200.

Koegel, R.L., & Rincover, A. (1974). Treatment of psychotic children in a classroom environment: I. Learning in a large group. *Journal of Applied Behavior Analysis, 7*, 45-59.

Lord, C. (1985a). Contribution of behavioral approaches to the language and communication of persons with autism. In E. Schopler & G. B. Mesibov (Eds.), *Communication problems in autism* (pp. 59-68). New York: Plenum Press.

Lord, C. (1985b). Autism and the comprehension of language. In E. Schopler & G. B. Mesibov (Eds.), *Communication problems in autism* (pp. 257-281). New York: Plenum Press.

Lotter, V. (1978). Follow-up studies. In M. Rutter & E. Schopler (Eds.), Autism: *A reappraisal of concepts and treatmental* (pp. 475-496). New York: Plenum Press.

Lovaas, O.I. (1971). Considerations in the development of a behavioral treatment program for psychotic children. In D.W. CHurchill, G.D. Alpern, & M.K. DeMyer (Eds.), *Infantile Autism* (pp. 124-144). Springfield, Illinois: Charles C. Thomas.

Lovaas, O.I. (1977). *The autistic child: Language development through behavior modification*. New York: Irvington Publishers.

Lovaas, O.I. (1978). Parents as therapists. In M. Rutter & E. Schopler (Eds.), *Autism: A reappraisal of concepts and treatment* (pp. 369-378). New York: Plenum Press.

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

Lovaas, O.I., Freitag, G., Gold, V.J., & Kassorla, I.C. (1965). Experimental studies in childhood schizophrenia: Analysis of self-destructive behavior. *Journal of Experimental Child Psychology, 2*, 67-84.

Lovaas, O.I., Schaeffer, B., & Simmons, J.Q. (1965). Building social behavior in autistic children by use of electric shock. *Journal of Experimental Research in Personality, 1*, 99-109.

MacDonald, J.D. (1985). Language through conversation: A model for intervention with language-delayed persons. In S. Warren & A. Rogers-Warren (Eds.), *Teaching functional language: Generalization and maintenance of language skills* (pp. 89-122). Baltimore: University Park Press.

MacDonald, J.D., & Gillette, Y. (1984). Conversation engineering: A pragmatic approach to early social competence. *Seminars in Speech and Language, 5*, 171-183.

Manolson, A. (1985). *It takes two to talk: A Hanen early language parent guide book*. Toronto: Hanen Early Language Resource Centre.

Marcus, L.M., & Schopler, E. (1987). Working with families: A developmental perspective. In D. Cohen & A. Donnellan (Eds.), *Handbook of Autism and Pervasive Developmental Disorders* (pp. 499-512). New York: John Wiley and Sons.

Margolies, P.J. (1977). Behavioral approaches to the treatment of early infantile autism: A review. *Psychological Bulletin, 84*, 249-264.

McAdoo, W.G., & DeMyer, M.K. (1978). Personality characteristics of parents. In M. Rutter & E. Schopler (Eds.), *Autism: A Reappraisal of concepts and treatment* (pp. 251-267). New York: Plenum Press.

McLean, J.E., & Snyder-McLean, L. (1978). *A transactional approach to early language training*. Columbus, OH: Charles E. Merrill.

McLean, L.P., & McLean, J.E. (1974). A language training program for nonverbal autistic children. *Journal of Speech and Hearing Disorders, 39*, 186-193.

Meyer, L., & Evans, I. (1986). Modification of excess behavior: An adaptive and functional approach for educational and community contexts. In R. Horner, L. Meyer, & H. Fredericks (Eds.), *Education of learners with severe handicaps: Exemplary service strategies* (pp. 315-350). Baltimore: Paul Brookes.

Miller, A., & Miller, E.E. (1973). Cognitive-developmental training with elevated boards and sign language. *Journal of Autism and Childhood Schizophrenia, 3*, 65-85.

Mirenda, P.L., & Donnellan, A.M. (1986). Effects of adult interaction style on conversational behavior in students with severe communication problems. *Language, Speech and Hearing Services in the Schools, 17*, 126-141.

Mirenda, P.L., Donnellan, A.M., & Yoder, D.E. (1983). Gaze behavior: A new look at an old problem. *Journal of Autism and Developmental Disorders, 13*, 397-409.

Mundy, P., & Sigman, M. (1989). Specifying the nature of the social impairment in autism. In G. Dawson (Ed.), *Autism: Nature, diagnosis, and treatment* (pp. 3-21). New York: Guilford Press.

Mundy, P., Sigman, M., Ungerer, J., & Sherman, T. (1986). Defining the social deficits of autism: The contribution of nonverbal communication measures. *Journal of Child Psychology and Psychiatry, 27*, 657-669.

Ornitz, E. M. (1985). Neurophysiology of infantile autism. *Journal of the American Academy of Child Psychiatry, 24*, 251-262.

Paul, R. (1987). Natural history. In D.J. Cohen & A.M. Donnellan (Eds.), *Handbook of autism and pervasive developmental disorders* (pp. 61-84). Silver Spring: V.H. Winston & Sons.

Peck, C. (1985). Increasing opportunities for social control by children with autism and severe handicaps: Effects on student behavior and perceived classroom climate. *Journal of the Association for Persons with Severe Handicaps, 4*, 183-193.

Philips, G.M., & Dyer, C. (1977). Late onset echolalia in autism and allied disorders. *British Journal of Disorders of Communication, 12*, 47-59.

Prizant, B.M. (1982). Speech-language pathologists and autistic children: What is our role? Part II. *ASHA, 24*, 521-537.

Prizant, B.M. (1983a). Echolalia in autism: Assessment and intervention. *Seminars in Speech and Language, 4*, 63-78.

Prizant, B.M. (1983b). Language acquisition and communicative behavior in autism: Toward an understanding of the "whole" of it. *Journal of Speech and Hearing Disorders, 48*, 296-307.

Prizant, B.M., & Duchan, J. (1981). The functions of immediate echolalia in autistic children. *Journal of Speech and Hearing Disorders, 46*, 241-249.

Prizant, B.M., & Rydell, P. (1984). Analysis of the functions of delayed echolalia in autistic children. *Journal of Speech and Hearing Research, 27*, 183-192.

Prizant, B.M., & Schuler, A. (1987). Facilitating communication: Language approaches. In D. Cohen & A. Donnellan (Eds.), *Handbook of Autism and Pervasive Developmental Disorders* (pp. 316-332). New York: John Wiley and Sons.

Prizant, B.M., & Wetherby, A.M. (1987). Communicative intent: A framework for understanding social-communicative behavior in autism. *Journal of the American Academy of Child Psychiatry, 26*, 472-479.

Prizant, B.M., & Wetherby, A.M. (1988). Providing services to children with autism (0 to 2 years) and their families. *Topics in Language Disorders, 9*, 1-23.

Prizant, B.M., & Wetherby, A.M. (1989). Enhancing language and communication in autism: From theory to practice. In G. Dawson (Ed.), *Autism: Nature, diagnosis, and treatment* (pp. 282-309). New York: Guilford Press.

Reichler, R.J., & Lee, E.M. (1987). Overview of biomedical issues in autism. In E. Schopler & G. Mesibov (Eds.), *Neurobiological issues in autism* (pp. 14-41). New York: Plenum Press.

Ricks, D., & Wing, L. (1975). Language, communication and the use of symbols in normal and autistic children. *Journal of Autism and Childhood Schizophrenia, 5*, 191-221.

Rimland, B. (1964). *Infantile autism*. New York: Appleton-Century Crofts.

Ritvo, E., & Freeman, B. (1978). National Society for Autistic Children definition of the syndrome of autism. *Journal of Autism and Childhood Schizophrenia, 8*, 162-167.

Ruttenberg, B.A. (1971). A psychoanalytic understanding of infantile autism. In D.W. Churchill, G.D. Alpern, & M.K. DeMyer (Eds.), *Infantile autism* (pp. 145-184). Springfield, Illinois: Charles C. Thomas.

Rutter, M. (1978). Diagnosis and definition of childhood autism. *Journal of Autism and Childhood Schizophrenia, 8*, 139-161.

Rutter, M. (1985). The treatment of autistic children. *Journal of Child Psychology, 26*, 193-214.

Rutter, M., & Bartak, L. (1971). Causes of infantile autism: Some considerations from recent research. *Journal of Autism and Childhood Schizophrenia, 1*, 20-32.

Sameroff, A., & Chandler, M.J. (1975). Reproductive risk and the continuum of caretaking causality. In F. Horowitz, M. Hetherington, F. Scarr-Salapatek, & G. Siegel (Eds.), *Review of child development research, Vol. 4* (pp. 187-244). Chicago: University of Chicago Press.

Savage, V.A. (1968). Childhood autism: A review of the literature with particular reference to the speech and language structure of the autistic child. *British Journal of Disorders of Communication, 3*, 75-88.

Schreibman, L., & Carr, E. (1978). Elimination of echolalic responding to questions through the training of a generalized verbal response. *Journal of Applied Behavior Analysis, 11*, 453-464.

Schuler, A. (1979). Echolalia: Issues and clinical applications. *Journal of Speech and Hearing Disorders, 44*, 411-434.

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

Schuler, A., & Prizant, B. (1987). Facilitating communication: Pre-language approaches. In D. Cohen & A. Donnellan (Eds.), *Handbook of autism and pervasive developmental disorders* (pp. 301-315). New York: John Wiley and Sons.

Shapiro, T. (1977). The quest for a linguistic model to study the speech of autistic children. *Journal of the American Academy of Child Psychiatry, 16*, 608-619.

Snyder-McLean, L., Solomonson, B., McLean, J., & Sack, S. (1984). Structuring joint action routines: A strategy for facilitating communication and language development in the classroom. *Seminars in Speech and Language, 5*, 213-228.

Tiegerman, E., & Primavera, L. (1984). Imitating the autistic child: Facilitating communicative gaze behavior. *Journal of Autism and Developmental Disorders, 14*, 27-38.

Warren, S.F., & Kaiser, A.P. (1986). Incidental language teaching: A critical review. *Journal of Speech and Hearing Disorders, 51*, 291-299.

Watson, L. (1985). The TEACCH communication curriculum. In E. Schopler & G. B. Mesibov (Eds.), *Communication problems in autism* (pp. 187-206). New York: Plenum Press.

Watson, L., Lord, C., Schaeffer, B., & Schopler, E. (1989). *Teaching spontaneous communication to autistic and developmentally handicapped children*. New York: Irvington Press.

Weitzman, E., & Mayerovitch, J. (1987). A pilot program for the parents of young children with autism: A modified Hanen program. Unpublished manuscript. Toronto: Hanen Early Language Resource Centre.

Wetherby, A.M. (1984). Possible neurolinguistic breakdown in autistic children. *Topics in Language Disorders, 4*, 19-33.

Wetherby, A.M. (1986). Ontogeny of communicative functions in autism. *Journal of Autism and Developmental Disorders, 16*, 295-316.

Wetherby, A.M., & Prutting, C. (1984). Profiles of communicative and cognitive-social abilities in autistic children. *Journal of Speech and Hearing Research, 27*, 364-377.

Wing, L. (1981). Language, social, and cognitive impairments in autism and severe mental retardation. *Journal of Autism and Developmental Disorders, 11*, 31-44.