

FUNCTIONAL ASSESSMENT, CURRICULAR REVISION, AND SEVERE BEHAVIOR PROBLEMS

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An adolescent female with multiple handicaps and a long history of severely disruptive behavior participated in a functional assessment linked directly to specific revisions in her school curriculum. During Phase 1, reversal designs were used to test hypotheses pertaining to antecedent and curricular influences on problem behavior. During Phase 2, a multiple baseline across afternoon and morning time periods demonstrated that the curricular revisions were effective in eliminating severely disruptive behavior and increasing on-task responding. Data also showed that inappropriate "psychotic" speech was reduced and appropriate social interactions were increased. Follow-up results showed that the changes were maintained throughout the school year. Questionnaire data provided social validation of the procedures and outcomes. The findings are discussed in relation to their implications for functional assessment, individualized curricula, and positive programming for students with disabilities and serious behavior problems.

DESCRIPTORS: functional assessment, curricular revision, problem behavior

Students with multiple disabilities and long histories of severe behavior problems present challenges for educators and other service personnel. When ordinary classroom systems of behavior management fail, these students are frequently exposed to extensive interventions that often include medications and increasingly restrictive placements and contingencies. Fortunately, recent developments in applied behavior analysis suggest alternatives to these approaches (e.g., Carr, Robinson, & Palumbo, 1990; Horner et al., 1990). In particular, two significant emphases bring great promise for the positive resolution of behavior problems: (a) the emergence of functional assessment and hypothesis-driven interventions (Lennox & Milten-

berger, 1989; Repp, Felce, & Barton, 1988), and (b) the increased recognition that behavior problems are related to the overall context in which they are displayed (e.g., Bailey & Pyles, 1989).

Procedures of functional analysis and functional assessment seek to identify the maintaining variables and stimulus conditions that govern the occurrence of identified behaviors. When such variables are identified, a functional intervention should be apparent. However, currently very few investigations demonstrate the relationship between functional assessment information and antecedent interventions for behavior problems (Touchette, MacDonald, & Langer, 1985), even though there is ample evidence that antecedent (e.g., curricular) manipulations can influence substantially the occurrence of undesirable behavior (e.g., Dyer, Dunlap, & Winterling, 1990; Singer, Singer, & Horner, 1987; Winterling, Dunlap, & O'Neill, 1987). This deficiency is somewhat surprising because of increased attention to the influence of antecedent and contextual (or setting) factors in applied behavior analysis (e.g., Bailey & Pyles, 1989; Dumas, 1989; Haring & Kennedy, 1990; Wahler & Fox, 1981).

The present experiment extended research that directly relates the results of functional assessment of behavior problems to curricular variables. In particular, this study sought to use a comprehensive

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hypothesis-testing approach (Repp *et al.*, 1988) to determine the conditions under which problem behaviors occur, and then to design a functional intervention based on an individualized curriculum package to be applied during the entire school day. The study was conducted with an adolescent female whose behavior problems were regarded as among the most severe and intransigent in her school system.

GENERAL METHOD

Participant and Setting

"Jill," a 12-year-old student, served as the participant in the investigation. She lived at home and for 6 years had attended a public school classroom for children described as severely emotionally disturbed. She had received a variety of diagnoses, including "severe emotional disturbance," mental retardation, attention deficit disorder, and schizophrenia. Jill frequently displayed high-intensity disruptive behavior characterized by aggression, yelling and cursing, perseverative and delusional speech, spitting, tipping over desks, and property destruction. Jill also displayed marked academic difficulties. Her performance was at least 3 years behind grade level in reading and math. According to results obtained from the WISC-R, Jill functioned in the mild range of mental retardation (full scale IQ of 63). Similar deficits were revealed on the Vineland Adaptive Behavior Scales (VABS), on which she received an Adaptive Behavior Composite age equivalent score of 5 years 4 months.

For the past 6 years, Jill had been on and off medication, including Ritalin, Dexedrine, and Mellaril. When the study began, Jill was taking Mellaril (15 mg per day). A number of behavior management programs had been implemented to control her severe behavior problems. These included changing reinforcement schedules, differential reinforcement of other behavior (DRO) (e.g., tangible reinforcement for 2 min of on-task responding), and open- and closed-door time-out. Although some programs showed promise for brief periods, none was effective in maintaining reductions in Jill's behavior problems. This failure occurred despite ongoing efforts from a team of professionals that

included educational specialists, behavioral psychologists, physicians, and mental health personnel.

The setting for this investigation was a public-school special education program for children with severe emotional problems. Seven other children also were enrolled in the classroom. The classroom was staffed by a teacher, a full-time aide, and a full-time bus attendant.

Because of the severity and frequency of Jill's disruptive behaviors, two additional experienced classroom instructors (working alternating days) had been hired prior to the study specifically to work with Jill. The instructors' responsibilities included working one-to-one with Jill to provide individual supervision and instruction and to prevent or contain her disruptive behaviors as much as possible.

In Jill's classroom, the school day was divided into 30-min periods with separate subjects (e.g., math, reading, science) taught during each period. The tasks usually required independent work consisting of textbook and workbook activities. A classroom-wide behavior management system was in effect, whereby appropriate classroom deportment was rewarded with points (on 15-min intervals) exchangeable for privileges such as free time, weekly swimming excursions, or items from a token store. When students exhibited aggression, excessive noncompliance, or other serious behavior problems, they were placed in a seclusion time-out room, where they were required to remain until they sat quietly in the corner for 3 consecutive min. In addition to the classroom-wide procedures, Jill was given the opportunity to leave the classroom voluntarily (and work away from her classmates) when she requested to do so.

Behavioral Definitions

Four categories of student behavior and one category of teacher behavior were recorded.

Disruptive behavior. The following behaviors were scored as major disruptions: kicking, hitting, spitting, throwing objects, turning over desk, or elopement (i.e., leaving the area where she was expected to be and running around or out of the classroom). Disruptive behavior was also scored when Jill required restraint or when she was placed in seclusion time-out.

On task/off task. Behavior was scored as on task when Jill was complying with staff instructions and her eyes were on materials or teacher as requested. Behavior was scored as off task if Jill failed to attend to task for longer than 3 consecutive s.

Social interactions. Verbal or nonverbal behaviors emitted by Jill and directed to another person that were positive or neutral in nature and appropriate to the context were scored as appropriate social interactions.

Inappropriate vocalizations. Vocalizations irrelevant to task and not directed to another person (e.g., perseverative or delusional speech, cursing) were recorded as instances of inappropriate vocalizations. These vocalizations were frequently described as "psychotic" and were often characterized by violent or sexual themes. It was possible for Jill to be on task and still be emitting inappropriate vocalizations. Inappropriate vocalizations were not scored during periods of restraint or seclusion.

Teacher feedback. All teacher interactions were recorded as either positive or negative. Positive interactions were statements that made a positive (e.g., praise) or neutral (e.g., instructions) evaluation of the child's behavior, or gestures (e.g., thumbs up sign) or physical contacts (e.g., pat on the back) indicating approval. Interactions were recorded as negative if they described inappropriate behavior or were intended to serve as punishers (e.g., reprimands).

Observers and Observer Training

Data were collected by five staff members who were familiar with the behaviors of handicapped students and had extensive prior experience with data collection. Prior to the investigation, each data recorder practiced with the behavioral definitions during nonexperimental observations until an 80% criterion was reached on each of the separate behavioral definitions.

PHASE 1: FUNCTIONAL ASSESSMENT

METHOD AND RESULTS

Hypothesis Development

The functional assessment process began with the development of hypotheses relating specific cur-

ricular conditions to occurrences of Jill's major disruptions and to her desirable responding. Data were collected from a variety of sources, including standardized instruments, direct observations, rating scales, and an 11-item questionnaire (available from the authors) administered to 28 respondents who had regular contact with Jill over the previous few years. The hypotheses had to relate to common themes from the structured interviews and to observable variables that could be manipulated within a school context. After approximately 5 weeks of this preliminary assessment, the four emerging hypotheses were (a) Jill is better behaved when she is engaged in large motor as opposed to fine motor activities, (b) Jill is better behaved when her fine motor and academic requirements are brief as opposed to lengthy, (c) Jill is better behaved when she is engaged in functional activities resulting in concrete and preferred outcomes, and (d) Jill is better behaved when she has some choice regarding her activities.

Hypothesis Testing

Procedures. During the hypothesis-testing phase, each of the four hypotheses was tested in sessions conducted by the special classroom instructor who was scheduled to work with Jill that day. The instructor presented the task, provided reinforcers when appropriate, and prompted Jill to continue the task if she remained off task for more than 5 s. If serious disruptive behavior occurred, the prevailing classroom procedures were followed. Sessions took place in a room adjacent to the classroom or on the school playground during outdoor activities. Each session lasted 15 min, except for the short-task sessions conducted during the testing of Hypothesis 2.

During the testing of Hypothesis 1 (fine vs. gross motor activities), fine motor activities were defined as activities requiring a fine motor skill (e.g., coloring a picture, using scissors) and gross motor activities were tasks involving large motor skills (e.g., throwing a frisbee in a hoop, shooting baskets). For the testing of Hypothesis 2 (short vs. long tasks), the assigned tasks were identical in terms of the response topography and content. The tasks consisted of workbook and textbook exercises

in math, spelling, and handwriting. For short-task sessions, the instructor selected a portion of work that she estimated would take Jill approximately 5 min to complete. During the long-task sessions, Jill was given her textbook or workbook and told that she needed to work on the task for 15 min.

For the testing of Hypothesis 3 (functional vs. analogue tasks), functional tasks were defined as tasks involving content or materials that Jill had expressed having an interest in and/or that led to a functional outcome (related to Jill's interests or daily living activities). These tasks were closely matched with tasks in the analogue sessions; however, analogue tasks were defined as practice tasks, such as workbook problems, that were not associated with a functional outcome. For example, one task assigned during the functional condition was writing a letter to a teacher requesting the opportunity to read a story to her primary students. This was matched with the analogue task of copying a letter from a handwriting book.

The fourth hypothesis (choice vs. no choice) was tested with textbook assignments from science, social studies, math, and handwriting. During the choice condition, Jill was told she could select which of the four assignments she would work on during that session. She could also change activities during the session if she chose to do so. During the no-choice sessions, the assignments were the same as those in the choice sessions, but the assignments were randomly selected for each session.

Design, measurement, and reliability. The four hypotheses were tested within rapidly changing reversal designs over a total of 4 school days. One day was devoted to the testing of each hypothesis and, over the course of each day, conditions were alternated in accordance with a reversal sequence. Four reversal conditions were conducted for Hypotheses 1 and 2, and three reversal conditions were conducted for Hypotheses 3 and 4. The sessions were separated by at least 5 min of free time, lunch, or other scheduled activities. Data were collected on on-task responding and disruptive behavior by two independent observers using an interval system of recording that consisted of 10 s of continuous observation followed by 5 s of recording. Intervals

were cued by a tape recording that the observers heard through separate earphones. Reliability was assessed during 26 of the 29 assessment sessions. Agreements were defined as intervals in which two observers scored Jill's behavior in the same manner. Mean reliability for total agreement and for occurrences and nonoccurrences of on-task responding always exceeded 83%, with only two conditions below 95%. Reliability for disruptive responding was 100% across all conditions.

Results

The results of the reversal analyses for each of the four hypotheses are presented in Figure 1. In general, the data provide support for the hypotheses. Levels of on-task and disruptive behavior tended to vary systematically with the condition changes. One notable exception occurred during the testing of Hypothesis 2 (asterisks in Figure 1). During the third short-task session, disruptive behavior was present, and levels of on-task responding were low. Interestingly, this session differed from the other short-task sessions in that the cues signaling the session would be short came only in the form of verbal instructions. During this session, Jill worked from her workbook, as she did during the long-task sessions. In the other three short-task sessions, where there was consistently high rates of on-task responding and no disruptions, the duration of the sessions was marked not only by verbal instructions but also by the clearly delineated number of required responses on the photocopied pages.

PHASE 2: INTERVENTION

METHOD AND RESULTS

During the intervention phase, Jill's curriculum was revised to incorporate elements identified during the functional assessment as being associated with low rates of disruptive behavior and high rates of on-task behavior.

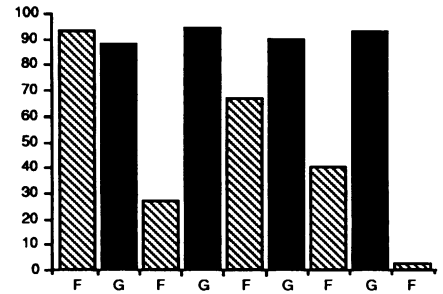
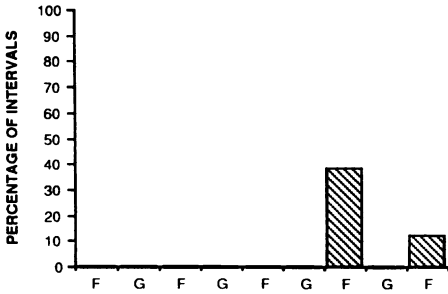
Baseline. During baseline, Jill was scheduled to participate in standard academic and nonacademic activities with her classmates. However, as described earlier, because of her difficulty completing

DISRUPTIVE BEHAVIOR

ON -TASK BEHAVIOR

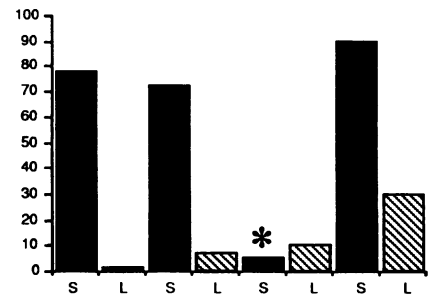
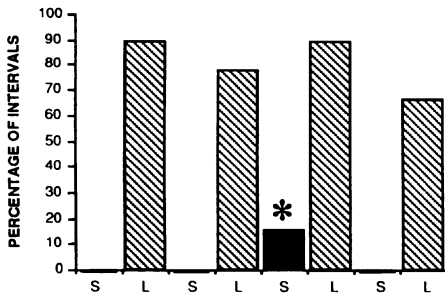
A) HYPOTHESIS 1: Analysis of fine vs. gross motor activities:

■ = gross (G) ▨ = fine (F)



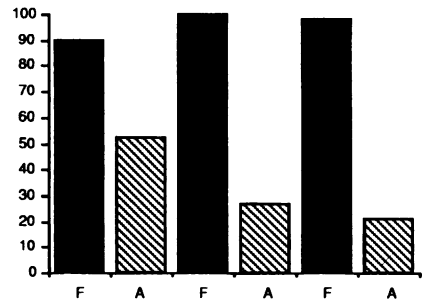
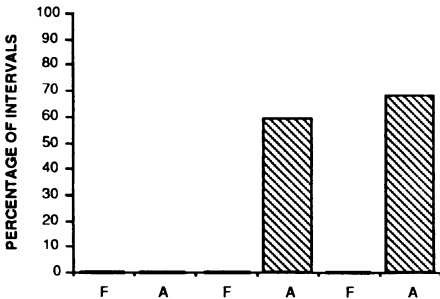
B) HYPOTHESIS 2: Analysis of short vs. long tasks:

■ = short (S) ▨ = long (L)



C) HYPOTHESIS 3: Analysis of functional vs. analog tasks:

■ = functional (F) ▨ = analog (A)



D) HYPOTHESIS 4: Analysis of choice vs. no choice:

■ = choice (C) ▨ = no choice (NC)

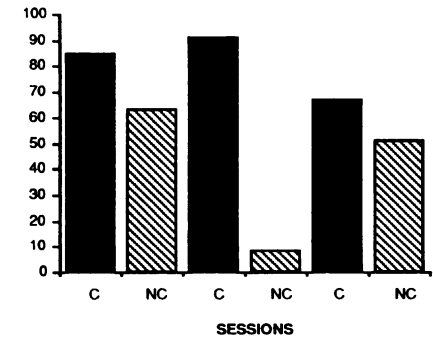
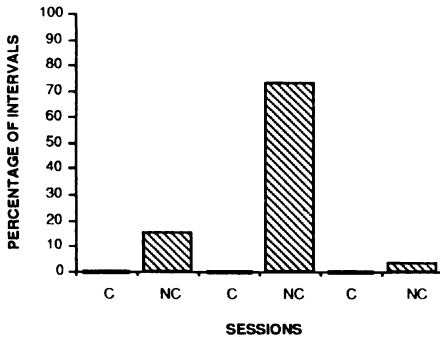


Figure 1. Results of the hypothesis-testing phase of the functional assessment process. Levels of disruptive behavior (left) and on-task responding (right) are shown for each of the four hypotheses.

assigned work, she was given the opportunity to leave the classroom, upon request, to work with her instructor in an adjacent room relatively free of distractions. The classroom behavior management system remained in effect in this setting. If Jill exhibited serious behavior problems (e.g., aggression, prolonged property destruction) while in the classroom or in the adjoining workroom, she was physically moved to a seclusion time-out room, where she was required to remain until she sat quietly for 3 consecutive min. Baseline observations were conducted without changes in this school routine.

Intervention and follow-up. Intervention consisted of the implementation of curricular revisions based on the results of the functional assessments and continued for the remaining 6 months of the school year. A set of guidelines was generated to assist in the development of lesson plans. These guidelines included (a) sessions requiring fine motor and concentrated academic activity are to be short in duration (e.g., 5 min or less) and materials prepared so the number of required responses is visually clear, (b) fine motor and other challenging requirements are interspersed with large motor activities, (c) whenever possible, arrange work activities so the content is interesting to Jill and leads to a concrete and preferred outcome, and (d) whenever possible, provide a menu of options for Jill to have some choice regarding the activity and/or the materials. These changes, and the resulting lesson plans, were developed with the assistance of the consultants. The consultants prompted the instructional staff to maintain adherence to the program guidelines throughout the intervention phases. The consultants also provided ongoing feedback and encouragement to the instructors. However, the school personnel continued to implement the activities, and the behavior management system remained in place.

Design, measurement, and reliability. The curricular changes were evaluated within a multiple baseline across time periods. The intervention was implemented first during the afternoon. After 9 days of observation, the intervention was implemented in the morning as well. At this time, the

intervention was in effect during the entire work portion of Jill's school day. The curricular revisions were continued throughout the remainder of the school year. The follow-up period consisted of the same intervention program, but the frequency of data collection was reduced to 1 day per week.

Data were collected on all defined behaviors during baseline and intervention. Also, data were obtained throughout the study on the percentage of intervals in which Jill participated in the typical classroom activities. Data were recorded using the 10-s system described earlier, with a 5-s recording window separating each 10-s observation interval. The morning and afternoon periods were observed in four blocks of 15 min each, with a 15-min period separating each period of observation. That is, each morning included four blocks of 15 min of observation, totaling 240 intervals over a 2-hr period (9:00 a.m. to 11:00 a.m.). Afternoon observations were conducted in the same manner, but between noon and 2:00 p.m. Data were collected every day of school except when Jill was absent or when a special classroom or school event occurred. Follow-up began after Day 55, when observations were reduced to 1 day per week.

Reliability observations occurred during 37% of the sessions. Reliability assessments were calculated by dividing the number of agreements by the number of agreements plus disagreements. These calculations were conducted for total agreement (TA), agreement on occurrences (OA) and agreement on nonoccurrences (NA). Mean TA reliability exceeded 87% for each variable per condition. Mean OA and NA reliability quotients always exceeded 74%, except for OA on inappropriate vocalizations, which was 62% and 69% during baseline and intervention. (Relatively low levels of OA reliability for inappropriate vocalizations may be related to the low frequencies of occurrence. Specific reliability information for each dependent variable may be obtained by writing to the authors.)

In addition to direct observations, social validation data were obtained on ratings of Jill's school program and on the amount of progress she exhibited. An 8-item questionnaire was distributed to all individuals who interacted with or observed

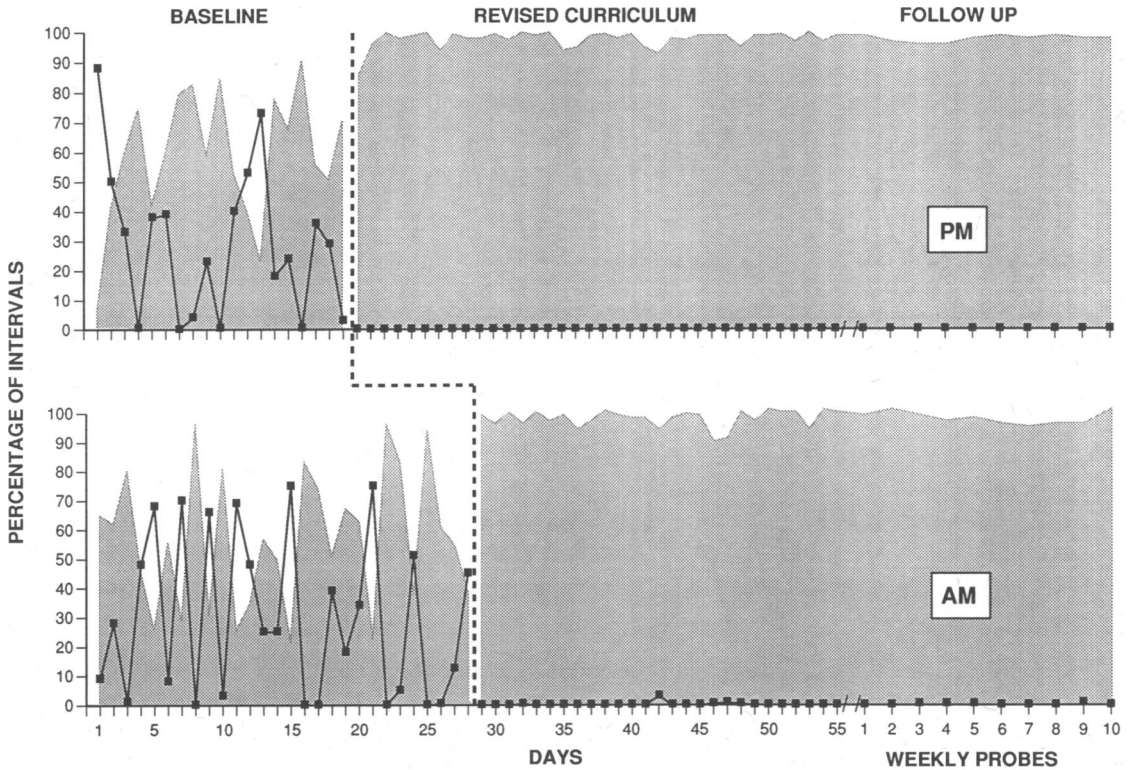


Figure 2. Results of the multiple baseline analysis for on-task responding (shaded) and disruptive behavior (lines) across baseline, revised curriculum, and follow-up phases.

Jill on a regular basis. These individuals included the school principal, secretary, bus driver, teachers, and other instructional and support personnel. (The consultants directly involved in the program design and implementation did not complete the questionnaire.) The questionnaire was administered during the early stages of baseline observations and again during the latter month of follow-up.

Results

Data for disruptive and on-task behavior are presented in Figure 2. These data reveal variable levels for both behaviors during baseline in both the afternoon and morning. After the intervention was introduced, disruptive behavior did not occur, with the exception of 1 day in which disruptive behavior occurred during 3% of the intervals. On-task behavior increased immediately following the curriculum revision and remained high throughout follow-up, with ranges from 89% to 100%.

The results for appropriate social interactions and inappropriate vocalizations are presented in Figure 3. The mean level of appropriate social interactions during baseline was 33% in the afternoon and 28% in the morning. During the intervention phase, appropriate social interactions increased to a mean of 47% in the afternoon and 49% in the morning, with the follow-up means being 38% and 55%, respectively. For inappropriate vocalizations, the mean baseline levels were 8% in the afternoon and 7% in the morning. Following the introduction of the revised curriculum, inappropriate vocalizations were reduced to 0.3% in both the morning and afternoon.

Data on teacher feedback revealed some variability; however, the average levels of positive and negative feedback were roughly equivalent across the different phases of the study. For example, across baseline, intervention, and follow-up in the afternoon, the mean percentages of intervals with

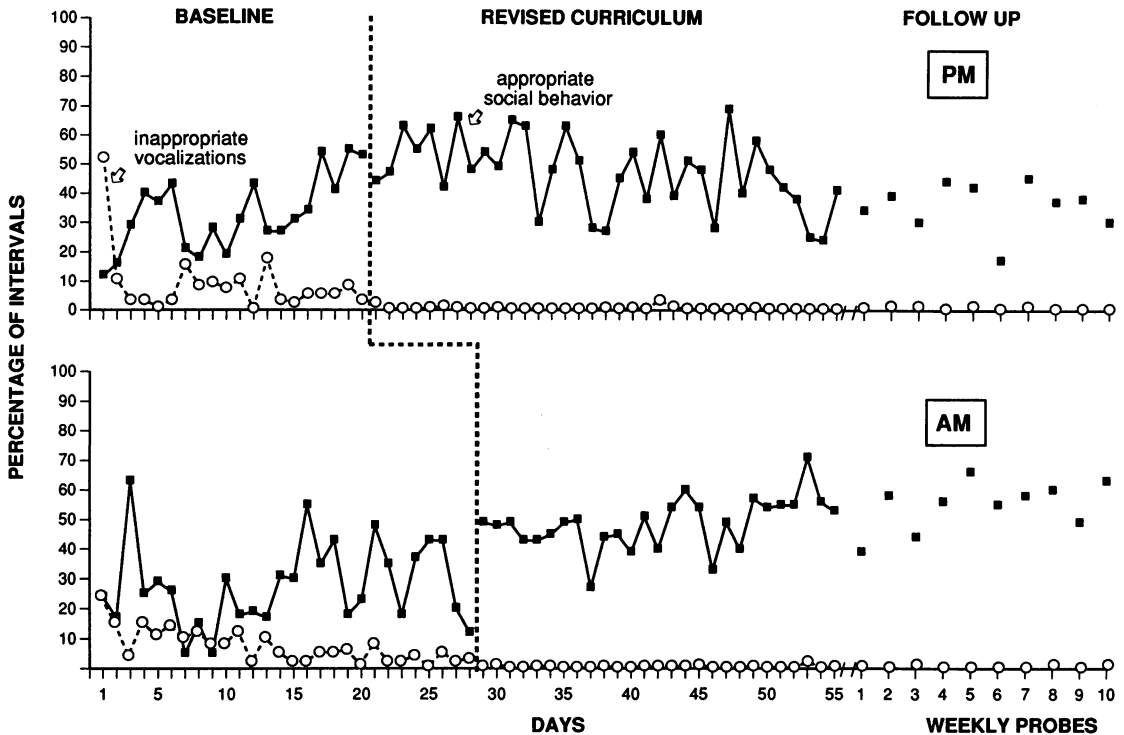


Figure 3. Results of the multiple baseline analysis for appropriate social behavior and inappropriate vocalizations across baseline, revised curriculum, and follow-up phases.

positive statements were 64, 59, and 51; in the morning, the figures were 50, 62, and 61. With regard to the percentage of intervals with negative statements, the means across the three afternoon phases were 12, 9, and 12; in the morning, they were 15, 9, and 13.

Data on the context in which Jill's instruction occurred showed a very gradual trend towards increased participation with peers in regular school activities. During baseline, an average of 20% of the time was spent in these contexts. During intervention the average was 25.5%, and during follow-up the average increased to 30.5%.

The social validation questionnaire produced responses from 22 individuals during baseline and 17 at follow-up. The results indicated that the respondents, as a group, believed that Jill's procedures and progress were much more positive following the introduction of the revised curriculum. (Detailed results are available from the authors.)

The Vineland Adaptive Behavior Scales were

administered at the onset of baseline observations and again near the end of the follow-up phase. At baseline, Jill's Adaptive Behavior Composite score was an age equivalent of 5 years 4 months. Seven months later, the composite age equivalent score was 7 years 1 month, an increase of 21 months.

DISCUSSION

This study demonstrated the efficacy of a functional assessment process and a curriculum-based intervention that produced substantial and durable reductions in a student's longstanding and severe behavior problems. Although the external validity is restricted due to the participation of only 1 student, the process and results of this investigation offer important directions for the analysis of behavior and the development of positive interventions.

The results suggest a number of considerations for conducting functional assessments with indi-

viduals who have serious behavior problems. First, the process assessed functional relationships and developed interventions involving antecedent factors and specific stimulus conditions (Touchette et al., 1985), as well as reinforcers (e.g., Carr & Durand, 1985; Iwata, Dorsey, Slifer, Baumann, & Richman, 1982). For many individuals, an emphasis on antecedent and curricular factors may have important advantages. For example, during the time preceding Jill's intervention, she was provided with nearly continuous schedules of individualized attention, various tangible reinforcers, and ongoing opportunities to escape unpleasant circumstances. These dense and complex schedules may have made it more difficult to distinguish the reinforcers maintaining her problem behaviors. However, as the current data indicate, it was possible to identify antecedent circumstances associated with high rates of problem behaviors and with occurrences of desirable behavior. A second consideration is that the functional assessment process was conducted within the natural context of Jill's school environment. In comparison with analyses conducted within analogue circumstances, this strategy facilitated the identification of specific stimulus conditions affecting Jill's behavior. Rather than identifying general stimulus conditions such as "demands," the present approach delineated more specific conditions (e.g., the specific context and/or kinds of demands) that were then easily translated into program modifications.

Another pertinent issue is that the process of developing the four hypotheses was relatively lengthy (about 5 weeks) and involved careful consideration of multiple data sources. Although it is likely the functional assessment of less complex repertoires would require much less time, in cases such as Jill's, the process of developing informed judgments may require time and multiple sources of information. In addition, the severity, notoriety, and intransigence of Jill's problems required that a high level of understanding and confidence precede intervention. This process of "discovery" is an important one requiring a great deal of additional research. Although the hypothesis development was a lengthy process, it is important to note that the empirical

testing and confirmation of the four hypotheses was relatively simple, occurring within a natural context over 4 days. The feasibility of the reversal manipulations is apparent because they were carried out by the instructional staff, with only collaborative support from the project consultants. Finally, it is important to emphasize that a special advantage of the functional assessment procedures is that they offered a direct link to the subsequent interventions (Horner, Sprague, & Flannery, *in press*; Repp et al., 1988).

The results of this investigation have implications for developing, implementing, and evaluating interventions for students with severe behavior problems. First, it is becoming clear through practical experience and a growing research base that a variety of ecological, curricular, and physiological factors are functionally related to severe behavior problems (e.g., Bailey & Pyles, 1989). In this regard, the present study may be among the first to identify curricular revision as an intervention (or independent variable) for serious behavior problems. The intervention was based entirely on modifications to the schedule and content of the curriculum without changing the prescribed consequences for desirable or undesirable behavior. A second point is that the intervention was a package, composed of several modifications to the implementation of Jill's curriculum. As several authors have stressed (e.g., Horner et al., 1990; National Institutes of Health, 1990), it is becoming increasingly clear that effective programs of durable behavior management require multiple interventions. This may be especially true for those individuals who have experienced very long histories of behavior problems and who exhibit multiple and complex disabilities. A final point about the intervention is that it relied on procedures viewed as positive and less restrictive than previous efforts. With the revised curriculum, the problem behaviors declined to the point that restraint and seclusion time-out became extraneous elements of her behavior management program. Thus, this investigation provides further encouragement that positive interventions, based on functional assessment data and individualized programming, can be effective in ameliorating very serious

behavior problems and in producing collateral benefits related to lifestyle enhancement (Meyer & Evans, 1989).

Although the data from this study are highly encouraging, it is important to acknowledge some caveats and issues pertinent to implementation. First, the process of assessment and intervention in this study addressed environmental correlates of problem behavior. We cannot claim to have addressed (or to have identified) all of the maintaining variables; thus, the potential for regression remains. In addition, the causes and correlates of an individual's problem behaviors are likely to differ over changing contexts (Haring & Kennedy, 1990) and over time, especially with the multiple physiological and environmental changes associated with adolescence. To ensure continued progress, an ongoing functional assessment of setting, stimulus, and reinforcement variables might be an important recommendation. Another issue relates to the highly individualized nature of the intervention. The curriculum revisions in this study offered deviations from a traditional academic approach. The extent to which such an individualized program would be supported by typical administrators is uncertain. Finally, given that the intervention consisted of a package, it is not possible to comment or speculate on the necessary and sufficient contribution of each component. To make more fine-grained interpretations, it is necessary to conduct a series of withdrawals (e.g., Wacker *et al.*, 1990) that were beyond the scope of the current study.

In summary, the present study demonstrated an assessment and intervention process representative of important directions in applied behavior analysis. The contributions are pertinent to a practical technology of functional assessment and to the broadening perspectives on behavioral interventions. The investigation may also extend this general line of research by addressing the needs of a student with multiple disabilities in a public school program for students with emotional disorders. Additional research is needed to increase our understanding of the influence of curricular and other stimulus (and setting) factors on the occurrence of problem behaviors (Bailey & Pyles, 1989; Dunlap, Johnson,

& Robbins, 1990) and to develop increasingly practical technologies of functional assessment (Lennox & Miltenberger, 1989).

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