

Behavioral Approaches to the Treatment of Early Infantile Autism: A Review

Paul J. Margolies

State University of New York at Stony Brook

Behavioral approaches to the treatment of early infantile autism are examined and evaluated. Attempts to modify such diverse targets as self-destructive behavior, tantrums, aggressive and disruptive behavior, self-stimulation, toilet training, eye contact, imitation, verbal skills, prosocial behavior, and classroom activity are presented. Issues including proper diagnosis, etiology, and generalization are discussed. It is concluded that although the level of product has been generally less than experimental (or quasi-experimental) in nature, there is reason to believe that behavioral intervention has been associated with real behavior change.

Any examination of the behavior modification literature would lead one to conclude that early infantile autism has been a popular area for study. Indeed, reports of therapeutic interventions dealing with one or more aspects of the syndrome are often found in the contemporary literature. Intervention has focused on the elimination of the numerous maladaptive behaviors that these children often demonstrate (e.g., self-destructive behavior, tantrums, self-stimulation, disruptive behavior) and the broadening of the behavioral repertoire to include more adaptive patterns of behavior (e.g., imitation, toilet training, verbal behavior, prosocial behavior). The present paper is an examination and evaluation of the success of behavioral approaches in the treatment of early infantile autism. Issues such as proper diagnosis, etiology, and generalization of treatment gains will also be explored.

What Is Autism?

Diagnosis

To date, there has been no agreement as to the accurate diagnosis of early infantile autism. Numerous diagnostic systems, checklists, and behavior rating scales have been devised; none has received universal support.

Wing (1972), commenting on the situation, stated, "One of the biggest problems in writing about autistic children is that doctors and other professional people tend to differ in the words they use to describe and name the condition" (p. 3). Lovaas, Koegel, Simmons, and Long (1973) more pointedly observed,

The delineation of "autism" is one area that will demand considerably more work. It has not been a particularly useful diagnosis. Few people agree on when to apply it. It is not a functional term in the sense that it is neither related to a particular etiology nor to a particular treatment outcome. (p. 156)

The earliest attempt at diagnostic criteria is Kanner (1943), who proposed 12 features of autism. These were: (a) the autistic child is always aloof; (b) the autistic child looks normal, alert, and expressive; (c) motor coordination seems normal, with quick, skillful movements; (d) the child avoids eye contact and lacks visual or auditory responses to others; (e) there is no physical reaching out from infancy; (f) the child does not initiate sounds or gestures; (g) there is a failure to use speech for purposes of communication; (h) the child has a marked facility with objects (in contrast to his response to people and to language); (i) psychometric performance indicates that cognitive potentialities are masked by the basic disorder; (j) there is an obsessive desire to maintain sameness; (k) bedwetting, thumbsucking, nailbiting, and masturbation are rarely associated with early infantile autism; and (l) the rate of occur-

Requests for reprints should be sent to Paul J. Margolies, Department of Psychology, State University of New York, Stony Brook, New York 11794.

rence is less than 1% in the general population.

Continued research led Eisenberg and Kanner (1956) to conclude that all of the original diagnostic criteria except two were also found in other childhood disorders. These two major features of early infantile autism were (a) the lack of object relations, and (b) the maintenance of sameness via stereotypic behaviors.

Ward's (1970) diagnostic standards were (a) lack of object relations from birth, (b) lack of use of speech for communication, (c) maintenance of sameness via stereotypic behavior, and (d) lack of neurological dysfunction. Finally, DeMyer, Churchill, Pontius, and Gilkey (1971) presented the following criteria: (a) emotional withdrawal from people before the age of three, (b) lack of speech for communication, (c) nonfunctional, repetitive use of objects, and (d) failure to engage in role playing alone or with other children.

The number of other sets of diagnostic criteria is seemingly endless. The point is this—agreement, even among experts, cannot be expected when different individuals are using different sets of criteria. This point is illustrated best by DeMyer et al. (1971), who found only a 35% degree of correspondence when four popular scales (Creak, 1964; Lotter, 1966; Polan & Spencer, 1959; and Rimland, 1964) were used to diagnose the same group of 44 children referred consecutively to a clinical center.

When examining the work presented in the present paper, there is no guarantee that the characteristics of children from study to study are identical; as a point of fact, this would seem highly unlikely.

Relationship to Childhood Schizophrenia

Most authors agree that behaviorally, it is difficult to distinguish autism from childhood schizophrenia. The critical variable, it has been suggested (Eisenberg & Kanner, 1956; Ward, 1970), is the level of functioning before the onset of the disorder. Childhood schizophrenia is generally seen as a withdrawal from a previously adequate level of functioning, whereas autism represents inadequate functioning from the start. However, even here there

is less than perfect agreement. As Kanner (1965) observed,

There are those who insist that infantile autism is one of the schizophrenias, even though this means giving up the original idea that childhood schizophrenia develops after a period of relative normalcy." (p. 418)

Other Characteristics

The prevalence of the syndrome is approximately 4 per 10,000 children, with a male-female ratio of approximately 2.5:1. The age of onset is between birth and 2½ years of age (Hermelin & O'Connor, 1970; Wing, 1972).

Prognosis

DeMyer, Barton, DeMyer, Norton, Allen, and Steele (1973) followed 120 autistic children for 12 years and found that most remained educationally retarded. Of those 120 children, 1 to 2% recovered to normal, 5 to 15% were found to function at a borderline level, 16 to 25% were at a fair level, and 60 to 75% were at a poor level; 42% remained institutionalized. (It should be noted that these figures were taken at a time when behavioral intervention was rare.)

DeMyer et al. (1973) reported that the best predictor of the performance of these children in a work/school setting was the child's rating at intake. Stark (1972) suggested that the child's ability to communicate verbally was the most significant prognostic indicator.

Etiology

At the present time, a discussion of etiology must remain at the theoretical level. There is no conclusive evidence to support any of a number of theoretical accounts (Bosch, 1970). Keeping in mind that the focus of the present paper is treatment, the following is a brief description of the etiological picture.

Kanner (1949) remarked that, in his experience, the parents of autistics were almost always very successful in their careers. They were generally highly intelligent, not comfortable in the company of people, and dem-

strated little affection. These observations may lead one to speculate that parental coldness and lack of affection are in some way causative agents for the disorder. However, the universality of the findings has been questioned. In addition, such a hypothesis fails to consider the direction of causality. It is equally likely that parents demonstrate a lack of affection due to the demands of caring for an autistic child. This alternate hypothesis must be explored.

Rimland (1964) saw the disorder as a central nervous system dysfunction, probably involving the reticular formation. This resulted in the child's inability to form associations among stimuli and relate new experience to what had been learned in the past.

The role of sensory stimulation has been explored by Moore and Shiek (1971), who suggested that autistics tended to suffer from sensory deprivation due to impaired perceptual abilities, which resulted in their atypical behavioral repertoire. Others, including Betelheim (1967) and DesLauriers and Carlson (1969), hypothesized just the opposite, viewing the autistic's repertoire as a reaction to overstimulation.

Phillips (1957) used early learning theory (i.e., Miller's approach-avoidance conflict theory) to account for the development of the syndrome. The approach gradient was equated with assertiveness, and the avoidance gradient with disconfirmation of experience. Conflict creates tension, which results in the autistic symptomatology.

Ferster (1961) speculated that the behavioral repertoire of the autistic is learned in the same way that other behavior is learned. That is, the child is born with the capabilities to develop normally, but due to his specific learning experiences, develops the autistic repertoire. Prolonged extinction and intermittent reinforcement act to prevent the permanent acquisition of speech and social behavior. The parents, being the predominant sources of reinforcement for the child, are the agents of this extinction and intermittent reinforcement. As a consequence of such a learning history, secondary reinforcers such as praise and attention exert little or no control over the child.

Bosch's (1970) conclusions highlighted the uncertain nature of the situation when he stated, "As regards the etiology, I believe that the condition is most probably caused by a variety of factors, each of which can be involved to a greater or lesser extent in creating the disturbance" (p. 145).

Why Use Behavior Modification?

Traditional forms of psychotherapy have had little success with infantile autism (Brawley, Harris, Allen, Fleming, & Patterson, 1969; Kanner, 1949; Rimland, 1964; Wetzel, Baker, Roney, & Martin, 1966). Such a finding is in agreement with other examinations of the utility of traditional psychotherapy (e.g., Bergin, 1966; Eysenck, 1965). Behavior modification has been found to be effective with targets previously resistant to change (Bandura, 1969; Franks, 1969). It would seem to be an obvious step to attempt to utilize behavioral means to deal with the autistic behavioral repertoire.

Demonstrating Control Over the Autistic Repertoire

Early attempts at behavioral intervention were not concerned with therapeutic gains; rather, they attempted to demonstrate that behavioral methods could gain control over the repertoire of the autistic child. By placing the child in a highly structured environment, it was hoped that the effects of such basic processes as schedules of reinforcement, stimulus control, and conditioned reinforcement could be shown. If this were to be the case, then therapeutic gains would indeed be possible.

Ferster and DeMyer's (1961) study was an experimental attempt to enlarge the behavioral repertoire of two autistic children. The target response was key pressing, a response quite familiar in the animal literature. The children were rewarded according to various schedules of reinforcement with candy, food, or tokens, which operated devices that dispensed a number of primary reinforcers including candy and toys. Discrimination situations were developed in which tokens could only be used when a light was on next to the

proper slot in the dispenser; if the light was off, deposited coins were wasted. The authors believed that their results successfully supported the contention that the autistic child's repertoire was capable of being controlled by environmental contingencies. It was concluded that "altering the reinforcement program produced corresponding changes in the children's performance, similar to the efforts of those procedures in animals and normal subjects" (p. 341). Ferster and DeMyer (1962) reported the success of a similar program with three autistic children.

Hingtgen and Coulter (1967) attempted to determine whether operant responding by mute autistic children could be brought under the control of a number of auditory discriminative stimuli. Four subjects, ages 5 through 8, were individually placed in a room and presented with auditory stimuli over a loudspeaker. Tokens, which were to be used in a food vendor, could be obtained on a fixed-ratio schedule by pressing a lever during the presentation of certain stimuli; no tokens were available during the presentation of other stimuli. Three of the four children were able to learn the proper discriminations. It was concluded that some mute autistic children were capable of learning simple auditory-motor associations.

It has been demonstrated that the application of principles derived from learning theory could lead to the control of the autistic child's behavioral repertoire. The next application would be toward therapeutic gain.

Problems in Treating Autistics

Appropriate Reinforcers

In order to establish and maintain behavior in any organism, the reinforcers used must be effective. Effective reinforcers vary with species and individuals, and the behavior change agent must be capable of determining appropriate reinforcers in order to be successful. Ferster and DeMyer (1961) pointed out that "the problem of a reinforcer is especially acute with the autistic child because of his general deficit in positively maintained behavior" (p. 313). When attempting to teach complex behavior to autistics, under conditions of in-

termittent reinforcement, durable, potent reinforcers must be utilized (Ferster & DeMyer, 1961, 1962).

Generally, primary reinforcers (e.g., food, candy) are initially used with autistics. This is because autistics usually show an inability to profit from the use of secondary reinforcers (e.g., verbal approval). However, as Lovaas et al. (1973) noted, the reliance upon primary reinforcers has several disadvantages, often including the necessity of establishing special environments in which to dispense the reinforcer. Therefore, secondary reinforcers are developed as soon as possible, through initial pairing with primary reinforcers. Ferster and DeMyer recommended the use of conditioned generalized reinforcers (i.e., tokens), since they derive their effect from a number of primary reinforcers and are therefore quite durable.

Jellis (1972) enumerated a number of considerations. The reinforcer chosen should not divert the child's attention away from the task (e.g., toys are often distracting), should not interfere with the time intervals between stimulus presentations (e.g., food can do this), and should not be subject to rapid satiation. Jellis found the visual patterns of a kaleidoscope to be an appropriate reinforcer for verbalization in a 4-year-old boy. Similarly, Fine-man (1968a, 1968b) found the visual display of a color organ to effectively reinforce verbalization in a 4½-year-old girl and a 6-year-old boy.

The large variability from child to child with respect to what is appropriate is reflected by Silver (1970), who found mild deprivation of foods sufficiently capable of motivating a 6½-year-old boy, and Wetzell et al. (1966), who found attention to be a successful reinforcer. Often, these reinforcers have not been appropriate with autistics.

Eliminating Distraction During Training

Autistic children are highly distractible. Learning environments must be structured in such a way as to reduce distraction to a minimum. This can be accomplished by using small, isolated, unfurnished rooms (e.g., Jellis, 1972) or by actually constructing a dis-

action-free learning booth (e.g., Hewett, 1965). Reinforcers should not add to distraction, and sessions should be short enough so as to maintain the child's attention throughout.

Eliminating Maladaptive Behaviors

The repertoire of the autistic child is problematic in two ways. Not only does the child lack the usual assortment of adaptive responses, but the behavior that does exist is often maladaptive or undesirable in some way. Such behavior can have dangerous consequences for the child and for those around him. Behavior modification techniques have been found to be quite effective in decreasing the magnitude and frequency of a variety of problem behaviors in a variety of child populations, including autistics (Gelfand & Hartmann, 1968). In general, the procedures used involve one or more of the following: (a) contingent reinforcement withdrawal (e.g., time-out rooms, looking away from the child), (b) contingent aversive stimulation, and (c) reinforcement of incompatible behavior (Lovaas et al., 1973).

Self-Destructive Behavior

No learning can proceed until self-destructive behavior has been reduced considerably, if not eliminated altogether. Indeed, the child's physical survival may depend upon decreases in such behaviors as head banging, face scratching, and self-slapping.

Wolf, Risley, and Mees (1964) used a time-out room to eliminate head banging and face scratching in a 3½-year-old autistic boy. The child was placed in the room contingent upon the onset of such behavior and remained there until the behavior had ceased. This proved effective in eliminating the problem, as a 6-month follow-up demonstrated. Later (Wolf, Risley, Johnston, Harris, & Allen, 1967), this same procedure proved equally effective in eliminating self-slapping in the same child.

Yeakel, Salisbury, Greer, and Marcus (1970) attempted to deal with a severe instance of constant head banging in a 14-year-

old autistic girl. They developed a helmet-like device that would absorb the impact of the blows without harming the girl's wrists, and would also deliver a shock to the arm whenever the head was hit. No data was presented; however, the authors observed that the head banging was rapidly eliminated by the helmet when it was worn, only to return to full strength when the device was removed.

Lovaas (1970), commenting upon his approach to the problem, which generally involved the use of contingent shock, stated,

To summarize the result of our treatment projects, I would say that we are probably best, most efficient and most reliable, at removing behavior. This is particularly true in the case of self-destructive behavior where, seemingly independently of how badly the child is mutilating himself or how long he has been doing so, we can essentially remove the self-destructive behavior within the first minute. (p. 38)

Upon first examination, it would appear that self-destructive behavior in autistics is amenable to behavioral intervention, as has been suggested with other populations (e.g., Tate & Baroff, 1966). Certainly, the studies presented here support such a contention. However, in order to undeniably support such a hypothesis, the evidence must be of an experimental or quasi-experimental nature (Campbell & Stanley, 1963). Much of the evidence here falls somewhat short on this account.

Tantrums

Tantrum behavior is maintained by its consequences (Bandura, 1969). Williams (1959) showed that the removal of attention contingent upon such behavior resulted in the extinction of the response in a nonautistic infant.

Wetzel et al. (1966) attempted to deal with the tantrums of a 6-year-old autistic boy by using isolation as a time-out procedure. The child was given an initial warning and then kept in a room until the tantrum had ceased for 3 minutes. Within one month, the target behavior was reduced to near zero. As part of a larger treatment program, Jensen and Womack (1967) extinguished tantrums in a 6-year-old autistic boy through the use of a time-out room; the program was effective

within 10 weeks. Schell and Adams (1968) taught parents to extinguish tantrums in their 3-year-old by ignoring the behavior and by the use of a time-out room; a 4-month follow-up found the contingencies still effective. Martin, England, Kaprowy, Kilgour, and Pilek (1968) ignored tantrum behavior and then reinforced quietness in a classroom setting; this proved effective by the end of the 12-week training program. Davison (1965a) emphasized the use of verbal explanations as well as nonreinforcement in reducing the tantrums of a 9-year-old verbal autistic boy.

This literature would tend to support the notion that tantrum behavior can readily be eliminated through the effects of time-out and related techniques. Caution should be taken, however, since the proper experimental controls are all but absent in this body of work.

Aggressive and Disruptive Behavior

It is this behavior that contributes to and helps to maintain social isolation. Children who display aggressive and disruptive behaviors are aversive to those around them; other children and adults may seek to avoid contact with the aggressive/disruptive child. The elimination of such behavior from the repertoire would increase the likelihood of the autistic child finding a responsive environment.

Wolf et al. (1964) used a time-out room to eliminate the throwing of eyeglasses in their 3½-year-old subject. The child was sent to his room for a period of 10 minutes contingent upon each throw. When the contingencies were dropped, the rate of throwing resumed its previous level. Reinstatement of the contingencies once again reduced the frequency to near zero. Wolf et al. (1967) reported the successful use of time-out to eliminate the same child's tendency to pinch other children and teachers.

Jensen and Womack (1967) successfully used immediate contingent punishment over a period of 10 weeks to eliminate such aggressive behaviors as spitting, stepping on others, and hitting in a 6-year-old autistic. The punishment consisted of an immediate slap, brief restraint, or verbal disapproval. Verbal negativism was the target of a treatment regime

devised by Brown, Pace, and Becker (1969). After baseline recordings were made, the child was forced to comply with simple instructions. The same responses were then contingently reinforced with tokens, and later, tokens and praise. Data taken at each of these phases indicated that the verbal negativism was greatly reduced by the end of treatment. Husted, Hall, and Agin (1971) used time-out to eliminate physical aggression and "hyperactivity" (i.e., running from the living unit) in four children, three of whom were autistic, during a 14-month program. Comparisons with baseline measures found time-out to be highly effective; however, the maladaptive behavior resumed when contingencies were dropped. Tramontana and Stimbert (1970) briefly noted that time-out from social attention worked effectively to control disruptive behavior with a 7-year-old autistic boy.

Once again, although lack of proper experimental controls prevents the elimination of alternative hypotheses in the bulk of this work, these results do suggest the effectiveness of behavioral intervention. Wolf et al.'s (1964) use of an equivalent time-samples design (Campbell & Stanley, 1963) is firmly in the realm of quasi-experimental support.

Self-Stimulation

One of the more striking characteristics of the autistic child is the stereotyped self-stimulatory activity often engaged in. Typical of such behaviors are hand flapping, rhythmic rocking, and the twirling of objects in front of the eyes. There is recent evidence suggesting that the ability to learn more adaptive responses is in some way diminished during periods of self-stimulation: "Autistic children appear to be most unresponsive to their environment when engaged in ritualistic stereotyped behaviors" (Koegel & Covert, 1972, p. 381).

Lovaas, Litrownik, and Mann (1971) compared groups of mute autistics, echolalic autistics, and normal children during periods of self-stimulation and of absence of self-stimulation on an approach task. It was found that for the mute autistics self-stimulation wa

associated with increased response latencies, and for all autistics the amount of self-stimulation varied with the magnitude of reinforcement for approach behavior. The authors concluded that some control over response latencies was obtained by manipulating the amount of self-stimulation. Koegel and Covert (1972) found that for the three children they had studied, discrimination learning did not occur during periods of self-stimulation, suppression of this behavior produced an increase in learning, and successful learning was always associated with a reduction in self-stimulation. The authors discussed these findings in relation to theories of competing reinforcers and selective attention, and concluded, that "functionally, the data suggest that if one attempts to teach a new behavior to an autistic child, it is important to ensure that the child does not engage in self-stimulatory behavior" (p. 387). Koegel, Firestone, Kramme, and Dunlap (1974) used an equivalent time-samples design (i.e., an A-B-A design) to demonstrate a similar relationship between self-stimulation and spontaneous play behavior in two children.

Attempts to eliminate self-stimulation have varied. Suppression during experimental sessions has been achieved through verbal reprimand, slapping, briefly immobilizing the part of the body involved in the response (Koegel & Covert, 1972; Koegel et al., 1974), and contingent electric shock (Lovaas et al., 1965). Lovaas (1970) has acknowledged, however, that such attempts, although successful during experimental manipulations, generalized with great difficulty, and he has hypothesized that internal reinforcement is responsible for maintaining the behavior. Foxx and Azrin (1973) developed their *overcorrection procedure* because, as they observed, "No method is in general usage and of demonstrated effectiveness in eliminating the self-stimulatory behaviors of retardates and autistics" (p. 1). The procedure requires the child to practice more adaptive forms of behavior, which use the body part in question, contingent upon the onset of self-stimulation. Comparisons made between this procedure and such alternatives as physical punishment, and reinforcement for non-self-stimulatory behavior found the over-

correction procedure to be most effective, rapid, and enduring.

Expanding the Behavioral Repertoire

In general, the autistic child demonstrates a gross deficit in adaptive behavior. An inability to constructively deal with the surrounding environment, especially people, stems from a rigidly limited repertoire. The therapist's chore is a difficult one: New behaviors must be built in, their proper use established, and motivation maintained.

Fortunately, the behavior modifier has at his disposal a number of potential interventions that have demonstrated effectiveness with a wide range of populations: reinforcement of successive approximations (i.e., shaping) with primary or conditioned reinforcers, and the use of instructions, modeling, guided participation, behavior rehearsal, and negative reinforcement (Bandura, 1969; Schwitzgebel & Kolb, 1974).

Toilet Training

Marshall (1966) treated a nonverbal autistic boy who defecated in his pants approximately 95% of the time. This child was kept in diapers until age 4½, stopped bedwetting at age 6, and stopped wetting during the day at age 6½. Treatment consisted of shaping the appropriate behavior by reinforcing its component parts (e.g., approach to the toilet, removal of clothing, proper body posture, straining). In addition, punishment in the form of a slap on the buttocks was employed, contingent upon soiled pants. By the end of therapy, the rate of soiling was reduced to 30% of the time. The child's mother was trained to continue treatment after termination and was successful in completely toilet training her son. Wolf et al. (1967) toilet trained their subject through the use of shaping, in conjunction with guided instruction.

Although these results offer no true experimental evidence as to the efficacy of the techniques employed, they do suggest positive consequences for the interventions. Indeed, similar consequences have been reported for their use with normal children (Gelber & Meyer, 1965; Madsen, 1965).

Eye Contact

Autistic children show little eye contact in response to another human being. If allowed to continue, this can decrease the probability of effective social interaction, and minimize treatment opportunities. Brooks, Morrow, and Gray (1968) commented, "As long as gaze aversion is typical in a subject, normal social interaction is not possible. Once visual attention responses are established, the work of training other social skills can begin" (p. 309). McConnell (1967) demonstrated, through the use of an equivalent time-samples design, the effectiveness of verbal praise and smiling contingent upon eye contact in a 5½-year-old autistic boy. This social reinforcement effectively maintained direct eye contact, which was then chained to the boy's verbal behavior. Primary reinforcement in the form of candy was used by Brooks et al. (1968) to establish visual attention in a 19-year-old deaf autistic girl; measures taken during baseline, continuous reinforcement, variable ratio reinforcement, extinction, and variable ratio conditions once again demonstrated the power of the contingencies. Hartung (1970) suggested beginning the shaping process by holding the primary reinforcer directly in front of the therapist's face; the child would tend to look at the reinforcer and thereby attend to the therapist's face as well.

It can be concluded that social interaction and training of other social skills are indeed possible; that is, gaze aversion should not hinder these activities. There is strong evidence (Brooks et al., 1968; McConnell, 1967) to support the notion that eye contact is capable of being established through behavior modification techniques.

Imitation

Autistic children typically do not imitate the actions of those around them. Since imitation greatly facilitates the learning process (i.e., vicarious learning), the inability to imitate may contribute to the autistic child's limited behavioral repertoire (Hingtgen, Coulter, & Churchill, 1967). Learning to imitate would seem to be a natural step toward

expanding the repertoire; this would appear to be especially necessary before speech training could begin.

Metz (1965) used passive demonstration (i.e., physically guiding the child through the act) and shaping to teach two autistic children to imitate specific behaviors. The guidance was gradually withdrawn (faded) until the children produced the behavior spontaneously. Results indicated that autistic children are capable of learning imitation, that such learning can generalize to similar but new situations, and that the generalized imitative response persisted over time. The author cautioned, however, that causation could not be inferred, because the proper experimental controls were not present in the study. Hewitt (1965) spent one month developing imitation skills in a 4½-year-old nonverbal boy as a basis for speech training. Shaping was used to establish imitation of hand movements, including hand clapping, placing both hands on the face, and touching parts of the head. Stark, Giddan, and Meisel (1968) initially reinforced imitation of gross body movements and then gradually introduced more discrete stimuli including movement of the tongue, lips, and jaw; Marshall and Hegrenes (1970) did much the same thing. In a 21-day intensive training program, Hingtgen et al. (1967) shaped two autistic children to imitate simple and complex uses of body parts and objects, as well as vocal responses. All food, water, and social contact during this period were made contingent upon appropriate imitative behavior. Comparisons between pretest and posttest measures indicated that both children had shown significant improvement in their abilities to imitate; there was also some evidence of generalization to new responses. However, as was the case with Metz (1965), true experimental conditions had not been established. Hingtgen and Churchill (1969) successfully trained four autistics in a similar manner as part of a larger treatment plan. In an experimental study, Craighead, O'Leary, and Allen (1973) used food and verbal praise to teach a 4-year-old boy, diagnosed as autistic, to follow verbal instructions. The child learned to follow the instructions presented, and the response generalized to new people and instructions and

continued when the original intervention was withdrawn.

These studies strongly suggest the establishment of imitative behavior in autistic children as a result of behavior management. It is regrettable that, with the exception of Craighead et al., no study was adequately controlled in an experimental sense.

Verbal Behavior and Language Skills

The importance of the addition of functional verbal behavior to the child's repertoire cannot be understated. This is the one skill that affords the child the ability to manipulate the environment. It is apparent why Stark (1972) considered it to be the primary prognostic indicator. The ability to speak opens new horizons.

Teaching the mute child verbal imitation skills. Without the ability to imitate, verbal learning is not possible. Once generalized imitation skills have been established, nonvocal imitation has been extended to include use of the mouth, tongue, jaws, and lips (Marshall & Hegrenes, 1970; Stark et al., 1968). Lovaas et al. (1973) explained the process of establishing verbal imitation in the following way:

Briefly, verbal imitation was established in five steps: (1) The child received reinforcement for vocalizing in order to increase the frequency of speech sounds. (2) We then established a temporal discrimination. The child received reinforcement only for those vocalizations that were emitted within a five second period after the therapist made a vocalization. (3) The therapist now began to demand similarity of vocalizations between himself and the child. For example, the therapist gave reinforcement for a sound only after the therapist had just emitted that sound himself. (4) After the child reliably emitted one sound, the therapist introduced a second sound and reinforced reproductions of that sound. These first two sounds were then presented in a random order so that the child was required to discriminate between the two vocalizations. (5) A third sound was presented, requiring increasingly fine discriminations. (p. 135)

From imitation to functional speech. Shaping, prompting, and fading are used to establish labels for objects. Previously mute children imitate closer and closer approximations of object labels. The shaping process begins with sounds already in the child's repertoire and is extended until the proper labels are

verbalized. Echolalic children are prompted through the use of questions; gradually the prompts are faded until the child is properly labeling objects. As soon as proper object names are learned, the children are expected to use them in other settings, to maximize generalization. Closer and closer approximations to functional speech are shaped, as pronoun use and other aspects of language are programmed in (Lovaas et al., 1973; Risley & Wolf, 1967).

Studies with mute autistics. In order to begin the shaping process, the child must vocalize during the training session. In order to maximize such vocalization, Jellis (1972) employed changes in a projected kaleidoscope pattern as a reinforcer. When compared to contingent oscilloscope wave patterns and verbal praise, the kaleidoscope patterns were found to be the most effective. Fineman (1968a, 1968b) found that visual display of a color organ increased the number of vocalizations per session over baseline. In combination with the more traditional reinforcers, these should afford the therapist the ability to increase the frequency of vocalization.

Hewett (1965) reported on a program to teach verbal skills to a 4½-year-old mute autistic boy. The first week was spent introducing the child to the specially constructed learning environment and associating his teacher with positive reinforcement. A month followed in which imitation skills were developed. Speech training lasted 6 months; verbal imitation was shaped until the child had acquired a 32-word vocabulary and was capable of answering a variety of questions. The final 8 months were devoted to maximizing generalization; newly learned words were required to be used properly in various social settings with a number of individuals besides the teacher. The child's vocabulary grew to 150 words.

Schell, Stark, and Giddan (1967) spent 15 weeks with a 4-year-old nonverbal autistic boy, during which time the child was trained on visual and auditory discrimination tasks, the prompting and shaping of verbal behavior, and the following of verbal instructions (e.g., "Shut the door"). By the end of treatment, the authors noted an increase in the frequency and variety of verbal and nonverbal behavior

and more appropriate stimulus control over such behavior.

Stark, Giddan, and Meisel (1968) developed a treatment plan that began with imitation training. Verbal labeling was accomplished through the use of fading. Sounds were responses to letters printed on cards, and the letters were associated with picture stimuli and then gradually faded until the sound was the response to the picture. In this manner, the child learned to properly use such words as knee, eye, and pie. Verbal discrimination was established by having the child respond to commands. By the end of 8 months, considerable progress was evident, and the use of language had acquired secondary reinforcing properties.

Marshall and Hegrenes (1970) presented four case studies involving previously nonverbal children. Imitation training was followed by the learning of object names and descriptions through prompting and fading procedures. Silver used a similar program to establish object names in a 6½-year-old autistic boy. Halpern (1970) reported on the results of a 4-year speech treatment program for 15 autistic children; 6 of the children showed rudimentary verbal output and the remaining 9 were nonverbal. By the end of treatment, 13 children were capable of some useful speech and 11 of these were actually enrolled in public schools.

Studies with somewhat verbal and echolalic children. Wolf et al. (1964) shaped verbal responses in a child who could mimic. Food was used as a reinforcer to establish object names. Wetzel et al. (1966) taught command following and object naming to a 6-year-old echolalic boy through prompting and fading. By the end of treatment, the child was capable of naming nearly 100 objects and following 70 to 80 commands. Similarly, Jensen and Womack (1967), as part of their 10-week treatment program for a 6-year-old autistic, taught the child proper object names and complete sentence usage. Martin et al. (1968) employed prompting and fading to teach seven autistics, who were able to mimic, to properly answer questions asked of them over a 12-week period. Tramontana and Stimbert (1970) did the same with a 7-year-old autistic boy. In a

multiple baseline design, Stevens-Long and Rasmussen (1974) demonstrated the use of contingent reinforcement and imitative prompts to establish simple and compound sentence usage.

Sailor and Taman (1972) illustrated the training of prepositional usage in three autistic children under "ambiguous" and "non-ambiguous" stimulus conditions. "Ambiguous" conditions employed the same stimulus objects to train use of both *in* and *on*; "non-ambiguous" conditions employed different stimulus objects for the different prepositions. The results for two of the children indicated the superiority of the "non-ambiguous" condition. Results for the third child suggested that initial training with "non-ambiguous" stimuli might contribute to later accurate responding under "ambiguous" conditions.

Nonspeech language training. McLean and McLean (1974) taught two nonverbal autistic children to respond to a number of social transactions by placing appropriate plywood word symbols on a tray. DeVilliers and Naughton (1974) taught language skills to two autistic children through the use of words printed on magnetic particles, which were placed on a magnetic board. All language transactions, including questions, descriptions, and commands, were carried out in this medium. The authors concluded the 9-month study by commenting that this medium would be most useful, not as an alternative to speech, but as a fading procedure through which functional speech could be established.

Eliminating psychotic speech. Bartlett, Ors-Brown, and Butler (1971) attempted to experimentally manipulate psychotic speech in a 12-year-old verbal autistic. In four experimental sessions, the child was reinforced for rational speech, extinguished, and then alternately reinforced for rational and psychotic speech. Reinforcement consisted of tokens that could be exchanged for money at the end of each session. Results indicated that the contingencies established were quite effective.

An evaluation. The present studies indicate that verbal and language training are appropriate targets for behavioral intervention. However, much of the data presented has been in case study form; experimental inference

to the effectiveness of various components of the intervention is not possible at this level of analysis.

In addition, it is important to understand the limits of the work to date. Hewett (1965) pointed out the distinction between speech and meaningful language: "Speech can be defined as articulated vocal utterances which may be the basis for communication, but meaningful language implies expression of thought and emotion in an appropriate and integrated manner" (p. 935). The degree to which meaningful language has thus far been taught is questionable.

Lovaas (1970) summarized the success of his speech training program in the following way:

With respect to building behavior, it is certainly true that with the older and mute autistic children, our progress has been quite limited. As an example, the program we have for building speech in these children has been fairly well limited to establishing elementary vocabularies for requesting wants. In the case of the echolalic children, we have been more successful. (p. 39)

Peer Interaction and Prosocial Behavior

If left to himself, the autistic child will remain aloof. Wetzell et al. (1966) increased approach behavior with a 6-year-old in a 3-month program. Adult attention was used to shape the desired response; success was indicated by a significant increase over baseline measurements. Means and Merrens (1969), working with a 3½-year-old boy, shaped approach and parallel play (i.e., both the therapist and child bounced a ball against a wall); the authors did not indicate their means of reinforcement, however. Lovaas et al. (1965) presented experimental data to support the use of electric shock to *build* social behavior. Using the shock as a negative reinforcer, approach responses to adults brought about a reduction in the aversive stimulus. As a result of the treatment, the authors noted increases in affectionate and other social behaviors toward adults. Schell and Adams (1968) reported teaching play behavior to a 3-year-old autistic boy through the use of modeling, rehearsal, and imitation of successively closer approximations to the desired goal.

Cooperative responses were learned in a controlled environment arranged by Hingtgen, Sanders, and DeMyer (1965). The experimental room contained a two-key response panel, coin vendor, and food vendor. Reinforcement was contingent upon cooperative key responses from the two children; each had to allow the other access to the coin vendor through increasingly complex key responses. Results indicated that the final cooperative response was learned within an average of 23 sessions.

Although it has been suggested that behavioral intervention is capable of establishing prosocial responses, the generalization of such responses to the daily life of the child would seem to be the goal. Although the play behavior of Schell and Adams (1968) was maintained at a 4-month follow-up, the picture is not as clear for others. Breger (1965), commenting upon the work of Lovaas et al. (1965), concluded that little lasting generalization actually did occur. Hingtgen et al. (1965) commented that generalization of their results was not found when the contingencies were not in effect (i.e., on the ward). It would seem necessary to bring prosocial responses under the control of social reinforcement in order to maintain gains made in the laboratory.

Classroom Behavior

The ability to function in a classroom setting would greatly facilitate learning for the autistic child. Consequently, Rabb and Hewett (1967) reported on a three-phase program to assess attempts at establishing appropriate classroom behaviors in a group of autistic children. Phase 1, which lasted 3 months, consisted of gathering baseline data on the children's task-oriented attention. During Phase 2, which lasted 5 months, tokens and teacher attention were made contingent upon proper attention and activity performance. Phase 3 (reinforcement withdrawn) was still in progress at the time of the report; however, the data available indicated that tokens were more effective than attention in maintaining the target behaviors.

Martin et al. (1968) shaped classroom behavior by beginning with a 1:1 student-

teacher ratio in a small room, gradually moving to a more typical classroom setting and increasing the ratio to 7:1. Tokens were used to teach appropriate behaviors, including sitting quietly in a desk, tracing, and copying. The procedure was successful in varying degrees for 7 of the 10 children involved.

Koegel and Rincover (1974) taught eight autistics basic classroom tasks (e.g., attending to the teacher upon command) in a 1:1 student-teacher ratio. They found that the tasks learned did not automatically generalize to other classroom ratios. Therefore, larger ratios were then faded in gradually. Multiple baseline measures of verbal and nonverbal behaviors found the fading procedure quite successful in establishing classroom behavior for these children.

These studies suggest that for some autistics, classroom behavior can be established. Martin et al. (1968) cautioned, however, that at least in their study, such behavior only approximated that of normal children. Nonetheless, it is a beginning.

Therapy Packages

The behavior modifier need not concentrate his full attention on one target behavior at a time. Therapeutic efforts can be concerned with a number of problematic areas at once, as the following studies demonstrated.

Wolf et al. (1964) were concerned with tantrums, bedtime problems, wearing of glasses, verbal skills, and proper table manners; Davison (1965a) eliminated tantrums and increased reading and writing skills; Wetzel et al. (1966) increased approach behavior and verbal abilities, while reducing tantrums; Jensen and Womack (1967) designed a program to deal with peer interaction, verbal skills, tantrums, stereotyped behaviors and aggressive behavior; Wolf et al. (1967) worked on self-slapping, pinching others, and toilet training; Schell and Adams (1968) taught parents to modify gaze aversion, tantrums, repetitive and self-stimulatory behavior, play, and speech skills; Brawley et al. (1969) dealt with a number of targets, including appropriate verbalizations, compliance, tantrums, and self-hitting; Browning (1971) focused on self-destructive behavior,

tantrums, toilet training, and speech acquisition; Rutter and Sussenwein (1971) treated language development, stereotyped behavior, and disruptive actions; Nordquist and Wahler (1973) performed experimental manipulations on rituals, crying, compliance, and imitation; and Wulbert, Barach, Perry, Straughan, Sulzbacher, Turner, and Wiltz (1974) had parents modify compliance, speech, and hand slapping in their child.

Generalization and Maintenance of Change

The ultimate purpose of any treatment plan is to have the therapeutic gains maintained after the completion of treatment, and generalized to new situations. Nordquist and Wahler noted that successful treatment in the laboratory is no guarantee that the response will transfer to the child's natural environment. In fact, Breger (1965) argued that generalization of behavior learned by autistics should not be expected. He stated, "In a sense, the autistic child seems to be that rare organism that behaves according to strict S-R principles. He cannot make use of past experience in any integrative fashion" (p. 112).

The posttreatment environment is an important aspect of the generalization process. If the contingencies established during therapy are withdrawn, the newly acquired response will generally extinguish (Hingtgen et al., 1965; Husted et al., 1971; Wulbert et al., 1974). Indeed, Lovaas (1970) stressed that those children discharged from his program to institutions where they received little treatment regressed to pretreatment levels of functioning within months.

However, generalization is possible; it merely has to be programmed into the treatment. This involves teaching the new response under a number of stimulus situations and altering the child's everyday environment so as to offer the appropriate contingencies (Risley & Wolf, 1967; Schell & Adams, 1968; Tramountana & Stimbert, 1970). Indeed, Lovaas et al. (1973) found such efforts to meet with success.

Parent Training

Maximum generalization is possible when the child's parents are trained as behavior

change agents. In this way, gains made during normal treatment can be maintained, and new behaviors can be shaped at home. This approach has been successful in a number of published reports (Brawley et al., 1969; Brown et al., 1969; Craighead et al., 1973; Hingtgen et al., 1967; Jensen & Womack, 1967; Lovaas et al., 1973; Marshall, 1966; Wetzel et al., 1966; Wolf et al., 1964).

Parents have been trained to carry out the initial stages of therapy as well. Schell and Adams (1968) spent 21 sessions training the parents of a 3-year-old autistic boy in record keeping, social learning theory, and operant conditioning techniques. The parents were successful in modifying a host of problematic behaviors; a 4-month follow-up found continued progress. Nordquist and Wahler (1973) trained parents to effectively treat a number of target behaviors with their 4-year-old son. Moore and Bailey (1973) shaped the mother of a 3-year-old autistic girl to reinforce pre-academic tasks (e.g., stacking blocks) and fulfilling social requests (e.g., "Smile at me") through the use of a "bug in the ear" device; follow-up 7 months later found the mother's behavior appropriate.

It is interesting to note that, just as parent training manuals have appeared for the parents of less severely disturbed children (Patterson, 1971; Patterson & Gullion, 1968), they have also been developed for parents of the autistic (Kozloff, 1973; Wing, 1972).

Nonprofessionals as Behavior Change Agents

In addition to parents, other nonprofessionals can be trained in the treatment of the autistic child. The nation's colleges and universities hold a valuable resource—the undergraduate. Davison (1964, 1965b), and Martin and Pear (1970) have demonstrated success with undergraduates as behavior modifiers. In addition, hospital staff (i.e., ward attendants, nursing staff) have served effectively in the treatment of those children living on an inpatient basis (Hewett, 1965; Hingtgen et al., 1967).

Concluding Comments

An appraisal of the research methodology employed in the bulk of the work presented in

the present paper would lead one to conclude that the level of product is not of the highest degree. As noted throughout this presentation, experimental or quasi-experimental controls (Campbell & Stanley, 1963) were frequently absent. In this respect, this body of literature resembled that reviewed by Gelfand and Hartmann (1968) concerning behavioral approaches to child problems. This is not to say, however, that behavioral interventions were found ineffective. Rather, true experimental conclusions were precluded by the frequent lack of experimental rigor. However, the large volume of preexperimental data supporting the effectiveness of behavior modification cannot be taken lightly. Although one case study suggests little, a large volume of preexperimental reports confirming the utilization of behavioral intervention does suggest that something positive may be occurring. It will take better controlled experimental work to confirm this assertion.

How much real behavior change has been shown to take place? Clearly, these children are not made normal. Speech and classroom behavior, for example, only grossly approximate that of the normal child. However, considering the state of the child's repertoire before intervention, it has been suggested that behavior modification has indeed produced real change. Maladaptive behaviors (e.g., tantrums, self-destructive and disruptive behavior) have been reduced or eliminated in a number of reports; the repertoire has been expanded (e.g., toilet training, some functional speech) in still others. Such change can be more fully appreciated by considering this report by Schell, Stark, and Giddan (1967), describing their 4½-year-old patient:

He is hardly the "vegetable" he was at first. He responds more frequently and appropriately to events and people around him. He laughs and giggles, makes some sounds similar to those made by others, responds to his name, pays attention, asserts himself, successfully does simple tasks, and is otherwise more alert and responsive. (p. 64)

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Received November 3, 1975