EFFECTS OF SETTING EVENTS ON THE PROBLEM BEHAVIOR OF STUDENTS WITH SEVERE DISABILITIES

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Two studies analyzed the effects of preceding setting events on the problem behavior of students with severe disabilities. Using ABAB withdrawal designs, the occurrence versus nonoccurrence of preceding setting events was analyzed in relation to the frequency of problem behavior. Data were collected throughout a student's school day, with interventions focusing upon the elimination of setting events that occurred before school. The results indicate that (a) the occurrence of preceding setting events was related to higher frequencies of problem behavior and (b) interventions designed to eliminate preceding setting events were consistently associated with low frequencies of problem behavior.

DESCRIPTORS: setting events, preceding setting events, problem behavior, functional assessment, severe disabilities

Setting events, establishing operations, and other "third variables" that alter the probability of behavior-environment relations are an important area for further analysis and discovery (Baer, Wolf, & Risley, 1987; Morris, 1991). Setting events can be defined as events that change the probability of occurrence of a three-term contingency without differentially altering reinforcer probability (Bijou & Baer, 1961; Michael, 1982). Gewirtz (1972) has differentiated between *concurrent* and *preceding* setting events based upon their temporal relation to behavior. Concurrent setting events occur at the same time as the behavior. For example, varying the type of instructional task across trials can alter the escape-producing effects of difficult tasks (Dunlap & Koegel, 1980). Preceding setting events occur prior to the behavior under study. For example, engaging in vigorous exercise before instruction has been shown to reduce rates of stereotypy (Bachman & Fuqua, 1983; Kern, Koegel, & Dunlap, 1984). The study of concurrent and preceding setting events may allow an extension of functional analyses to

more complex conditions that maintain problem behavior.

We report two studies of an assessment approach for identifying preceding setting events. Based upon the assessment information, the setting event was eliminated in order to reduce problem behavior. Initially, functional assessments were conducted to identify potential preceding setting events related to problem behavior for each of 2 students. Interventions specific to these setting events were then implemented to eliminate the setting event and reduce problem behavior.

GENERAL METHOD

Students and Settings

Two female students with severe disabilities participated in the investigation (Anita in Study 1 and Kelly in Study 2). Both students attended a special education classroom on a regular high school campus. Both studies were conducted during summer-school sessions (lasting from 8:30 a.m. to 12:30 p.m., 5 days per week). This time of the school year was chosen because it provided a high degree of consistency in scheduling and instructional programming. The students were nominated by their teacher (the second author) as presenting patterns of problem behavior in which behavior management interventions typically were successful, except

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on particular days when the behavior occurred throughout the school day. That is, curricular revision, differential reinforcement of appropriate behavior (DRO), and related interventions were usually effective but seemed to be occasionally overridden by the effects of other events. Both students had previously participated in research focusing upon identification of potential variables maintaining problem behavior and the analysis of interventions derived from those hypotheses (Kennedy, in press; Kennedy & Haring, in press).

Anita was 22 years old, with moderate mental retardation and autistic-like behavior. She was estimated to be functioning at 5.4 years of age by the Vineland Adaptive Behavior Scales (VABS) and had a measured IQ estimate of 47 using the Stanford-Binet. Anita used simple sentences to communicate. She could emit and follow two- or three-step requests. Across the course of the investigation, she received 50 mg of Dilantin® for grand mal seizures. Anita had a documented 10-year history of arguing, grabbing objects, hitting herself, hitting others, running away, and yelling.

Kelly was 20 years old and had profound mental retardation, cerebral palsy, and substantial limitations in vision. She was estimated to be functioning at the 1.3-year-old level by the VABS and was untestable using standardized intelligence measures. Kelly was nonverbal, but had a small repertoire of manual signs (e.g., requesting music or a drink). During the investigation she received no prescription medicine. Over the previous 14 years, Kelly had a documented history of falling on the ground, hitting others, pulling her hair, screaming, tearing her clothing, and whining.

Definitions of

Problem Behavior

Anita's problem behaviors were: (a) arguing (making a comment or statement contradicting a request made by a teacher or aide), (b) grabbing objects (picking up an object, holding it closely to the body, and refusing to relinquish the object), (c) hitting herself (Anita's hand or fist making contact with herself), (d) hitting others (Anita's hand or fist making contact with another person), (e) run-

ning away (rapidly moving in a direction away from the teacher or aide for 3 m or more), and (f) yelling (a loud statement above a normal conversational level). Kelly's problem behaviors were: (a) falling on the ground (dropping to the floor), (b) hitting others (see previous definition), (c) pulling her hair (Kelly grabbing her hair with either hand), (d) screaming (high-pitched vocalizations above a conversational level lasting 5 s or longer), (e) tearing her clothing (pulling or grabbing her own clothing), and (f) whining (a high-pitched vocalization occurring at or below a normal conversational level lasting 5 s or longer).

Measurement

An event recording system based upon the Functional Analysis Observation Form (FAOF) of O'Neill, Horner, Albin, Sprague, and Storey (1990) was used to collect information regarding the occurrence of problem behavior throughout the school day (using 30-min intervals). The FAOF uses a scatter plot technology (Touchette, MacDonald, & Langer, 1985) and permits the collection of information regarding the occurrence of specific topographies of problem behavior, their time of occurrence, antecedent and consequent events, and their perceived function(s). Data were collected by the classroom teacher and two assistants, all of whom had received pre- and in-service training regarding the use of the FAOF and related functional analysis techniques (O'Neill et al., 1990), as well as ongoing assistance regarding the implementation of the system. The FAOF was carried by the particular staff member working with each student, and any occurrence of a problem behavior and related information were recorded immediately.

Experimental Design

ABAB withdrawal designs were used to analyze the occurrence and nonoccurrence of a setting event in relation to the frequency of problem behavior. During baseline phases, setting events were allowed to occur naturally (i.e., on some days the setting event occurred; on other days it did not). This baseline arrangement permitted an assessment of the covariation between setting events and the fre-

quency of problem behavior (Baer et al., 1987; Bijou, Peterson, & Ault, 1968). During intervention phases, an independent variable was introduced to eliminate the setting event.

Interobserver Agreement

On 28% of the school days (across all phases for both students), interobserver agreement was assessed for the frequency of problem behavior and the occurrence of a setting event. Interobserver agreement measures for problem behavior were collected by having the first author accompany the student and educational personnel throughout the day. Interobserver agreement estimates were calculated by scoring an agreement when both observers recorded identical frequencies of the same behaviors within each 30-min interval and dividing agreements by agreements plus disagreements and multiplying by 100%. Mean agreement for the occurrence of problem behavior was 92% (range, 67% to 100%). For Anita, agreement on the setting event was scored if both observers identically recorded Anita as being awake or asleep (defined below) upon her arrival at school. For Kelly, an agreement on the setting event was scored if both observers recorded her arrival in the car by the city street or highway entrance to the school. Same-day comparisons of observers' records indicated 100% agreement on setting events.

STUDY 1: ANITA

Functional Assessment of Setting Event

Previous functional assessments (O'Neill et al., 1990) identified two clusters of behaviors that served different functions. Hitting herself, hitting others, arguing, and yelling typically occurred during transitions from one activity to another, although no pattern was present to indicate that the problem behavior was related to activity preference or difficulty. Running away and grabbing objects typically occurred in the presence of particular objects (e.g., dogs, jewelry, men). Based upon this information, a contingency contracting program was established in which Anita was allowed access to a

preferred event (e.g., talking about dogs, looking at jewelry in magazines, talking with a male peer) if she completed each transition without problem behavior and did not run away or grab objects during the school day. This intervention had been in place for several months prior to the investigation, appeared to be effective except on occasional school days, and was in place throughout Study 1.

The setting event functional assessment included (a) a review of the student's educational and medical documents maintained by the school district, (b) a structured interview taken from O'Neill et al. (1990; Functional Analysis Interview Form, FAIF), and (c) direct observations of student behavior and potential setting events. Because the occurrence of Anita's problem behavior was reported to covary with a preceding setting event, the focus of the functional assessment was on the identification of potential events before school. Teachers, support personnel, parents, and residential personnel all participated in the structured interview to obtain information from school, community, and home environments. Based upon the review of school records and the structured interview, Anita's awakening late in the morning was identified as potentially affecting problem behavior. Direct observations for several mornings at her group home and at school further suggested a relation between awakening late and the later occurrence of problem behavior. Specifically, Anita ignored her alarm clock in the morning and continued to sleep despite group-home staff's requests for her to wake up and prepare for school. The result was that on days when Anita resisted waking up, she missed breakfast, had to be assisted in dressing, slept on the route to school, and was reported to engage in high rates of problem behavior during the school day.

Definition and Measurement of Setting Event

Awakening late in the morning was defined as Anita remaining in bed for more than 5 min after her alarm clock had sounded. Two events were measured to assess the occurrence of the setting event. First, the program manager of the group home, who helped Anita prepare for school in the

Figure 1. Results for Anita in Study 1. The data are presented as the frequency of problem behavior per school day. Closed rectangles arrayed along the horizontal axis indicate the occurrence of a setting event.

morning, recorded whether or not the setting event had occurred and sent the information to Anita's teacher as part of their daily correspondence. Second, Anita's teacher recorded on the FAOF whether she was asleep when she arrived at school. Arriving at school asleep was defined as Anita's head resting on the seat in front of her or leaning against some other part of the bus with closed eyes. Correspondence between the group-home manager recording the presence or absence of the setting event and the teacher recording the presence or absence of her being asleep was 100%.

Procedure

The classroom behavior management programs described previously were in place throughout the study. Anita began each school day by reviewing her schedule and then engaging in the following sequence of activities: (a) personal grooming in the high school bathroom with Aide 1, (b) purchasing an item in a coffee shop with Aide 2, (c) riding public transportation with Aide 2, (d) busing tables and cleaning floors in a restaurant with Aide 2, (e) riding public transportation with Aide 2, (f) grocery shopping with Aide 1, and (g) academic instruction in the high school with Aide 1.

Baseline. During the initial and third phases of Study 1, data were collected regarding the fre-

quency of Anita's problem behavior and the occurrence or nonoccurrence of the setting event. The setting event during the initial and third phases was allowed to vary without restriction.

Setting event intervention. During the second and final phases, the setting event was eliminated. A morning wake-up program was developed in consultation with Anita's group-home manager. The morning program consisted of two components: (a) A contingency was established and explained to Anita in which she would be allowed to select a preferred breakfast and clothing if she woke up within 5 min of the alarm clock sounding, and (b) Anita herself was responsible for turning off the alarm clock (previously done by the group-home manager).

Results

Figure 1 shows that, across 10 days of baseline, the occurrence of a setting event was differentially associated with increased levels of problem behavior. When a setting event did or did not occur, means of 6.8 (range, 6 to 8) and 0.8 (range, 0 to 1) behavior problems were observed, respectively. With the introduction of the intervention and the elimination of the setting event, a mean of 0.3 problem behaviors occurred per day (range, 0 to 1). A return to baseline replicated the effects of

Phase 1. During the final phase, the reintroduction of the morning program (and the elimination of the setting event) resulted in a mean of 1 behavior problem per day (range, 0 to 2). At a 2.5-month follow-up, problem behavior occurred at a mean frequency of 1 per day (range, 0 to 2).

STUDY 2: KELLY

Functional Assessment of Setting Event

Previous functional assessments (cf. O'Neill et al., 1990) had indicated that Kelly's problem behaviors typically occurred when instructional demands were made. Based on the functional assessment, a series of steps was initiated. First, nonpreferred activities unrelated to educational objectives (but that occasioned problem behavior) were eliminated. For activities that could not be eliminated but seemed to be related to problem behavior, a combined negative and positive reinforcement DRO procedure was used (described in Kennedy & Haring, in press). Finally, completion of a nonpreferred activity without the occurrence of problem behavior was followed by a preferred activity. This collection of interventions had been used for several months prior to the investigation, was effective except on specific school days, and was in place throughout Study 2.

An assessment of setting events similar to that in Study 1 was used for Kelly. From the review of school records and FAIF interview with a variety of individuals from home and school, traveling in a motor vehicle was identified as potentially problematic for Kelly. In the past, Kelly's problem behaviors were so disruptive while being transported that the school's bus system refused to provide service. At the time of the investigation, Kelly was driven to school by a classroom aide. Direct observations, however, indicated that it was the route taken to school and not driving in a motor vehicle per se that appeared to function as a setting event. Specifically, the occurrence of problematic behavior seemed to be related to the number of stops being made in the vehicle (e.g., stop signs, traffic lights). Following several stops, Kelly would begin to scream, tear her clothing, hit others, whine,

and pull her hair. As long as the vehicle remained in motion for sustained periods of time, no problem behavior occurred. The aide who drove Kelly to school used either a city street route requiring approximately 20 stops or a highway route requiring only two stops. On days when the city street route was taken (and multiple stops occurred), Kelly's problem behavior occurred more frequently than when the highway route was taken.

Definition and Measurement of Setting Event

Only two primary streets could be used to reach the school from Kelly's home—the city street route and the highway route. Thus, the setting event for Kelly was the use of the city street route to arrive at the high school. Nonoccurrence of the setting event was defined as the use of the highway route to the school. Each school day, the occurrence or nonoccurrence of the setting event was recorded by the classroom teacher.

Procedure

The behavior management procedures described previously were in effect throughout Study 2. The following activity sequence occurred each school day: (a) grooming in the high school bathroom with the teacher, (b) grocery shopping with Aide 1, (c) board games in the special education classroom with Aide 1, (d) window shopping with the teacher, and (e) ordering fast food with the teacher.

Baseline. Data were collected during the first and third phases regarding the setting event and problem behavior, with no intervention instituted to restrict the occurrence of the setting event.

Setting event intervention. An intervention to eliminate the occurrence of the setting event was introduced during Phases 2 and 4. After consulting with the classroom aide who accompanied Kelly to school, it was determined that the aide's assigned errands in the morning (e.g., mailing letters) caused the aide to use the city street route rather than the highway route. The intervention consisted of the classroom teacher not assigning the aide errands to complete during the morning drive to school and requesting that the aide use only the highway route.

Figure 2. Results for Kelly in Study 2. The data are presented as the frequency of problem behavior per school day. Closed rectangles arrayed along the horizontal axis indicate the occurrence of a setting event.

Results

Figure 2 presents the results of Study 2. During baseline, the setting event was differentially associated with a greater frequency of problem behavior. When the setting event was observed, a mean of 16 problem behaviors occurred (range, 13 to 20); however, when no setting event was observed, a mean of 3 problem behaviors occurred (range, 1 to 6). In Phase 2, the setting event was eliminated and a mean of 2.3 problem behaviors occurred (range, 0 to 7). Returning to baseline (Phase 3) resulted in a mean of 12.3 problem behaviors when the setting event occurred (range, 11 to 14) and no problem behaviors in the absence of the setting event. Reintroducing the independent variable resulted in the elimination of the setting event and a mean of 1.6 problem behaviors (range, 0 to 4). At a 2.5-month follow-up, problem behavior occurred at a frequency of 0.7 per day (range, 0 to 2).

DISCUSSION

These two studies analyzed the effects of preceding setting events on the problem behavior of students with severe disabilities. The setting events identified through a functional assessment occurred before the student's school day and were shown to

be related to increased levels of problem behavior during school. Consistent patterns were demonstrated between setting events and problem behavior. Interventions focusing on the elimination of the setting event were then developed for each student. When the setting events were eliminated, low levels of problem behavior were observed. The results indicate that preceding setting events can be assessed and eliminated to reduce problem behavior.

Because the setting events occurred before school, interventions designed to eliminate or suppress these events may need to focus on events not typically considered in the assessment of school environments. In some cases, the interventions may target the student's support systems in addition to the student's problem behavior. If scheduling, preparation, and/or transportation (among other events) are identified as potential setting events, these conditions may necessitate the development of interventions with a broader target audience. In the current investigation, the elimination of setting events before the school day in the support environments of students resulted in substantial reductions in problem behavior.

The setting events in the current study may have functioned to alter the positively and/or negatively reinforcing effects of other events (e.g., teacher praise, escape from tasks) during the school day, thereby

increasing the value of reinforcers associated with problem behavior and decreasing the reinforcers associated with academic behavior. Systematic replication with other students of the effects presented here will be important to establish the generality of the findings in regard to types of setting events, behavior patterns, and behavioral functions. Future research should more stringently control for the immediate antecedents and consequences that occur along with the problem behavior to avoid possible confounding effects among events. Also, the need to ascertain directly the positively and/or negatively reinforcing consequences that maintain behavior and the relation of the setting event to the maintaining variable(s) is critical. Finally, because the individuals involved in recording events were knowledgeable of the logic of the study, observer bias cannot be ruled out, and the data should be interpreted with appropriate caution.

To summarize, the results of this investigation extend the literature regarding the variables that maintain problem behavior. Our findings contribute to the understanding of problem behavior by demonstrating that preceding setting events can affect the frequency of problem behavior at other times and in other settings. In cases in which the occurrence of problem behavior appears to fluctuate over time despite consistent educational intervention, a fine-grained assessment to identify potential setting events may be warranted.

REFERENCES

- Bachman, J. E., & Fuqua, R. W. (1983). Management of inappropriate behaviors of trainably mentally impaired students using antecedent exercise. *Journal of Applied Behavior Analysis*, 16, 477-484.
- Baer, D. M., Wolf, M. M., & Risley, T. R. (1987). Some still-current dimensions of applied behavior analysis. *Journal of Applied Behavior Analysis*, 20, 313-327.
- Bijou, S. W., & Baer, D. M. (1961). *Child development I: A systematic and empirical theory*. Englewood Cliffs, NJ: Prentice-Hall.
- Bijou, S. W., Peterson, R. F., & Ault, M. H. (1968). A method to integrate descriptive and experimental field studies at the level of data and empirical concepts. *Journal of Applied Behavior Analysis*, 1, 175-191.
- Dunlap, G., & Koegel, R. L. (1980). Motivating autistic children through stimulus variation. *Journal of Applied Behavior Analysis*, 13, 619-628.
- Gewirtz, J. L. (1972). Some contextual determinants of stimulus potency. In R. D. Parke (Ed.), *Recent developments in social learning theory* (pp. 7-33). New York: Academic Press.
- Kennedy, C. H. (in press). Manipulating antecedent conditions to alter the stimulus control of problem behavior. *Journal of Applied Behavior Analysis*.
- Kennedy, C. H., & Haring, T. G. (in press). Combining escape and reward DRO to reduce the challenging behavior of students with severe disabilities. *Journal of the Association for Persons with Severe Handicaps*.
- Kern, L., Koegel, R. L., & Dunlap, G. (1984). The influence of vigorous versus mild exercise on autistic stereotyped behaviors. *Journal of Autism and Developmental Disorders*, 14, 57-67.
- Michael, J. (1982). Distinguishing between discriminative and motivational functions of stimuli. *Journal of the Experimental Analysis of Behavior*, 57, 149-155.
- Morris, E. K. (1991). Deconstructing "technological to a fault." *Journal of Applied Behavior Analysis*, 24, 411-416.
- O'Neill, R. E., Horner, R. H., Albin, R. W., Storey, K., & Sprague, J. R. (1990). *Functional analysis: A practical assessment guide*. Sycamore, IL: Sycamore Press.
- Touchette, P. E., MacDonald, R. F., & Langer, S. N. (1985). A scatter plot analysis for identifying stimulus control of problem behavior. *Journal of Applied Behavior Analysis*, 18, 343-351.

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