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ABSTRACT

The study evaluated the usefulness of 48 hours of Restricted Environmental Stimulation Therapy (REST) as a treatment for eight autistic children (between 5 and 11 years old). Ss were placed in a dimly lit room which contained only a mattress, told to ask for toilet facilities when needed, and then left alone except for when meals were brought in. A battery of psychological tests was used to assess treatment effects and included Goodenough-Harris Drawing Test; Boehm and Slater Cognitive Skills Assessment Battery; Peabody Picture Vocabulary Test; Krug, Aric, and Almond Autism Screening Instrument for Educational Planning; Educational Subtest; Modified Autism Behavior Checklist; and Leiter International Performance Scale. Three control Ss spent the 48 hours in the hospital ward setting being cared for by parents. REST Ss improved on self initiated communicative speech for the 2 weeks following treatment and improved performance on discrimination learning tasks for 2 weeks. Analysis of behavioral records kept by Ss during the REST session allowed for the identification of the child's most prominent behaviors without interference from distractors or social interaction. It was concluded that REST was nonaversive to autistic patients and appeared to have at least short range beneficial effects. (DB)

Restricted Environmental Stimulation Therapy (REST) as a Treatment for Autistic Children[1]

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ABSTRACT -

This study was designed to test the usefulness of 48 hr. of Restricted Environmental Stimulation Therapy (REST) as a treatment for autistic children. In order to provide quantified objective measures for evaluating the effects of this treatment, a battery of psychological tests was developed which would be useful and practical for the assessment of these children in regular diagnostic settings. Several positive changes in behavioral and cognitive functioning were noted.

In the late 1960's a study was conducted using isolation and restricted stimulation to treat three autistic boys. The children, all about five years old, were put into a low-stimulation environment for 40, 68 and 73 days (e.g., Schechter, Shurley, Sexauer & Toussieng, 1969). The authors' rationale in using this procedure was as follows:

> "The research team postulated that the autistic defense is directed at overwhelming outer and inner stimuli. The defensive withdrawal is utilized repeatedly to cope with these stimuli and eventually becomes generalized to any and all stimuli....Our research team further postulated that the withdrawal mechanisms of these children are necessary because of defective central nervous system filtering mechanisms" (Schechter, Shurley, Toussieng & Maier, 1969, p. 565).

The researchers were also encouraged by two previous reports concerning the use of restricted stimulation to treat six severely disturbed children in an inpatient setting. The children were kept in a room with low intensity light, reduced sound, and a minimum of furniture. However, frequent observations and a daily visit by a therapist were included in the regimen, just as they were in the procedure of Schechter et al. The combination of restricted stimulation and therapy resulted in general improvement; the environmental manipulation specifically was thought to lead to a loosening of stabilized defenses and to eventual positive change in the child's self-perception and personality (Charny, 1963; Cohen, 1963). Schechter et al. felt that stimulus restriction would lead to a more positive orientation toward social contact and interaction through the operation of stimulus hunger, and to a reduced use of strong autistic defenses because of a more comfortable and balanced relationship between incoming stimulus load and the ability to receive and interpret these stimuli.

Observation and anecdotal reports during the Schechter et al. study suggested that the children were comfortable in the stimulus-restricted environment. They laughed and babbled to themselves happily, made few attempts to leave the room even when the door was left open, and at various times indicated their preference for solitude by trying to push the therapist out of the room. In the later stages of the experiment the boys had dropped much of their defensiveness; had become closely involved with their therapists and generalized this involvement to an ability to interact with other staff members and visitors; and were showing overt affection for their family members, engaging in and even initiating eye and bodily contact as well as verbal communication. One to two years afterwards, the authors found that "all have constantly increased their social contacts, no longer isolate themselves from their families, and have become tolerable members of their households. All of the boys have been attending nursery school and have enjoyed and profited from the experience" (Schechter, Shurley, Toussieng & Maier, 1969; p. 568).

Strangely enough, these promising preliminary reports were not followed up. However, some researchers have used partial stimulus restriction as a contingent procedure with autistic children, although not necessarily conceptualizing their treatment in this way. For example, Rincover (1978) designed a procedure for removing the sensory consequences of self-stimulation, on the hypothesis that these consequences reinforce and maintain stereotyped behavior. This sensory extinction procedure, which included such stimulus-reducing manipulations as sound-deadening carpets, blindfolds, and monotonous low-intensity vibration, was successful in reducing self-stimulatory behaviors that had previously provided auditory, visual, and tactile feedback. Bitgood, Crowe, Peters and Suarez (Note 1) used brief immobilization with retarded/autistic children. In six of the seven cases,

immobilization produced an immediate decrease in stereotyped self-stimulatory behaviors. More general stimulus restriction, incorporating social isolation, is typically a feature of time-out procedures, which have been found to be of some help in the reduction of autistic symptoms (see Suedfeld, 1980). Although in the preceding examples the environmental change was contingent upon the child's own behavior, the successful use of low stimulation does give this literature something in common with the work of Schechter et al (1969). Thus, Restricted Environmental Stimulation Therapy (REST) appeared to be a promising technique to test with an autistic sample.

The current study was designed to confirm and extend the findings of Schechter et al (1969). That study and its predecessor had served as preliminary demonstrations that REST, over prolonged periods and with frequent therapeutic contact, might bring about symptom amelioration on the part of autistic children. Our research was designed with three major goals besides seeing whether the improvements reported by previous researchers would be found again.

One of these goals was to test the hypothesis with a somewhat higher level of methodological rigor. In the earlier studies, the authors indicated that not all of the children were necessarily autistic; there were no prolonged pre-treatment observations; the REST treatment and the frequent contact with the therapist were confounded; there was no control group with which the effects of REST could be compared; and the reported improvement was measured primarily by clinical judgment and by anecdotal reports. In the current study, all of the children had been reliably diagnosed as autistic, extended pre- and post-treatment testing was performed, there was no therapeutic contact during the REST session, a group of children matched for age and diagnosis was given a control treatment, and a battery of objective measures and rating scales was used.

Second, we wanted to make the treatment more practical and more acceptable to potential users than the procedures reported by Schechter et al. One primary problem in the earlier studies was that the extreme length of the treatment made it highly demanding of staff and therapists' time and disruptive to the normal lives of the children and their families. Accordingly, the duration of REST in the study reported here was reduced to one weekend (48 hrs.), a period that seems much more likely to be adopted and tested by actual treatment facilities than the six to eleven week sessions used earlier.

Last, we were interested in integrating the use of REST with autistic children somewhat mre specifically with literature on the effects of stimulus reduction. The following specific hypotheses were derived:

1. Stimulus restriction has been shown to improve role learning in normal subjects (Suedfeld, 1969). Accordingly, we expected that autistic children who had undergone REST would improve on the performance of such tasks.

2. Social isolation has been shown to lead to a desire for social interaction and responsivity to social reinforcement (e.g., Stevenson & Odom, 1962); therefore, autistic children should be more open to such interactions and reinforcers after a period of stimulus reduction.

3. Schechter et al. as well as other theorists (see e.g., Lovaas, Schriebman, Koegel & Rehm, 1971) have postulated that autistic symptoms represent a reaction to stimulus overload. If this is the case, then the stereotyped behavior, avoidance of stimulating objects, and so on exhibited by autistic children should be reduced when the general environmental bombardment is diminished, as in REST.

METHOD

Subjects

Through correspondence and conversations with representatives of Laurel House (a local residential facility for autistic children) and of the Pacific Association for Autistic Citizens, an interest group including many parents of autistic children, a total of eight children were identified who were appropriate for inclusion in the study and whose parents volunteered to have them participate. There were 5 boys and 3 girls; 4 between the ages of five and seven years and 4 between nine and eleven years. The children were matched by age in an otherwise random assignment to the experimental (REST) or the control (WARD) treatment.

Environmental Settings

Each child spent one weekend in the Vancouver Children's Hospital. For REST, a small room was carpeted and lit by a dim (7 watt) light bulb. All furniture and fixtures were removed except for a mattress on the floor. A nurse and a member of the research team were constantly in the next room during the session, and monitored the patient both visually, through a one-way vision screen, and over the intercom. Toilet facilities and nutritious but bland food were brought into the room as needed.

The WARD children spent 48 hrs. in the Care-by-Patient unit of the hospital, which is normally empty on the weekend. The facilities consisted of a hospital room with one child and one adult bed. The area is brightly painted and lit. Normal meals were served in a large common room, furnished and decorated as a living room, and containing an assortment of toys and a television set. The children were not engaged in any systematic activities, and had access to the entire area and all furnishings. Their behavior was supervised by an experienced caretaker. Because of scheduling problems, only

three of the control children were actually put through the procedure. This environment was presumably lower in stimulation level than the child's home or school, and thus represented an attenuated version of the experimental treatment. It also shared with REST the characteristics of removing the child from familiar surroundings.

Procedure

One of the difficulties that Schechter et al. had reported was the initial antipathy of nursing staff and other professionals to the use of REST with the autistic children. This is a common concern, given the generally misleading negative expectations that people have about the technique (see Suedfeld, 1980). We avoided this kind of problem in the current study by having very full participation of parents, nurses, and other involved individuals right from the planning stage of the study. Complete information about the proposed design of the study, the time involved, the measures to be taken, and the environmental setting, was given to potential coworkers and to the parents of prospective subjects both in written form and in personal discussion. Considerable care was taken to acquaint these people with previous findings that the experience is nonaversive for most participants, and specifically that it had been shown to be pleasant in the earlier study with autistic children. Thus we obtained quite positive attitudes and cooperation from everyone involved. The categorizing of observed behaviors into stress related and non-stress related (see below) was an important procedure for establishing that the environment is innocuous for the children. This is, of course, a very necessary component of any plan to use REST with autistic children in the future, as well as an objective test of the hypotheses underlying this study and a test of the clinical judgment of Schechter et al (1969).

Six weeks prior to the hospital weekend, each child was administered a diagnostic performance battery that was designed specifically for this study (see below). In order to meet our requirement for further baseline measures, the children participated in eighteen sessions (three sessions per week for six weeks) prior to reporting for the weekend in hospital. During these eighteen sessions, the chilren were first observed in a playroom, with behavioral observations and coding of social interactions systematically being taken on seventeen specific behaviors (see Table 1). The observation was carried out by research assistants who had previously been trained on the observation and coding technique. The session was followed by individual administration of a specially designed set of discrimination learning tasks (see below).

Table 1 about here

One day prior to the weekend session, each child was assigned randomly to either the REST or the WARD condition; children in the two conditions were run concurrently.

Upon reporting for the weekend, both children were observed and videotaped in a highly stimulating, fully-equipped, vividly decorated playroom for approximately half an hour. REST children were introduced to the dimly lit room, which contained only a mattress, and told that they were going to have a good rest. The fact that they were wearing pajamas, and the quiet soothing manner of the nurse in charge, reinforced that explanation. They were told to ask for toilet facilities when needed, and they were then left alone. During the next 48 hrs., social contact occurred only when the nurse brought in food, beverages, or toilet facilities. Even on these occasions, the contact was brief and task-oriented, although the nurse's manner was friendly and accepting.

WARD children were taken to the Care-by-Parent unit and were shown around the facilities by the individual who would be taking care of them. Social contact occurred frequently during the next 48 hrs.

The behavior of the REST children was coded every 15 minutes by the nurse/observer, and that of both groups during 20 randomly timed 10-minute periods by the psychology research assistants in order to assess the effects of the environment on behavior. The record included the child's activities at the time of observation, using some of the categories coded during the 18-session pre-test. Additional categories relevant to the environment (sleeping, exploring the room) were added, and any vocalizations were recorded verbatim. The frequencies of each behavior were graphed for the 48 hr. REST period. Individual behaviors were color-coded, and the relative frequency of each behavior was assessed through the use of transparent overlays. The behaviors were divided into those that were stress-related and those that were not.

Post-session tests included a half-hour period of observation in the playroom immediately after release, a six-week, 18-session repetition of the playroom interaction and new sets of discrimination learning tasks, followed by a re-administration of the assessment battery.

Assessment Battery

In order to satisfy some of the requirements of our study--specifically, the need for objective quantified data and the measurement of specific cognitive, social, and other behavioral variables--it was necessary to design our own assessment battery. In the past, the assessment of autistic children has been a diffcult problem for diagnostic centers, particularly when the staff has had only limited experience with such children. Standardized test material delivered verbally is generally too difficult for even the highest

functioning autistic child. Bizarre behavior and difficulty in maintaining attention and eye contact interfere with performance in the test situation, and many autistic children have been considered untestable. Their achievement scores were at the bottom level of the tests used and were a reflection of what they could not do rather than of what they could.

The battery developed for this study is practical for use in regular diagnostic settings. It was designed to provide a complete inventory of the child's skills in the cognitive-verbal, cognitive-nonverbal, and motor areas. The tests were chosen to provide baseline information on cognitive, language, and behavioral development, which can be used by teachers and caretakers. These baselines could be used to compare the effects of new curricula, teaching procedures, and therapies, with retests to measure the child's rate of progress. The battery of tests needed to be short in order not to exceed the autistic children's attention span, and easy to administer so that the procedures developed would be useful as an assessment tool in regular diagnostic settings.

It should be noted that the tests were given blind; the tester was not otherwise connected with the project, and was not told to which condition the child had been assigned. Administration time is approximately 70 minutes. The battery consists of the following instruments:

a. Goodenough-Harris Drawing Test (Harris, 1963): This test was used to determine whether the child could follow simple verbal directions to draw a person; provide a detailed age-appropriate drawing; deal with a simple pencil and paper task; and control and direct the pencil with consistent handedness.

b. Boehm and Slater Cognitive Skills Assessment Battery (Boehm & Slater, 1974): This test measures a wide range of cognitive skills and elementary concepts basic to the development of academic skills in normal kindergarten and pre-kindergarten children. Task instructions are verbally complex.

Information is provided on the child's knowledge of sex differences; body parts; color; shape; number; picture and story comprehension; auditory and visual memory and discrimination; symbol discrimination; matching; vocabulary; letter naming; following multiple directions; large muscle skills; task persistence; and attention span. Scores are quantifiable and progress can be measured by noting change scores between the pre- and post-tests. A substantial part of the child's repertoire of skills which will be relevant to academic programming can be measured by this test. As well, small improvements in particular areas are efficiently noted as the child becomes able to complete more items in each of the categories. Since these skills are basic to readiness to learn to read, write, spell, and calculate, it is important to know which of these skills are in the child's repertoire.

c. Peabody Picture Vocabulary Test (Dunn, 1959): This test measures the level of the child's receptive vocabulary. It provides age scores based on the number of items passed. After a stimulus word is spoken, subjects are asked to point to the appropriate one of four pictures. This test was included to provide a measure of receptive vocabulary as an important component of cognitive-verbal development. Since new words learned would add to the child's age score, learning in this area could be efficiently measured in verbal children.

d. Krug, Arick and Almond Autism Screening Instrument for Educational Planning, Educational Subtest (Krug et al., 1979): The Autism Screening Instrument was developed to provide an assessment tool for severely handicapped autistic children that would be useful in making educational placements. Numerical scores make it valuable as a basis for evaluating student progress. The entire test was too long to be practical for our purposes. However, the Educational Subtest, which measures receptive and expressive language, body concept, and speech imitation, provides important

baseline information for the lower functioning child. This subtest can be used to record the behaviors present in the repertoires of nonverbal children which could not be assessed on instruments standardized for normal, even very young, children.

The subtest takes about 15 minutes to administer. It allows quick identification of higher functioning children and provides tasks on which they can be reinforced for successful performance. It also provides some tasks which lower functioning children can do, where they too can be reinforced for successful performance.

e. Modified Autism Behavior Checklist (Krug et al., 1979): Seven of the 58 items on the Autism Behavior Checklist were selected for this assessment battery. These were items which prominently reflect behaviors considered in the diagnosis of autism (e.g., has no social smile; actively avoids eye contact; will feel, taste or smell objects in the environment). This test was added to the assessment battery to determine whether the intervention used in this study had any effect on entrenched autistic behavior.

f. Leiter International Performance Scale (Arthur, 1952): This test provides a nonverbal measure of conceptual cognitive development. It was developed for use with children with hearing and/or speech disorders. It allows comparison of overall performance levels with tests using verbal directions and cues. It uses matching tasks to assess knowledge of color, form, shape, number, pattern, genus, age difference, etc. It measures the child's ability to manipulate several of these concepts in combination. It presents some tasks very similar to those with verbal directions in the Boehm and Slater.

Discrimination Learning Tasks

The discrimination learning tasks used in the 18 pre-intervention and 18 post-intervention sessions were modelled on Wood's (Note 2) modification of

the discrete trial format (Koegel, Russo & Rincover, 1977; Lavigna, Traphagen, Allen, Cooke, & Apolloni, 1978). In a preliminary session, 15-20 stimulus pictures were identified as novel and unfamiliar for each subject, and each learning session consisted of three blocks of 10 trials each of picture-card discrimination based on these stimuli. For each trial, two stimulus cards wereplaced on the table before the child and the tester named the target picture. If the child responded by pointing to the appropriate card within 5 seconds, a combination of primary and social/secondary reinforcement was administered. Incorrect or no responses were followed by the withdrawal of the stimulus cards and the turning aside of the tester for the duration of the intertrial interval. At the next administration, the correct picture was named again. If the response was correct, an attenuated version of the reinforcer was delivered. On the third presentation, if needed, the tester manually prompted the child to identify the correct stimulus and reinforced the response with verbal approval only. This particular hierarchy of responses graduated along the dimension of independence, matched to a corresponding hierarchy of reinforcers graduated along the dimension of potency, was employed in order to shape a pattern of independent responding.

After nine correct responses on the first presentation for each of three 10-trial blocks, using the discriminative stimulus (picture name) for one dominant card, the tester moved on to requesting the variant stimulus in a variant:dominant ratio of 3:7. When the same performance criterion was met at this level, the tester advanced to the final ratio of 5:5. Meeting the performance criterion at this ratio resulted in the introduction of two entirely new stimulus cards, and the resumption of the training process from the beginning. A perfect score would be 10 on each block.

RESULTS

There were no major pretreatment differences between the REST and the WARD groups on the measures. In view of the very small N, nonparametric tests were performed to compare changes from pre- to post-treatment tests in the REST and the WARD groups. Because of the exploratory nature of the study, and the importance of identifying even trends in behavioral and cognitive change, the information below includes both significant and marginal results.

Social Interaction

The behavioral observations taken during the six weeks of pre- and post-session testing showed high variability and infrequent occurrences of many of the behaviors. Inspection of the data indicated few persistent changes beyond two weeks; accordingly, the ratings for the two weeks immediately prior to the weekend session were compared with the two weeks immediately afterwards.

REST subjects improved on self-initiated communicative speech (from M = 0.84 to 1.35 occurrences per observation period) while WARD children declined (from M = 0.83 to 0), $U = 1$, $p = .057$. Combining scores measuring the vocal expression of affect, we found that REST children increased such expressions (from M = 0.17 to 1.68) while WARD children decreased (0.54 to 0.04), $U = 4$, $p = .004$). None of the other differences was statistically significant; many of the behavioral categories had a frequency of zero (or close to zero) on most observational sessions.

Discrimination Learning

Again, inspection of the data indicated that changes seldom persisted beyond the second week after the session. Scores were therefore analyzed

comparing learning performance during the two weeks before and after session, and also the single week before and after. The performance of REST subjects improved significantly more than that of WARD children on both of these analyses, M change = 5.72 vs. 2.89 and 3.67 vs. 0.89, Wilcoxon T = 8 and 7 respectively, p .05, one-tailed. The pre-session scores were not significantly different either as a function of group (REST M = 8.4, WARD M = 8.3) or week (two week M = 8.3, one week M = 8.7).

Assessment Battery

The following changes were noted on the Assessment Battery:

a. Goodenough: Only two of the seven subjects, one in each condition, could deal with the drawing task in either the pre- or post-treatment tests. No appreciable change was noted in either case.

b. Boehm-Slater: Greater improvements were noted in REST than in WARD subjects on Body Movement (M = 1.25 vs. 0, U = 1, p = .057), Number Concept (M = 2.5 vs. 0.33, U = 1), Symbol Discrimination (M = 1.25 vs. 0.67, U = 2, p = .11), and Information from Pictures (M = 0.5 vs. -.33, U = 3, NS). On the overall change scores, the Experimental subjects consistently showed more improvement than the Controls.

c. Peabody: Age levels on this test included two non-scoreable protocols (for one subject in each condition) and scores ranging from 2 years, 1 month to 3 years, 9 months. No significant changes were noted between pre- and post-session tests for either group.

d. Autism Screening-Educational Subtest: There were some statistically significant and some non-significant differences in improvement between the two groups. Experimentals did better than Controls after the session on Expressive Language (M = 1.5 vs. 0.33) and Additions (M = 7.0 vs. -1.67), both U = 1, p = .057. The overall difference in the Educational Subtest was significant at the same level (M = 8.5 vs. -2). Three of the four REST

subjects made improvements (one very substantially) and one showed no change. Of the WARD subjects, one showed a modest improvement, one showed no change, and one had a much lower score on the post-session test.

e. Behavior Checklist: Two REST and one WARD subjects showed some improvement on these measures. There was a trend for REST children to improve more than Controls, M = 0.75 vs. 0.33, $U = 2$, $p = .11$.

f. Leiter: The two REST subjects who were able to perform the tasks on the pre-test showed improvements on this measure; the other two did not have scoreable performances on either administration. In contrast, one Control demonstrated no change while one deteriorated (M = 1.0 vs. -0.33, $U = 1$, $p = .057$). The third could not be pre-tested. The performance of three of the children indicated the appropriateness of this test with autistic subjects. The scores of these children were at much higher levels than their scores on any of the tests where verbal presentations are used. One Experimental child scored at 5 years, 9 months on the post-treatment test, a three-month improvement over his initial score. This was less than one and a half years below his chronological age, and two years above his age score on the Peabody test of receptive vocabulary. A second REST child scored at 4 years 0 months on the post-test, a six-month improvement over his pre-test score and 1.4 years abovehis Peabody score. A third child, from the WARD group, had a post-test score of 4 years, 0 months, compared to a non-scoreable pre-test performance. His post-treatment score was nine months above his chronological age score on the Peabody. Thus, it is important to note that at least for some autistic children, material presented nonverbally produces a much higher level of performance than verbally presented tasks of similar types. For example, none of the three chidren was successful on the verbally presented matching task of the Boehm-Slater, while all succeeded on the more complex matching tasks presented nonverbally in the Leiter.

Playroom Behavior

Before going into REST or the WARD, and again at the conclusion of the 48 hr. period, each child was observed and videotaped for thirty minutes in a small hospital playroom adjacent to the wing in which the experiment was carried out. This playroom is a special treat for normal children, who love the red fire truck, rocking horse, doll house, etc. Before the treatment, our patients responded to the room with crying, heightened levels of stereotyped behavior, and withdrawal. One little girl sat in a corner, turned her back to the room, cried and bit her hand during the entire period, while her non-autistic little sister squealed with delight as she played with the toys in the center of the room. The subject could not be enticed to move even when her sister left. The playroom could almost have provided a good test for autism, in that none of the autistic children in either the Experimental or the Control groups liked it.

Children in the Experimental group found the room much more attractive immediately after REST. They verbally and facially expressed positive affect at a higher frequency than WARD subjects ($M = 1.83$ vs. 0.25, $U = 3$, $p = .033$). REST children showed little of their previous signs of stress, and even picked up books or toys (although their play was still not appropriate). The response of the WARD subjects to the playroom after the session was the same as in the original visit.

Behavior During the Session

Early REST behaviors included talking, giggling, touching the walls where a carpet had been placed, jumping on the mattress, looking at their dim reflections in the one-way mirror, and trying the door. One child said "I'll huff and I'll puff and I'll blow your door down." After a few minutes of huffing and puffing, he went on to other activities and ignored the door. Only one of the four children found the locked door aversive. She had several temper tantrums (a common behavior for her) after finding the door locked. We

later learned from her parents that she was afraid of locked rooms. However, after a while she calmed down and her overall behavior pattern did not show stress. After the REST period, one of the children's first words to his parents were "I'm fine," as if to say that it was not so bad and was not a cause for worry. The children did not avoid the room when they passed it on subsequent visits to the hospital, and one little boy eagerly took his small brother to show him "my room."

Using the behavioral records that the nurse/observer had taken every fifteen minutes during the REST session, each child's behavior was coded and analyzed to identify major patterns during the 48 hrs. This also allowed the analysis of the frequency of particular behaviors, and the comparison of each behavior with any or several others. The record was discussed with the child's parents or caretakers to determine whether any of these behaviors was bizarre or outside the child's normal activities in his or her regular environment. This was done to compare the low stimulus situation with a higher one (e.g., at home), and also to provide possible hints to caretakers as to the future design of home environments. In a more general way, this procedure could also provide the information to help in the design of learning and other environments for autistic children.

None of the children's parents or caretakers felt that any of the behaviors recorded was at all unusual or bizarre for their child. The REST environment, by stripping away the complexity of the child's ordinary settings, allows his or her most prominent behaviors to be observed without interference either from distractors or from social interaction. It is then possible to determine which behaviors need to be modified, and to choose replacement behaviors that are more appropriate and that are already within the child's repertoire.

In order to evaluate whether the restricted environment was stressful to autistic children, each behavior was categorized either as stress-related (e.g., tantruming, crying, grinding teeth, withdrawal) or non-stress related (e.g. exploring the room, looking in the mirror, eating, lying down). These categorizations were verified with the child's parents or caretakers. The specific behaviors in each category varied from child to child. Analysis of the results indicated that the autistic children in this study did not emit high levels of stress-related behavior during the 48 hrs. of the session, M = 0.69 occurrences per waking hour (see Fig. 1). The figure also shows a cyclical increase in the children's activity near the end of each day in REST.

Figure 1 about here

DISCUSSION

Clearly, this exploratory study cannot categorically establish the usefulness of REST in the treatment procedure for autism. In fact, it was not designed to provide such a test; rather, we wanted to test whether systematic measures and comparison with a control group would confirm the clinical impressions of Schechter et al. (1969) that REST was non-aversive to autistic patients and that it did have at least short-range beneficial effects. Our data support an affirmative answer to both of these questions. Observational, anecdotal and "self-report" evidence all indicate that the children showed little if any stress reaction to the REST situation. Furthermore, experimental subjects showed improvements on a number of learning, cognitive and behavioral scales after the session, and showed more such change than did controls. In regard to the hypotheses derived from the REST literature, there was some confirmation for the predictions that learning would improve, that social responsivity would increase, and that autistic avoidance of stimulating experiences would diminish

In addition, the scores on the Assessment Battery showed some interesting patterns. The Drawing Test was shown not to be a sensitive measure of change with low-functioning autistic children. The Peabody Picture Vocabulary Test also was not very useful in this study. However, both of these tests are probably useful in establishing baselines for educational purposes. The Peabody is particularly appropriate for defining vocabulary baselines since additional words will result in improved age scores. Information regarding the presence or absence of pointing responses and ability to comprehend verbal instructions provides important information even about the nonverbal child. The Autism Screening Instrument was quite useful, since its numerical scores make it valuable for evaluating progress and because it can serve as a quick identifier of higher functioning children, and also provides some tasks that even low-functioning children can perform. The Boehm-Slater is a sensitive and useful measure for educational programming. It also serves as a good comparison for level of performance when verbal directions are used as compared to similar tasks on the nonverbal Leiter, which also was a useful and sensitive instrument.

We feel that the development of the test battery is itself a potential contribution to research and therapy in the area of autism. The establishment of behavioral baselines and the measurement of changes after a period of development or intervention have been serious problems for people working with autistic children. This battery makes it possible to obtain such baselines, which will be useful not only for comparison purposes but also to gain the cooperation of parents, caretakers, and teachers in research projects as it becomes clear that the data can be applied to answer educational questions. The combination of tests selected appears to be a reasonably good one. It does not take very long and could be administered in two short sessions if for some reason the 70-minute administration time is excessive for a particular

situation. Even if only parts of the battery are used, so that not all of the relevant aspects of the child's repertoire are measured, there can be some useful applications.

The fact that our autistic subjects performed better on abstract tasks with nonverbal instructions than on essentially equivalent tasks that were presented verbally may point to appropriate directions in the treatment and education of such children. The use of nonverbal modalities may prove to be as useful in such cases as it has been shown to be with retarded children and adolescents (Feuerstein, 1979). The data also support recent findings that difficulties in language development and linguistic abstractions are characteristic of autism as opposed to retardation (Sindelar, Meisel, Buy & Klein, 1981).. Both the theory and the data have implications for differential diagnosis as well as for educational and therapeutic interventions.

Obviously, further testing is required to establish just how powerful REST is as a treatment procedure for autism. In general, we expect that its most appropriate use would be for relatively brief periods, but at fairly frequent intervals. Periods of REST could be used prior to or in conjunction with social reinforcement for appropriate behavior, and with concentrated teaching sessions to extinguish undesired behaviors and inculcate desired ones. REST provides an environment which is not overwhelming so that the child can be exposed in a non-stressful way to new and stimulating objects and activities. This approach would combine traditional (e.g., behavioral) techniques of treatment with REST, as has been proposed for the use of stimulus restriction in other therapeutic contexts (see Suedfeld, 1980). At the same time, it would interfere less with the normal life of the child than the extremely long sessions used by Schechter et al. (1969) or even the less disruptive 48-hour period used in the current study. Both home and school environments for autistic children may also be designed to incorporate the possibility of periodic brief REST sessions as a standard experience when appropriate.

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FOOTNOTE

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FIGURE CAPTION

Fig. 1. Total Numbers of Stress- and Non Stress-Related Behaviors During REST.

Table 1 Behavioral Categories

A. Eye Contact

This category is coded when the child engages another person in eye contact, either on the child's own initiative or responsively.

1. Eye contact with adult
2. Eye contact with child

B. Communicative Behavior

Coded when the child either independently or responsively produces a behavior that appears to be intended to convey meaning to another individual.

1. Self-initiated communicative speech
2. Responsive communicative speech
3. Communicative gesturing

C. Expression of Affect

The child produces vocalization and/or facial expression conventionally associated with affect.

1. Facial expression of positive affect
2. Vocal expression of positive affect
3. Facial expression of negative affect
4. Vocal expression of negative affect

D. Situationally Irrelevant Behavior

This category is coded when vocal or motor behavior appears to be ritualistic, repetitive, and/or unrelated to what is going on in the environment.

1. Situationally irrelevant vocalization
2. Ritualistic, repetitive motor behavior not involving an object
3. Ritualistic, repetitive motor behavior involving the productive use of an object.

E. Situationally Relevant Behavior

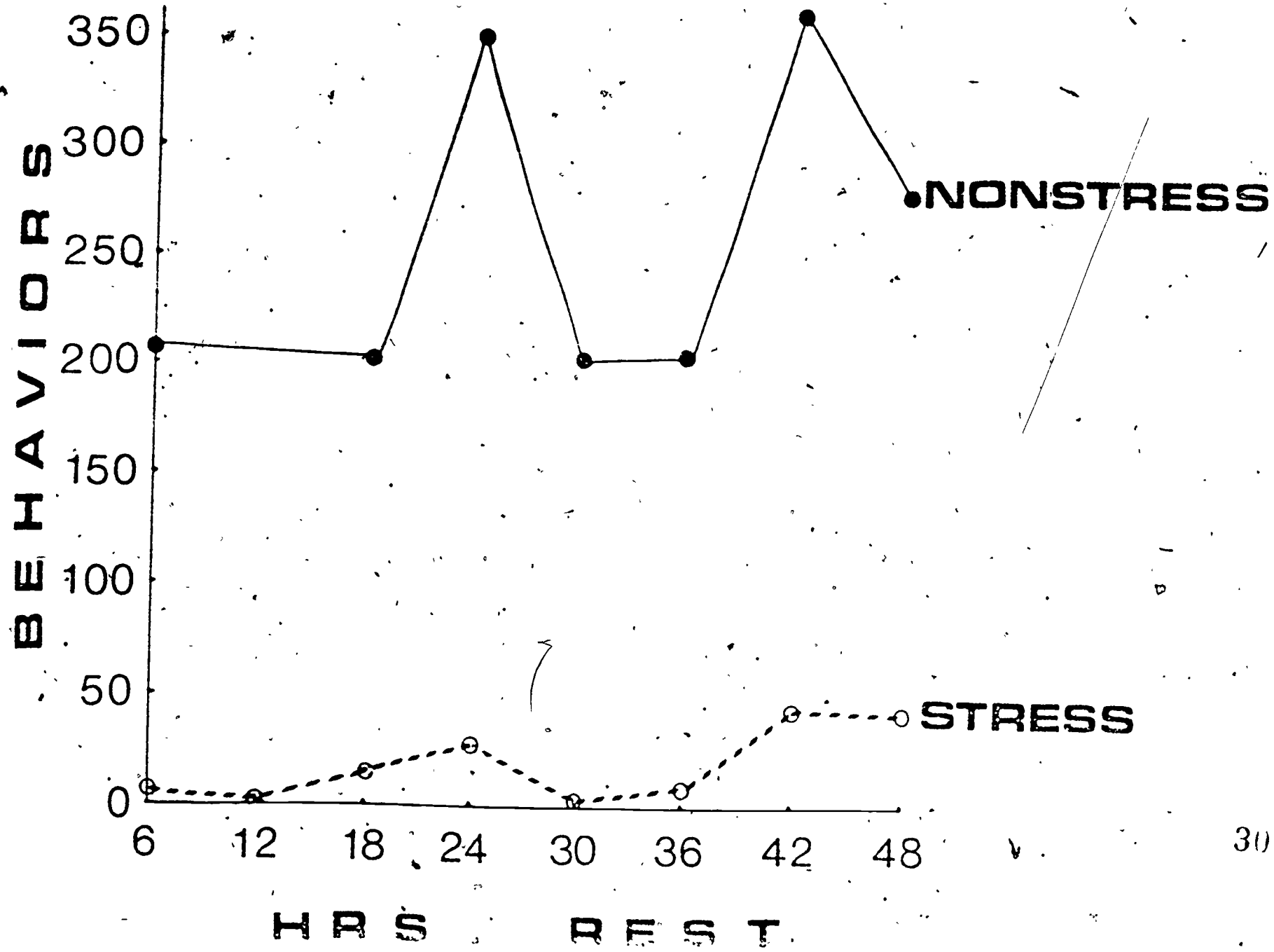
Coded when the child engages in behavior that appears "appropriate" in the environment.

1. Appropriate use of an object
2. Appropriate intentional physical contact with another person

F. Aggressive Behavior

This category is coded when the child, apparently intentionally, comes into contact that is likely to cause physical discomfort, damage or injury.

1. Physical aggression toward another person
2. Physical aggression toward objects
3. Self-inflicted injury


350
300
250
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BEHAVIORS
NONSTRESS
STRESS
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HRS REST