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# TASK DIFFICULTY AND ABERRANT BEHAVIOR IN SEVERELY HANDICAPPED STUDENTS

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The influence of task difficulty on aberrant behavior was investigated with three severely handicapped students. Noticeably higher rates of problem behavior occurred in demand compared to no-demand conditions. In addition, there were higher rates of problem behaviors on difficult versus easy tasks. Both these findings were validated with visual discrimination and perceptual motor tasks. An errorless learning procedure effectively minimized errors and aberrant behavior in visual discrimination tasks but not in perceptual motor tasks. It was conceptualized that aberrant behavior was maintained by negative reinforcement contingencies. Difficult tasks were aversive to the children, who emitted aberrant responses to escape or avoid such tasks. By contrast, conditions in which no demands were made, easy tasks, and, in visual discrimination learning, errorless tasks, were less aversive and resulted in little or no problem behavior. Implications for reducing maladaptive behaviors through curricular modifications are discussed and contrasted to more traditional consequence manipulation approaches.

DESCRIPTORS: aberrant behavior, instructional demands, task difficulty, errorless learning, severely handicapped

A sizable research literature has emerged indicating a number of convincing ways to reduce aberrant behavior in severely handicapped persons (Bachman, 1972; Baumeister & Forehand, 1973; Carr, 1977; Rollings, Baumeister, & Baumeister, 1977; Schroeder, Mulick, & Schroeder, in press). The specific techniques that have been used include the differential reinforcement of other behavior (Repp & Dietz, 1974), the differential reinforcement of incompatible behavior (Young & Wincze, 1974), overcorrection (Azrin, Gottlieb, Hugart, Wesolowski, & Rain, 1975), time-out (Duker, 1975; Wolf, Risley, & Mees, 1964) and contingent aversive stimulation (Lovaas & Simmons, 1969; Tanner & Zeiler, 1975). These techniques, as well as others that have been successfully applied (e.g., Lutzker, 1978), can be classified either as procedures that positively reinforce alternative, desirable responses to the aberrant behavior or as procedures that contingently punish the aberrant response. Both these approaches involve the manipulation of consequences. However, some attempts to apply these techniques have encountered a number of difficulties. Procedures using positive consequences may fail to suppress the aberrant behavior adequately, necessitating a search for other more effective interventions (Carr, Newsom, & Binkoff, 1976). Efforts to use punishing consequences in conjunction with or as an alternative to positive reinforcement procedures may encounter additional problems. Punishment has come under recent criticism, and both the courts and some governmental agencies have sought to limit and restrict its use severely (Gast & Nelson, 1977).

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Also, many of the treatment procedures involving the manipulation of consequences have been carried out in laboratory or clinical settings. It can be questioned whether these consequence manipulation procedures could be implemented with the same degree of control and success in more natural settings like classrooms. For example, Kelly and Drabman (1977) successfully reduced behavior with an overcorrection technique. Follow-up observations indicated, however, that the procedure was too exhausting and difficult to implement by staff, and therefore was no longer being used.

It has been suggested in a number of publications that the manipulation of antecedent events may provide an alternative method for reducing deviant behavior. Carr et al. (1976) found that a retarded boy's self-injurious responses increased when he was presented with mands (verbal antecedents consisting of commands that the boy make a specific response). In contrast, the delivery of tacts (simple declarative sentences that did not require a response) did not produce an acceleration of the aberrant behavior. The investigators were able to reduce the self-injurious behavior that followed the mands by embedding the mands in a series of verbal statements. In a related fashion, Plummer, Baer, and LeBlanc (1977) demonstrated that deviant behaviors among preschoolers could be accelerated by decreasing the rate of mands. Gaylord-Ross, Weeks, and Lipner (1979) described a 16-yr-old severely retarded girl who emitted self-injurious behavior which varied with the type of task she was asked to perform. When she was asked to assemble a puzzle, little or no aberrant behavior was observed. However, presentations of a button-sorting task produced high rates of self-destructive responses. Schroeder and Humphrey (Note 1) also found that self-injury increased abruptly and consistently with the presentation of certain tasks and declined upon the presentation of other types of tasks.

These studies suggest that by changing certain curriculum or task variables, a child's aberrant behavior may be reduced. One variable that could be modified is the difficulty level of the task. Difficult tasks may contain aversive properties, and a child faced with such a task may emit aberrant responses to avoid or escape the task. Dehn (1970) found that autistic children produced more aberrant behavior when they were presented with difficult tasks than when they were presented with easy tasks. Sailor, Guess, Rutherford, and Baer (1968) suppressed a retarded girl's tantrum behavior during verbal training by contingently presenting her with difficult stimulus items after a tantrum. If no tantrums occurred, she was presented with easier items. These findings support the possibility that difficult tasks may contain aversive properties.

In the present investigation, the relationship between aberrant behavior and the difficulty level of a task was examined. It was conceptualized that, when presented with a difficult task, severely handicapped children would emit aberrent responses to terminate the aversive task stimulus. The problem behavior is therefore under the control of negative reinforcement (cf. Carr, 1977). On the other hand, if the child is not presented with a task, there would be no aversive antecedent event from which to escape, and little or no deviant behavior would appear. Easy tasks would also contain few or no aversive properties and would not produce aberrant responses. To test these expectations, three experimental conditions were created which would expose severely handicapped students to difficult tasks, easy tasks, and no tasks. It was predicted that there would be considerable aberrant behavior during the difficult condition and near-zero levels of problem behavior in the easy and no task conditions.

An additional condition was presented in which an errorless learning procedure was used to alter a difficult task. Errorless learning is a procedure in which discriminative stimuli are gradually faded in and/or faded out so that stimulus control is established with a negligible amount of errors. Terrace (1966) demonstrated the efficacy of errorless learning with animals, and Lambert (1975) and Touchette (1968) have

shown it to be successful with mentally retarded individuals. It was expected that the errorless condition would be of equivalent difficulty to the baseline and easy conditions. The prediction was made, therefore, that a difficult task could be modified with an errorless learning procedure so that little or no errors would occur and little or no aberrant behavior would appear.

## EXPERIMENT 1

### METHOD

*Subjects*

Two severely handicapped children who displayed self-injurious behavior participated in Experiment 1. Heather was a 13-yr-old, severely retarded girl who lived with her parents and attended a day school for mentally retarded and behaviorally disordered pupils. The day school had given her the diagnosis of severe mental retardation with autism. Intelligence tests results, which were made available by the school, indicated she had an IQ = 32 and an MA = 2-9. Her self-abuse consisted of biting her right index finger and her right wrist.

Mark was a 15-yr-old resident at an institution for the behaviorally disordered who attended a school program at the institution. He had been diagnosed as childhood schizophrenic by the institution. Intelligence test results provided by the school indicated an IQ = 26 and an MA = 4-0. Mark's self-abuse consisted of biting his index fingers and thumbs. Thus, the aberrant responses displayed by both students had similar topographies. Anecdotal reports and observations supplied by teachers and other staff members at the schools indicated that the self-injurious behavior of both children was maintained by negative reinforcement, i.e., it appeared to be emitted to escape task demands.

*Procedure*

Experimental sessions lasted 20 min and were conducted in small rooms in the students' respective school buildings. Sessions were conducted daily, at least four days a week. The first author acted as experimenter for both Heather and Mark. The experimenter sat next to the student at a table in order to present the materials and the experimental trials.

*Pretest.* Prior to training, a pretest was administered to ensure that the student could: (a) point to one of two stimulus cards that were presented during each trial; (b) perform at an above-chance level on easy two-choice discrimination tasks. On each pretest trial the experimenter placed two 9 by 13 cm cards on a table in a horizontal orientation approximately 7 cm apart. A simple geometric figure appeared on each card. The difficulty of the task was minimized by using figures that differed from each other along three different dimensions: form, color, and size (Smith, Houfman, Dutch, & Frost, 1975). The stimuli presented to Heather consisted of a large red cross vs. a small blue circle while a small green square vs. a large yellow triangle comprised the stimulus array presented to Mark. For Heather, the cross was designated the correct choice (S+), and the circle was designated the incorrect card (S—). For Mark, the square constituted the correct card (S+) and the triangle was the incorrect choice (S—). The verbal cue, "point to the correct card" was delivered at the onset of each trial. If a correct response occurred within 20 sec, the student was verbally praised and given an edible. The cards were then removed, which indicated the end of the trial. An error occurred if the student: (a) pointed to S—, (b) emitted no response within 20 sec, or (c) pointed to both cards simultaneously. Responses to S— were consequated with "No, that's wrong," and the experimenter removing the cards, which indicated the end of the trial. If the student failed to respond within 20 sec, the experimenter removed the cards, and no other feedback was given. The end of each trial was followed by a 10-sec intertrial interval. Trials were conducted successively throughout each 20-min session. The left-right position of S+ was determined by a randomization procedure described by Fellows (1967). Because Mark frequently pointed to both cards simulta-

neously, he was given special training trials in which he was taught to point to only one of the two cards. During these trials, two blank cards were placed in front of Mark, and he was given verbal prompts, such as "Point to only one card," and physical prompts. The physical prompts consisted of holding one of Mark's hands so that he was prevented from pointing to more than one card. The verbal and physical prompts were then faded, and Mark was again presented with the triangle and the square. The special training procedure appeared to be fairly successful. Throughout the remainder of the study, Mark simultaneously pointed to both stimuli on only six trials, which, as indicated above, were treated as errors. The criterion for learning was 8 out of 10 correct responses.

*Baseline.* During the baseline condition, the student's behavior in the absence of task demands was examined. For a 20-min period, the student sat next to the experimenter, who neither delivered instructional commands nor interacted with the student in any other manner. Materials familiar to the student (e.g., paper, crayons, puzzles) which were used in his or her classroom were placed on the table. The student could manipulate the materials, sit inactively, or maneuver about the room.

*Easy condition.* All procedures used during the easy condition were identical to those used during the pretest. Only the stimulus cards comprising the discrimination task differed. The task for Mark was to discriminate a large blue circle (S+) from a small yellow square (S−). The task for Heather required her to discriminate a black-and-white closed figure (S+) from a black-and-white open figure (S−) (see Figure 1, Form 1). These figures were derived from the work of Gibson, Gibson, Pick, and Osser (1962) who found that such forms could be distinguished by normal four-year-old children. The criterion for learning the task consisted of 9 out of 10 consecutive correct trials in a session.

*Difficult condition.* The difficult condition followed the same trial-by-trial format used in the pretest and in the easy task. The figures consisted of reversed forms, which, according to a study by Gibson et al. (1962) are among the most difficult types of figures for children to discriminate. Heather was presented with forms 2 and 3 and Mark was presented with forms 5 and 6 in Figure 1. The students learned the discrimination for each form in separate presentations of the difficult condition. Heather and Mark each received two presentations of the difficult condition (see Design section below).

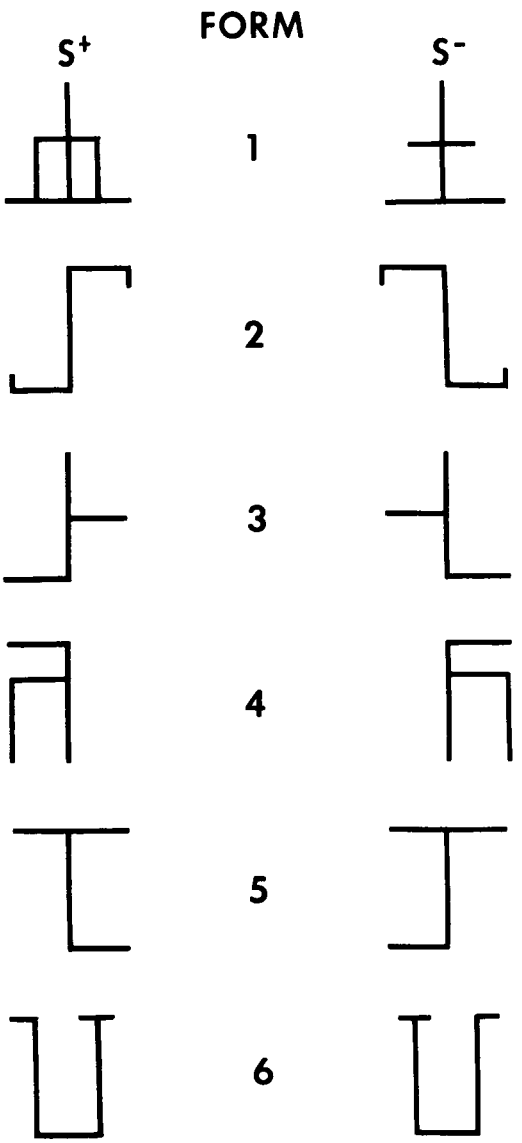


Fig. 1. Pairs of figures used in the two-choice discrimination problems.

*Errorless condition.* The same format used in the pretest and the other two conditions was used for the errorless condition. As was true for the difficult condition, the S+ and S— forms to be discriminated consisted of reversed figures. However, in the errorless condition, S+ remained unchanged while S— was gradually altered in a series of steps. During Step 1 of the errorless sequence, S+ was presented in the completed form, and S— consisted of a blank card. The 10-step sequence for form 3 in the errorless condition can be seen in Figure 2. In order to proceed to the next step, the student was required to make five consecutive correct responses. At each succeeding step, a greater portion of S— was faded in. If the student made an error on any trial, he or she was presented with the previous step. Five consecutive correct responses at that step were again required for the student to advance. The final step corresponded to the complete S—. As in the easy and difficult conditions, a criterion of 9 out of 10 correct consecutive trials was established for the last (complete S—) step. Heather and Mark each received two presentations of the errorless condition. Some of the forms used in the errorless condition presented to one student were identical to the forms used in the difficult condition for the other student. The figures used in the first errorless condition given to Heather were the same forms presented to Mark in the second difficult condition (Form 6). Also, the forms comprising the first difficult condition for Heather were identical to the figures comprising the second errorless condition given to Mark (Form 2). However, the forms used in the other difficult and errorless conditions given to Mark were not presented to Heather.

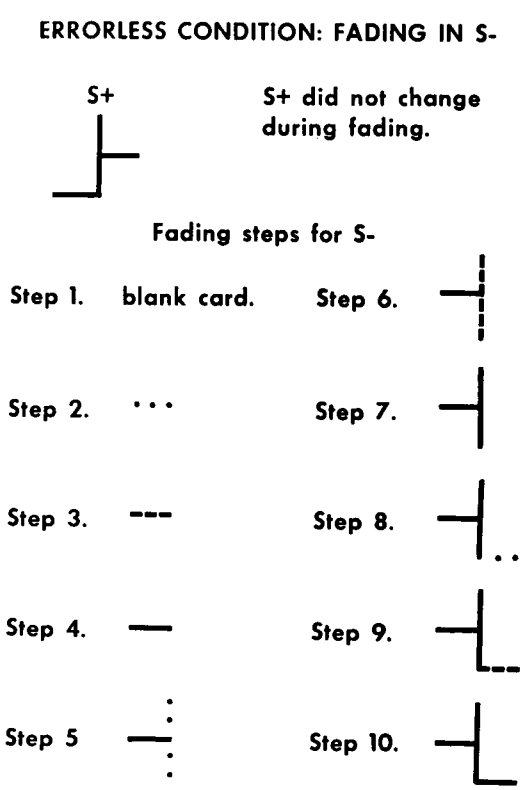


Fig. 2. Example of a fading sequence in the errorless condition.

*Recording and Reliability*

Student performance during discrimination learning was dichotomously scored as a plus or a minus. A plus was recorded if the student pointed to S+ and did not point to S— during the trial. During selected sessions, both the experimenter and another observer, naive regarding the purpose of the experiment, recorded the student's responses at the same time. In addition to whether a correct response or an error was made, the appearance or absence of a self-injurious response in a trial was also recorded and was also scored dichotomously. The trial consisted of the onset of the instruction, "Point to the correct card," to the end of the intertrial interval. During the baseline condition, an interval recording procedure was used to record observations of self-injurious behavior (because baseline contained no instructional trials, task performance was not recorded). The presence or absence of a self-destructive response was dichotomously recorded during a 30-sec interval. An interval length of 30 sec was selected because it was analogous to the duration of a trial in the other conditions. In the other conditions, the presentation of a cue, the student response, and the consequence occurred within 20 sec, followed by a 10-sec intertrial interval.

During baseline the experimenter also recorded whether or not the student was on task, which meant the student manipulated the curriculum materials placed in front of him or her in an appropriate manner. However, data for on-task performance are not reported because the students were almost never on task. Their behavior during baseline usually consisted of walking around the experimental room or manipulating the curriculum materials in an inappropriate manner, such as flipping puzzle pieces in the air.

Interobserver agreement was assessed during 10 randomly selected sessions for Heather and during nine randomly selected sessions for Mark; at least twice during each condition. During reliability checks, the experimenter and another observer were seated at opposite ends of the experimental room and simultaneously recorded the students' responses to task stimuli (or, on-task performance during baseline) and whether or not an aberrant response had occurred. Because it was necessary to record an observation at the end of each trial (or, during baseline, at the end of each 30-sec interval) it was impossible for either the experimenter or the observer to determine when the other was only scoring the correctness of a response to the learning task (or scoring whether the student was on task during baseline) and when the presence of an aberrant response was also scored.

Occurrence reliability for discrimination learning was calculated by dividing the number of agreements between observer and experimenter on plus trials by the number of agreements and disagreements on plus trials and multiplying the quotient by 100. Interobserver agreement was 100% for both students. To calculate occurrence reliability for aberrant behavior, the number of agreements of occurrence of self-injurious behavior was divided by the number of agreements plus disagreements with the quotient multiplied by 100. For both children, interobserver agreement was 100%

*Design*

A reversal design was used to evaluate the differences in responding: (a) between baseline and the instructional conditions and (b) among the three instructional conditions. Conditions are designated as: A = baseline, B = easy, C = difficult, and D = errorless. The sequence of conditions for Heather was A-B-A-C-A-D-A-C-A-D. The sequence of conditions for Mark was A-C-A-C-A-D-A-D-A-B. These sequences gave a partial counterbalancing of the order of instructional conditions since B appeared first and third, C second and first, and D third and second for Heather and Mark, respectively.

## RESULTS

Figures 3 and 4 present the percentage of errors and self-injurious behaviors per session for Heather and Mark, respectively. It can be seen that Heather displayed no finger biting throughout any of the baseline sessions. In the easy condition there was no self-injury in any of the sessions and she reached criterion in the first session. Thus, the task was truly easy, with few associated self-injurious responses. There was a considerable number of errors in the difficult condition. Much self-injury appeared in the earlier sessions but declined to a zero level by later sessions—the sessions when learning also improved significantly. In the errorless condition there were few task errors throughout the sessions and criterion was reached in sessions 1 or 2. Also, there were nearly zero finger biting responses in all of the errorless sessions.

Mark displayed low, but not zero rates of self-injury during baseline. Rates of self-injury ranged between 0 and 20% throughout the baseline sessions. In the easy condition there were few errors or aberrant responses, with criterion reached in the first session. In both of the difficult task conditions there was considerable self-injury and task errors. In the first difficult task it is striking how the forms of the error and self-injury curves parallel each other. Criterion was never reached in the first task and aberrant responding never went below the 20% rate. In the second task, criterion was reached in session

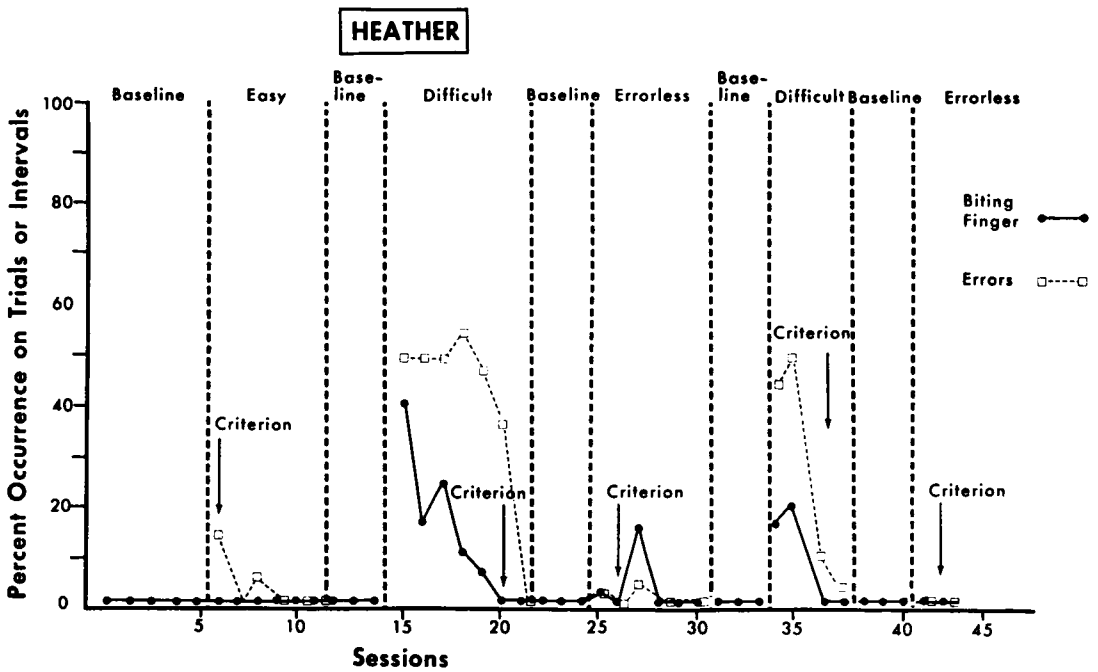


Fig. 3. Percent occurrence of errors and self-injury for Heather across the four experimental conditions.

3 and self-injury dropped significantly in sessions 3 and 4. There were low rates of self-injury and errors in both errorless task conditions. The parallelism in the curves of the first task is noteworthy.

*Correlational analysis.* A further analysis of the relationship between errors and deviant responses was conducted by tabulating their co-occurrence on a trial-by-trial basis. A 2 × 2 matrix for each task condition and student was generated with the frequency of trials in each cell indicating the presence of: (a) self-injury and error, (b) self-injury and no error, (c) no self-injury and error, and (d) no self-injury and no error. The first category (a) and the last category (d) confirm the expectation that self-injury only appeared on error trials. The second and third categories (b and c) disconfirm this expectation. Separate chi-square analyses were calculated for the difficult condition of Heather and Mark and the errorless condition of Mark.

The other instructional conditions were excluded from the analyses because there were nearly zero deviant responses or errors in these conditions. For all three statistical analyses chi-square was significant at the $p < .01$ level, indicating that self-injury tended to only occur on error trials.

## DISCUSSION

Experiment 1 demonstrated three findings. First, few deviant responses occurred in a no-demand situation versus an instructional situation where demanding tasks were presented. Second, easy visual discrimination tasks produced few, associated aberrant behaviors while difficult tasks had high rates of aberrant behavior. Third, difficult visual discrimination tasks can be modified through errorless learning procedures so that few performance errors and deviant responses co-occur.

## EXPERIMENT 2

In any scientific endeavor the ability to replicate the effects of an experiment directly with different subjects tends to strengthen the inter-

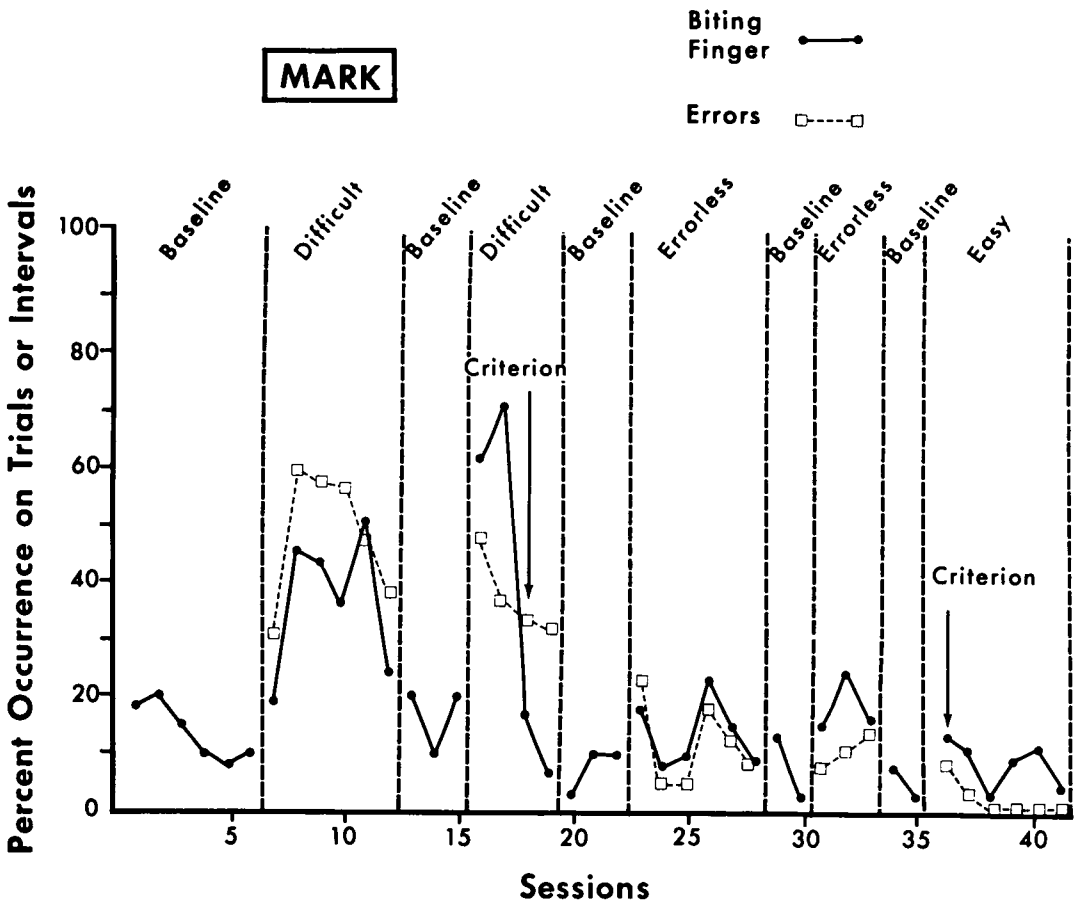


Fig. 4. Percent occurrence of errors and self-injury for Mark across the four experimental conditions.

nal and external validity of a particular treatment or independent variable (Campbell & Stanley, 1963; Hersen & Barlow, 1976). In the area of mental retardation research it also becomes useful to establish the ecological validity of a finding with "real life," natural materials as well as by making demonstrations with tasks associated with the experimental laboratory (Brooks & Baumeister, 1977; Gaylord-Ross, 1979). In this light Experiment 1 used the type of task that has been frequently examined in laboratory experiments with retarded and autistic persons (e.g., Fisher & Zeaman, 1973; Lovaas, 1977). It would be useful to extend the findings of Experiment 1 to a domain of functional tasks that are commonly practiced by severely handicapped persons. Therefore, a set of perceptual motor tasks was selected in Experiment 2 that overlapped with self-care activities frequently trained with this population. The same objective of the first experiment was present in the second: to examine the covariation of aberrant behavior and instruction under the conditions of no demand, easy task, difficult task, and errorless learning.

## METHOD

### *Subject*

Ann was a 10-yr, 6-mo-old girl attending the same day school as Heather. She was classified as profoundly retarded by an agency independent of the study. Her IQ was estimated to be below 30, and her MA was 1-11. Her aberrant behavior consisted of striking others with an open hand and crying frequently. Informal ob-

servations indicated that these behaviors appeared to be under the control of negative reinforcement.

*Procedure*

A 21-yr-old female graduate student served as the experimenter. Experimental sessions were conducted in a small room located in the child's school building. With the exception of the pretest, all sessions were 20 min in length.

*Pretest.* A pretest was administered for each of three perceptual motor tasks: operating a toy rocket, buttoning a shirt, and buckling a belt. During the pretest, Ann was presented with the materials needed to perform the task, after which she was instructed to complete the task. For example, the pretest for buckling a belt consisted of placing a belt of Ann's size around her waist, and, leaving the belt unbuckled, giving her the instruction, "Ann, buckle your belt." Ann was given no prompts or consequences. Three trials were presented for each task. If Ann was unable to complete the task on all three trials, the task was used in one of the experimental conditions. Ann failed all three trials of the three tasks listed above.

*Baseline condition.* The baseline condition was identical to baseline in Experiment 1. Materials familiar to the student were placed on a table, and no form of interaction occurred between the experimenter and Ann during the 20-min session. A 30-sec interval recording procedure was used to record the presence or absence of aggression and crying. The decision to use 30-sec intervals was based on the observation that a maximum of 30 sec was required for a severely handicapped child to complete the self-help skills used in the experimental conditions.

*Easy condition.* A one-step visual motor task was selected for the easy condition. The task consisted of striking or squeezing a toy rocket launcher (8 × 12 × 16 cm) that would eject a rocket. The toy contained a plastic launcher base with a manipulandum that the child could squeeze or strike. A form rubber rocket could be attached to the plastic launcher stand. Each trial began with the experimenter's instruction, "Make the rocket go." If the student responded within 3 sec, she received an edible and verbal praise. If the child failed to respond or responded incorrectly within three seconds, the experimenter delivered a verbal prompt, which consisted of repeating the initial instruction, "Make the rocket go." An incorrect response or a failure to respond during the following 3 sec resulted in the experimenter delivering a physical prompt. Thus, a trial that necessitated the use of a physical prompt was regarded as a trial in which an error had occurred. The student's hand was guided through the correct response of striking the manipulandum, which caused the toy rocket to be ejected. The physical prompt was faded over succeeding trials. Prompted trials were positively consequated in the same manner as correct trials. For each trial, the experimenter recorded the presence or absence of: (a) a correct (unprompted) perceptual motor response; (b) an aggressive (student striking experimenter) response; and (c) a crying response. A trial consisted of the period between the initial cue, "Make the rocket go," and the delivery of the edible and the verbal praise that followed the completion of the task. The criterion for learning the task was 9 out of 10 correct trials.

*Difficult condition.* In the difficult condition, trials and sessions were conducted and recorded in the same manner as in the easy condition. The task used in the difficult condition consisted of Ann buttoning a button (one cm in diameter) on a blouse she was wearing. The procedures used to teach the difficult task were analogous to procedures typically used in classrooms to instruct severely handicapped students in self-help skills. A 5-step task analysis for buttoning a blouse was used to teach Ann the difficult task. The task analysis, which was based on a task analysis described by Watson (1972), required Ann to pull the button through the buttonhole in the following steps:

(1) with 90% of the button already pulled through the buttonhole,

(2) with 75% of the button already pulled through the buttonhole,
(3) with 50% of the button already pulled through the buttonhole,
(4) with 25% of the button already pulled through the buttonhole,
(5) with 0% of the button pulled through the buttonhole.

The cue, "Button your blouse," was delivered at the onset of each trial.

The correct response of buttoning one button within 3 sec was positively consequated. As was true in the easy condition, if Ann did not respond or responded incorrectly within 3 sec, she was given a verbal prompt in which the instruction was repeated. If, after another 3-sec interval, she still failed to make the correct response, a physical prompt was used. All completed responses were consequated with an edible and verbal praise regardless of whether or not a prompt had been used. Physical prompts were systematically faded. When Ann completed a particular step in the task analysis without physical prompts on three successive trials, she was moved to the next task analysis step. The criterion for learning to button a blouse consisted of correctly performing step five of the task analysis on 9 out of 10 consecutive trials.

*Errorless condition.* Trials and sessions were conducted and recorded in the same manner as in the easy and difficult conditions. The errorless task required Ann to buckle a belt around her waist. As in the difficult condition, a task analysis based on a task analysis described by Watson (1972) was applied. The 6-step task analysis required Ann to pull a belt so that the buckle hole would slide into the catch in the following sequence:

(1) with 100% of the belt already pulled through the rim of the buckle and the hole resting on top of the catch,
(2) with 90% of the belt already pulled through the buckle,
(3) with 75% of the belt already pulled through the buckle,
(4) with 50% of the belt already pulled through the buckle,
(5) with 25% of the belt already pulled through the buckle,
(6) with 0% of the belt pulled through the buckle.

Instead of conducting all trials with a normal fitting belt and buckle, a procedure of using oversized garments was adapted from Azrin, Schaeffer, and Wesolowski (1976). Because oversized garments are easier to grasp and manipulate than normal fitting materials, it was expected that their use would result in few initial errors. After a task has been mastered with an oversized garment, it should be possible to reduce the size of the belt and buckle in successive steps until the student reaches criterion on the normal fitting garment so that the student makes relatively few errors throughout the training sequence. A 4-step sequence for systematically reducing the size of both the belt and the buckle was designed. The dimensions of the buckle and the width of the belt, respectively, in each step consisted of: Step A, 6 × 4 cm, and 4 cm; Step B, 4 × 4 cm, and 3.5 cm; Step C, 3 × 3 cm, and 3 cm; Step D, 2.5 × 2 cm, and 2 cm. At the onset of every trial, Ann was given the cue, "Buckle your belt." The errorless condition involved the same procedures for the positive consequation of completed trials, the application of verbal and physical prompts, and the fading of physical prompts that were used in the easy and in the difficult conditions. Ann was taught the entire task analysis with the largest size belt and buckle (Step A). When she had reached criterion (9 out of 10 consecutive correct responses) on the last step of the task analysis (pulling the belt through the buckle and sliding the hole into the catch when the belt is not pulled through the buckle at all), she was shifted to the next smallest size belt and buckle (Step B). Ann was then required to perform the last task analysis step using the belt and buckle size of Step B. If she completed three consecutive correct trials using the materials of Step B,

she was presented with the next size belt and buckle (Step C). Again, the student was required to perform the last task analysis step using the materials of Step C. After she completed three consecutive correct trials using the belt and buckle size of Step C, she was shifted to the normal fitting belt and buckle (Step D). The criterion for learning to buckle a belt was 9 out of 10 consecutive correct trials using the normal fitting belt and buckle. Any correct trials that occurred after criterion was reached constituted overlearning trials.

*Recording and Reliability*

For each trial in all conditions, the experimenter recorded whether or not a physical prompt was used. Use of a physical prompt meant that an error had occurred. The presence or absence of aberrant behavior during a trial was scored in the same manner as in Experiment 1. Also scored in the same manner as in Experiment 1, was the presence or absence of aberrant behavior and whether or not the student was on task during baseline. Interobserver agreement was assessed during eight randomly selected sessions, at least once in each condition, in the same manner as in Experiment 1. Occurrence reliability for aberrant behavior was calculated as in Experiment 1, with the mean agreement of 100%. Occurrence reliability for whether or not an error occurred was calculated in the same manner as for visual discrimination learning in Experiment 1. The mean interobserver agreement was 89% with a range from 73% to 100%. The mean reliability for nonoccurrence of an error was 81% with a range from 67% to 100%.

*Design*

A reversal design was used to contrast performance between baseline and instructional conditions and among the different instructional conditions. An A-B-A-C-A-D-A design was used with: A = baseline, B = easy, C = errorless, and D = difficult.

## RESULTS

The graph in Figure 5 indicates that aberrant behavior occurred at an essentially zero rate throughout all baseline conditions. By contrast, varying rates of aberrant behavior appeared in the instructional conditions. Furthermore, the easy task does appear to have presented relatively little difficulty for Ann because she was able to reach criterion in the first session but was unable to attain criterion until the third and fourth sessions in the other conditions. Finally, very little aberrant behavior occurred in the easy condition. Aberrant behavior was only observed during the first session of the easy condition, in which Ann also made some task errors. By contrast, aberrant responses occurred at a higher rate during the other two instructional conditions. Furthermore, in the errorless condition the rate of aberrant behavior tended to parallel the rate of errors. As the number of errors decreased, a corresponding decline in the amount of aberrant responses occurred.

The contrast between the easy condition and the other two instructional conditions was in the expected direction. However, in a comparison of the difficult and errorless conditions the data do not conform to expectations. Criterion was reached in the third session of the difficult condition and not until the fourth session of the errorless condition. In addition, numerous errors occurred in the early sessions of the errorless condition. The predicted differences in deviant responding between the difficult and errorless conditions were not observed. The rate of aberrant responding appeared to be slightly higher in the errorless condition.

A chi-square, correlational analysis between the trial-by-trial appearance of errors and aberrant responses was performed in the same manner as in Experiment 1. Statistically significant coefficients ($p < .01$) were found for the easy, difficult, and errorless conditions. This finding can be seen in Figure 5 in which errors tend to covary with aberrant responses in all sessions except session 2 of the difficult condition.

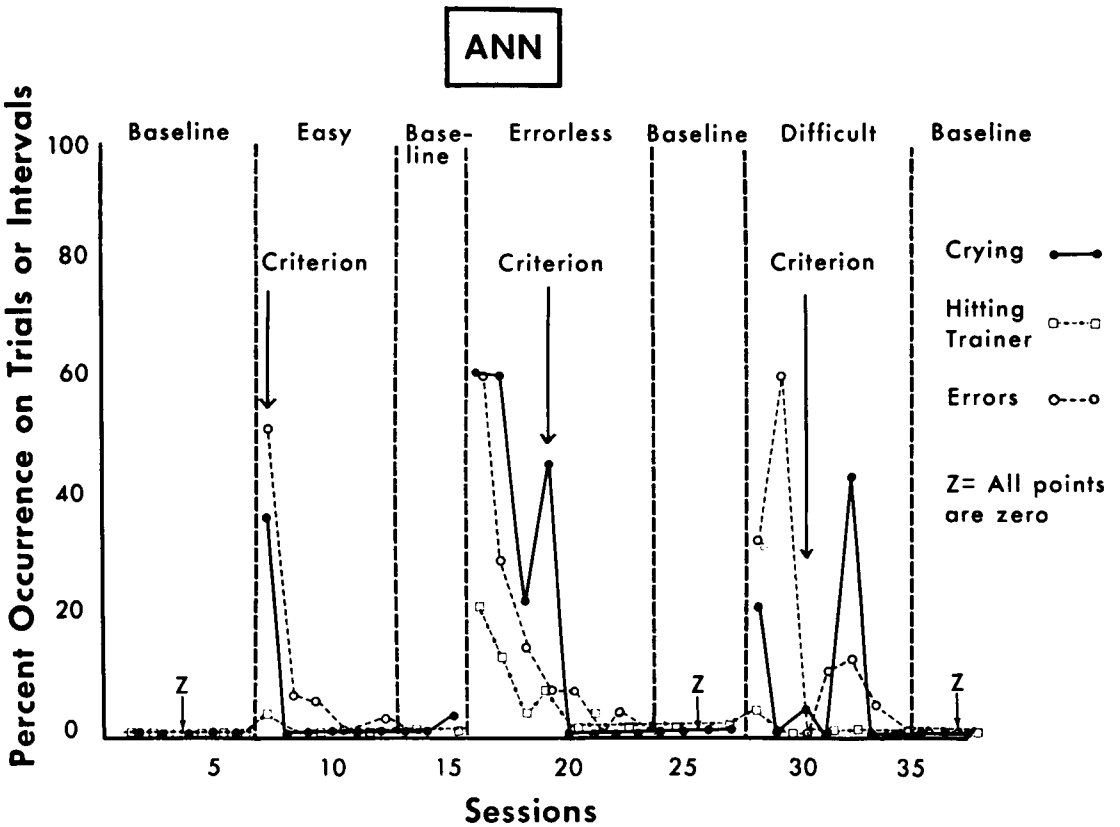


Fig. 5. Percent occurrence of errors, aggression, and crying for Ann across the four experimental conditions.

## DISCUSSION

The majority of the findings of Experiment 1 were replicated in Experiment 2. In both experiments, noticeably greater rates of aberrant behavior were produced in demand situations than in situations in which no demands were made of the student, and noticeably greater rates of aberrant behavior occurred during difficult tasks than during easy tasks. An additional finding in Experiment 2 was the positive correlation between the use of physical prompts and deviant responses. This finding is analogous to the relationship between errors and aberrant behavior that was observed in Experiment 1. However, Experiment 2 did not replicate the finding from Experiment 1 that greater rates of aberrant behavior occurred during the difficult task than during the errorless task. A number of variables could have contributed to the failure to replicate these treatment differences. It is possible that the buckling task was intrinsically more difficult than the buttoning task, and therefore produced more errors in spite of the effectiveness of the errorless procedure. It is also possible that poorer stimulus control was established with the perceptual motor tasks used in Experiment 2 than with the visual discrimination tasks of Experiment 1. The discriminative stimuli in the visual discrimination tasks consisted of only visual cues, while the $S^D$s in the self-help skills involved a complex combination of visual, tactile, and kinesthetic cues. Therefore, the less complex discriminative stimuli in visual discrimination tasks may be more salient than the $S^D$s in self-help perceptual motor skills. When a procedure has poorer stimulus control, weaker treatment effects may result. As a result of poorer stimulus control, fading the size of the belt and belt buckle may not have constituted a truly errorless

procedure. There is certainly a need to investigate stimulus control variables, and hence the difficulty level, in self-help tasks to the same degree that they have been examined in visual discrimination tasks. The findings of such investigations would not only result in a more accurate determination of the difficulty level of various self-help skills, but would also suggest alternate methods of teaching such skills. A final possibility is that, for Ann, gradually reducing the size of the belt buckle did not present a truly errorless task, but for another child, perhaps one with poorer fine motor coordination, this technique may have indeed produced a minimal number of errors. If this were true, it would be necessary to determine a child's fine motor capabilities before deciding whether such a procedure will result in few errors for that particular child.

It was observed that during the buttoning task, there was less of a tendency for aberrant behavior to covary with errors. It is possible that variables other than the task may have influenced Ann's behavior during this condition. For example, at the time she was learning this task, she had sustained a slight knee injury which did not occur during a session. The discomfort caused by the injury could have affected her behavior.

## GENERAL DISCUSSION

The purpose of this investigation was to examine the relationship between task characteristics and aberrant behavior. Among the findings of this study, it was clear that substantial amounts of aberrant behavior were associated with demands, and that near-zero aberrant behavior occurred in settings that were free of demands. This finding replicates previous research (Carr et al., 1976; Carr, Newsom, & Binkoff, 1980; Gaylord-Ross et al., 1979; Plummer et al., 1977). Furthermore, in the present study the relationship between demands and aberrant behavior was demonstrated in both visual discrimination tasks and perceptual motor tasks. It is, however, unlikely that this relationship applies to all children who emit deviant responses. The children who participated in this study were primarily selected because anecdotal observations appeared to indicate that their aberrant behavior was maintained by negative reinforcement. Disruptive behaviors can be maintained by other contingencies such as positive reinforcement and self-stimulation. Teachers, psychologists, and other individuals who work with disruptive children could greatly benefit if there existed some procedure for precisely identifying the type of child whose behavior is maintained by different contingencies. A useful contribution to the burgeoning field of behavioral assessment would be the development of clear criteria for determining whether aberrant behavior is maintained by positive reinforcement, negative reinforcement, or intrinsic reinforcement (self-stimulation) (Carr, 1977; Napolitan, Note 2).

A second finding, which was replicated across visual discrimination and perceptual motor task domains, was that a substantial amount of aberrant behavior was produced during the presentation of difficult tasks, and, conversely, that few aberrant responses occurred when students performed easy tasks. Thus, errors made during task performance can exert a powerful influence on other behaviors. Interestingly, this relationship has been historically documented by investigators in fields outside of applied behavior analysis (e.g., Lane, 1976; Pavlov, 1927). This finding suggests that the relationship between antecedent events and changes in behavior should be investigated more thoroughly. However, as was mentioned earlier, the majority of behavior management efforts have focused on the manipulation of consequences. Only a few investigations have examined the effect of antecedent task variables.

A recent study by Koegel and Egel (1979) has shown that the level of correct responding has a direct effect on an autistic child's motivation to perform. When there was a low level of correct responding, little output was observed.

When the level of correct responding was raised through a training package, performance output increased dramatically. In the present study, low levels of correct responding occurred in the difficult condition and higher levels of correct responding were found in the easy condition, as well as the errorless condition of the visual discrimination tasks. There is certainly a need for further investigation of the properties of task errors and correct responses. Are the effects of errors reported here and by Koegel and Egel due to the absence of reinforcement on error trials, negative feedback like "no" or "wrong" given to incorrect responses, or some intrinsically aversive property associated with making an error?

The results of the present investigation suggest that aberrant behaviors can be modified by adapting the curriculum or task as well as by manipulating consequences. Therefore, an important implication from these findings is that educators must give serious attention to task variables like mands (Carr et al., 1976), difficulty level (Dehn, 1970), and preference value (Gaylord-Ross et al., 1979). Errorless learning procedures may provide a promising means not only for lowering error rates, but also for eliminating aberrant behavior. The present data demonstrated this effect with visual discrimination tasks but not with perceptual motor tasks. There is certainly a need to develop a more powerful technology of errorless learning that will generalize to multiple content areas of instruction. The process of ensuring that a correct task response will occur appears to be a critical performance variable. For example, the treatment package developed by Koegel and Egel required the child to continue response trials until a correct response occurred. Similarly, Utley (Note 3) developed a shaping program that required deaf-blind, severely handicapped students to continue responding throughout a session until a sucessful operant appeared. The further study of the differential effects of correct responding and error responding thus appears to have great potential impact on the instruction and behavior management of severely handicapped students.

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