

*AN ANALYSIS OF AVERSIVE STIMULI IN  
CLASSROOM DEMAND CONTEXTS*

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Although recent research has identified numerous variables that can affect behavior maintained by negative reinforcement, questions remain concerning the potential aspects of the demand context that evoke problem behavior. To date, few studies have examined these questions within general education classrooms. The current study assessed the influence of social and task-difficulty variables on problem behavior maintained by negative reinforcement. Teachers in general education classrooms implemented three analyses to determine the influence of these variables on the problem behavior of 4 boys. Results are discussed in terms of response covariation within the demand context.

DESCRIPTORS: classroom functional analysis, negative reinforcement, teacher attention, task difficulty

Michael (2000) described several variables that may influence the rate of problem behavior in a classroom demand context. Over the last several years, factors shown to affect behaviors maintained by negative reinforcement have included task difficulty, preference for tasks (Cooper et al., 1992; Roman-  
iuk et al., 2002), pacing of demands (Smith, Iwata, Goh, & Shore, 1995), repetition of tasks (McComas, Hoch, Paone, & El-Roy, 2000), the instructional strategy employed (McComas et al.), and the influence of attention on behavior maintained by negative reinforcement (e.g., Cooper et al.; Moore, Edwards, Wilczynski, & Olmi, 2001). However, these studies have not evaluated these variables in general education classrooms.

Gunter, Denny, Jack, Shores, and Nelson (1993) pointed out that one serious imped-

iment to the study of escape and avoidance behaviors in classrooms has been the difficulty of pinpointing naturally occurring aversive stimuli that are involved in demand contexts. The classroom is a logical setting in which to gain a better understanding of demand contexts and to capture naturally occurring aversive stimuli. Although Gunter et al. considered the relative impact of task difficulty and student preference for academic materials, the role of attention in the demand context should also be considered.

For example, the effects of teacher attention (e.g., praise for task engagement) on behavior maintained by negative reinforcement remain unknown. Previous studies conducted outside the classroom have suggested that increases in compliance may produce collateral decreases in problem behavior (Lalli et al., 1999; Piazza et al., 1997).

In the current study, 4 students whose behavior was sensitive to negative reinforcement participated in an analysis to determine the specific aspects of the demand context that led to problem behavior. Namely, manipulations to distinguish between the effects of task difficulty and attention and to evaluate the effects of specific forms of attention on escape-maintained problem be-

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havior were conducted by teachers in general education classrooms during ongoing instruction.

## METHOD

### *Participants and Setting*

Four students were selected based on the following criteria: (a) enrollment in general education classrooms between kindergarten and 12th grade, and (b) higher levels of problem behavior in a demand condition than in an attention condition of a functional analysis (Iwata, Duncan, Zarcone, Lerman, & Shore, 1994). All sessions were conducted in the students' classrooms during ongoing instruction.

Edgar was a 9-year-old boy who attended a general education fourth-grade classroom with 17 other students. Edgar had been referred for yelling in class. When he attended school in a different state the previous year, Edgar received a special education ruling of severely emotionally disturbed. Edgar's academic and cognitive abilities fell in the average range of academic functioning, and he received 100% of his academic instruction in a general education classroom.

Morris was a 7-year-old boy who attended a general education first-grade classroom with 25 other students. Morris had been referred for talking out, refusing to complete work, and arguing with the teacher. His academic and cognitive abilities fell in the average range.

Jacob was a 17-year-old boy who received resource services one period per day for language and attended a general prealgebra classroom with 10 other students. Jacob had been referred for refusing to complete his work and for high rates of disengagement.

Robert was a 7-year-old boy who attended a general education second-grade classroom with 24 other students. Robert had been referred for arguing with his teacher during

instruction and for low work-completion rates.

### *Teachers*

Edgar's teacher was in her 6th year of teaching. She held a BS degree and an MA degree in elementary education. Morris' teacher was in her 23rd year teaching. She held a BA in elementary education. Jacob's teacher was in her 9th year of teaching. She held a BA and MA in special education. Robert's teacher was in her 6th year teaching. She held a BA in elementary education and was enrolled in graduate courses in educational administration at the time of the study.

### *Response Measurement and Reliability*

Yelling (Edgar, Morris, and Robert) was defined as vocal utterances above a normal tone of voice. Inappropriate hand movement (Morris) was defined as forcefully throwing the arms down to the sides so that the hands were below the level of the seat. Hand banging (Jacob and Robert) was defined as forceful contact of the hand or fist against the desk. Object throwing (Jacob) was defined as releasing an item from the hand in a forceful downward motion directly above the desk so that the object made an audible sound at impact. Engagement was defined as the student directing his eyes toward work materials or manipulating materials associated with a given task.

Task demands were defined as verbal instructions and written academic work delivered by the teacher. Teacher attention was defined as any verbal comment directed toward the student and delivered by the teacher within 1 m of the student. Teacher attention was further specified as reprimands, praise, or encouragement during Phase 3. Reprimands included behavior-specific statements that relayed disapproval, such as "Why aren't you working?" or "Don't look around the room!" Praise included behavior-

specific statements that communicated approval, such as "Great job working on your math." Encouragement included nondisapproving statements that attempted to prompt student engagement, "You have done this before. I know you can do it now."

Data on all behaviors were collected using 10-s partial-interval recording except data on engagement, which were collected using 10-s whole-interval recording. To calculate interobserver agreement, the number of intervals of agreement was divided by the total number of observation intervals and multiplied by 100%. For Edgar, agreement data for problem behavior and engagement were collected across 56% of the observations and averaged 96% (range, 89% to 100%) and 93% (range, 80% to 100%), respectively. For Morris, agreement data for problem behavior and engagement were collected across 48% of the observations and averaged 96% (range, 88% to 100%) and 97% (range, 90% to 100%), respectively. For Jacob, agreement data for problem behavior and engagement were collected across 26% of the observations and averaged 95% (range, 80% to 100%) and 91% (range, 76% to 100%), respectively. For Robert, agreement data for problem behavior and engagement were collected across 49% of the observations and averaged 97% (range, 89% to 100%) and 94% (range, 92% to 98%), respectively. All teachers were trained to implement procedures with 90% to 100% accuracy using procedures described by Moore et al. (2002). Integrity data were collected during each session (Moore et al.). Across all phases, integrity for Edgar's teacher, Morris' teacher, Jacob's teacher, and Robert's teacher averaged 98%, 95%, 92%, and 96%, respectively.

#### *Procedure*

*Phase 1: Functional analysis.* A functional analysis based on the procedures described by Iwata et al. (1994) was conducted to de-

termine if the students' behavior was maintained by negative reinforcement. An attention condition was alternated with a demand condition to serve as a control and to rule out possible maintenance by positive reinforcement. The teacher implemented all sessions in a multielement design during class time and used a stopwatch to monitor the delivery of specific antecedents and consequences. Each session lasted 10 min, and at least 5 min elapsed between sessions.

In the demand condition, the teacher presented learning trials to the student every 30 s throughout the session. All demands were presented in worksheet form. A sequential vocal, gestural, and physical (i.e., hand-over-hand) prompting hierarchy was employed to present demand trials. Hand-over-hand prompting included placing the pencil in the student's hand and positioning the pencil lead on the worksheet. The teacher delivered praise if the student complied with the verbal or gestural prompt, continued the prompting sequence if the student did not comply, and terminated the trial (by removing the worksheet and moving to the other side of the room) if the student engaged in the target problem behavior at any time during the trial. During the escape period, no teacher demands were placed on the student. Although the students were free to engage in a variety of behaviors, the students sat at their desks during most escape periods (data available upon request).

During the attention sessions, the student was given access to several nonpreferred leisure activities throughout the session. The teacher ignored the student except to deliver attention in the form of a statement of disapproval or concern (e.g., "Stop that; you are disrupting the class") and brief physical contact (e.g., a pat on the back or touching the arm) following each occurrence of the target problem behavior. All other appropriate and inappropriate behaviors were ignored.

*Phase 2: Task difficulty versus teacher attention.* The purpose of Phase 2 was to clarify the stimulus parameters of the demand situation that gave rise to the escape-maintained behaviors identified in the functional analysis. The type of task (i.e., easy or difficult) and the level of teacher attention (i.e., low or high) were manipulated in four conditions that were randomly alternated in a multielement design. Teachers implemented all conditions in a manner similar to the demand condition of the functional analysis (i.e., delivered praise if the student complied with the verbal or gestural prompt, continued the prompting sequence if the student did not comply, and terminated the trial if the student engaged in the target problem behavior at any time). Each session lasted 10 min, and at least 5 min elapsed between sessions. In all conditions, the teacher presented worksheets to the entire class with a group instruction such as "Work on this until you finish or I tell you to stop." The participants received easy or difficult work depending on the specific condition. All other students received easy worksheets in each condition to minimize the likelihood of requests for teacher assistance.

Procedural differences across the four conditions included the type of the task (i.e., easy or difficult) and the amount of attention provided (i.e., high or low). An easy demand was defined as a task that the student answered correctly at least 85% of the time. A difficult demand included work that the student answered correctly less than 50% of the time. High attention was defined as the teacher delivering attention in more than 50% of the 10-s intervals. Low attention was defined as the teacher delivering attention in less than 33% of the 10-s intervals. With the exception of the total amount of attention, the delivery of teacher attention was not programmed in that teachers were instructed to deliver attention in the form of praise, encouragement, or reprimands for appropri-

ate or inappropriate behavior or independent of behavior. Teachers monitored total amount of attention delivered with a stopwatch. Teachers were given target amounts of attention and instructed not to exceed the amount during low-attention conditions (3 min 20 s) and to exceed the amount during high-attention conditions (5 min). In the easy task demands/low-attention (ET/LA) condition, the teacher delivered an easy task with low attention. The easy task demands/high-attention (ET/HA) condition involved an easy task and high teacher attention. During the difficult task demands/low-attention (DT/LA) condition, the teacher delivered a difficult task and provided low levels of attention. In the difficult task demands/high-attention (DT/HA) condition, the teacher delivered difficult tasks as well as high amounts of attention.

Data on work completion and accuracy were collected during every condition. Work completion was defined as the student making a visible written attempt to answer a problem. Work completion was represented as a percentage and calculated by dividing the total number of completed problems by the total number of problems contained on the worksheet and multiplying by 100%. Each worksheet contained 4 to 20 problems. Work accuracy was defined as the student correctly answering the problem. Accuracy was also represented as a percentage and was calculated by dividing the total number of problems answered correctly by the total number of problems and multiplying by 100%. Work accuracy and completion data demonstrated that the independent variable (i.e., task difficulty) was manipulated in the intended manner (i.e., easy vs. difficult; data available upon request). Integrity data also demonstrated that teacher attention was manipulated in the intended manner (i.e., high vs. low; data available upon request).

*Phase 3: Concurrent operant analysis with programmed teacher attention.* Whereas in

Phase 2 we programmed only the amount of attention, in Phase 3 the type of consequence (i.e., form of teacher attention) and the target of the consequence (i.e., engagement or disengagement) were manipulated in various combinations in a multielement design. Escape contingent on the target problem behavior was available in each condition. Demands were presented as described above. Worksheets with difficult task demands were presented in every condition to control for the effects of task difficulty. Teachers implemented all sessions and monitored the delivery of antecedents and consequences with a stopwatch. Each condition lasted 10 min, and at least 5 min elapsed between each session.

The reprimands for disengagement condition was identical to the DT/LA condition in Phase 2 except the teacher delivered a reprimand or redirection (e.g., "Why aren't you working?" "Stop that!") when the student was not engaged with work materials following the initial prompting sequence. This reprimand was delivered 10 s after the final prompt of the trial or the first instance of disengagement after 10 s, given that disengagement occurred before the next trial. All appropriate behaviors were ignored. The encouragement for disengagement condition was identical to reprimands for disengagement except that the teacher delivered a statement of encouragement (e.g., "You can do this." "You will get done sooner if you get to work.") contingent on disengagement following the initial prompting sequence. This statement was delivered 10 s after the final prompt of the trial or the first instance of disengagement after 10 s, given that disengagement occurred before the next trial. All appropriate behaviors were ignored. The praise for engagement condition was identical to DT/LA except that the teacher delivered praise (e.g., "Great job!" "You are working hard!") contingent on student engagement following the initial prompting se-

quence. Praise was delivered 10 s after the final prompt of the trial or the first instance of engagement after 10 s, given that engagement occurred before the next trial. All behaviors other than engagement or target behaviors were ignored.

## RESULTS

Results of the functional analysis are depicted in the upper half of Figure 1. Each student demonstrated higher levels of problem behavior during the demand condition relative to the attention condition, suggesting that their problem behavior was maintained by negative reinforcement. Results of Phase 2 are depicted in the lower half of Figure 1. Edgar and Morris engaged in higher levels of problem behavior when teacher attention was high. Jacob and Robert engaged in higher levels of problem behavior when tasks were difficult than in conditions employing easy tasks. For both students, however, problem behavior was lower when difficult tasks were combined with low teacher attention than when difficult tasks were combined with high teacher attention. Interestingly, Jacob also exhibited high levels of problem behavior when easy tasks were combined with high levels of teacher attention. In fact, his behavior during this condition was very similar to that during DT/LA.

Figure 2 shows the percentage of intervals in which problem behavior and engagement occurred during Phase 3. Edgar and Morris engaged in higher levels of problem behavior and lower levels of engagement when their teachers delivered praise for engagement. When disengagement led to encouragement or reprimands, problem behavior was lower and engagement was markedly higher than in praise for engagement. In contrast, praise for engagement was associated with the lowest levels of problem behavior and the highest levels of engagement for Jacob and Rob-

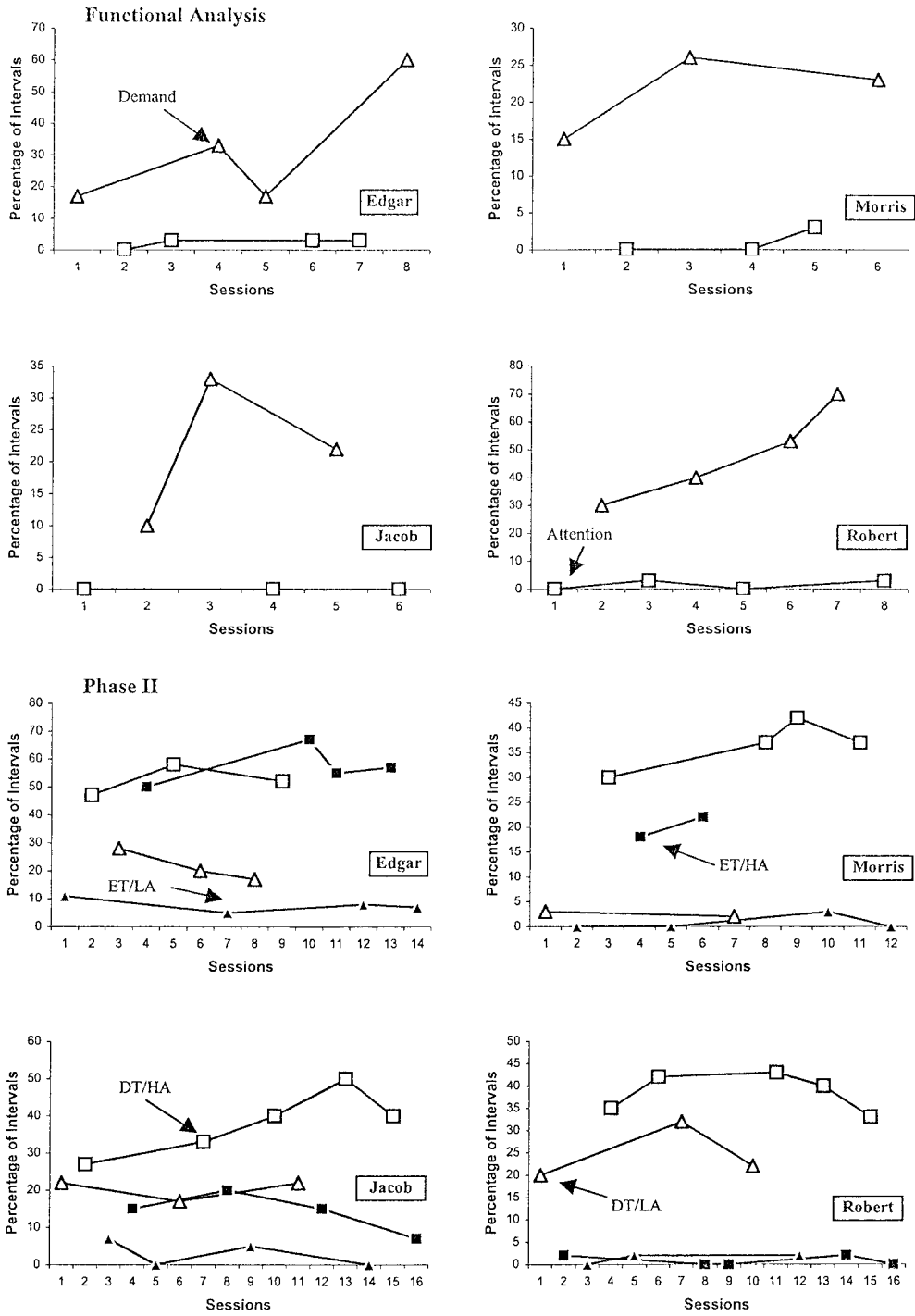


Figure 1. Percentage of intervals containing problem behavior for Edgar, Morris, Jacob, and Robert during the functional analysis (upper panels) and Phase 2 (lower panels).

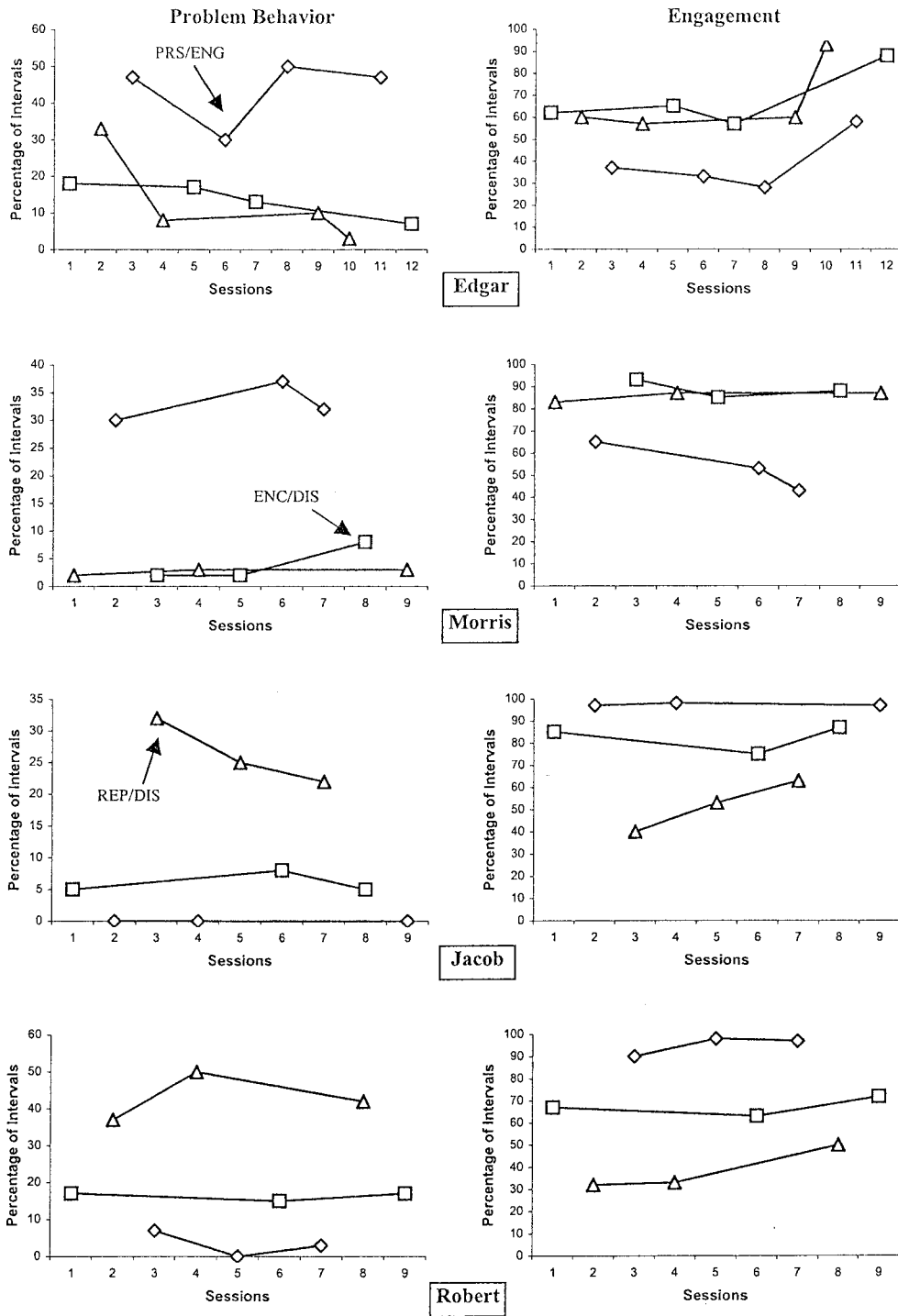


Figure 2. Percentage of intervals containing problem behavior (left panels) and percentage of intervals containing engagement (right panels) for Edgar, Morris, Jacob, and Robert during Phase 3.

ert. Both students demonstrated the highest levels of problem behavior and the lowest levels of engagement when disengagement led to teacher reprimands.

## DISCUSSION

Specific stimuli in classroom demand contexts that may be associated with behavior maintained by negative reinforcement were closely scrutinized. Data across all phases for Edgar and Morris suggested that the social attention aspects of the demand context functioned as aversive stimuli, whereas data across all phases for Jacob and Robert suggested that task difficulty was functionally related to problem behavior. In addition, there appeared to be interactions between task difficulty and levels of teacher attention for all students. Differences in task difficulty appeared to have little effect on Edgar's problem behavior when teacher attention was high; however, the behavior occurred less often when tasks were easy rather than difficult during the low-attention condition. Conversely, for Morris, the level of task difficulty appeared to affect the level of problem behavior when attention was high but not when attention was low.

Both Jacob and Robert engaged in problem behavior more often under conditions that included difficult tasks. As with Edgar and Morris, interactions were noted for Jacob and Robert. For Robert, levels of attention had an impact under the difficult task condition but not under the easy task condition. For Jacob, however, the level of attention influenced levels of problem behavior under both task difficulty conditions. These results extend previous research that highlighted the influence of multiple stimuli on behavior maintained by negative reinforcement (Cooper et al., 1992; McComas et al., 2000; Smith et al., 1995). This study also extends past research by demonstrating

the potential role teacher attention may play in the classroom demand context.

Although task difficulty and teacher attention may have interacted to create an aversive demand context, the fact that teacher attention was not controlled in Phase 2 may have accounted for apparent interaction effects. Phase 3 helped to shed light on this issue and provided some important information about classroom demand contexts. Results suggested that teacher attention functioned as a reinforcer or a punisher for behavior that competed with problem behavior. Edgar and Morris both displayed higher rates of problem behavior and lower rates of engagement when their teachers provided praise for engagement. These students conversely demonstrated lower levels of problem behavior and higher engagement when the teacher attended to disengagement, regardless of the type of teacher attention involved. That is, teacher attention for disengagement led to an increase in engagement via negative reinforcement and a corresponding decrease in the problem behavior. These findings are consistent with those of Phase 2, suggesting that attention per se functioned as an aversive stimulus for these students. Jacob and Robert displayed the highest levels of problem behavior and the lowest levels of engagement when disengagement produced teacher reprimands. Unlike Morris and Edgar, they also displayed higher levels of engagement and lower levels of problem behavior when engagement produced teacher praise. These findings indicate that some forms of teacher attention functioned as an aversive stimulus (reprimands) whereas other forms functioned as a reinforcing stimulus (praise). A similar relation between compliance and problem behavior, often referred to as response covariation, has been shown in previous studies (Mace & Belfiore, 1990; Russo, Cataldo, & Cushing, 1981).

Nevertheless, conclusions regarding the

aversive aspects of the demand situation require tempering. Results for Edgar and Morris did not exclude the possibility that some other aspect of the demand was aversive because the level of error associated with the task (i.e., task difficulty) was the only parameter evaluated. As research has demonstrated, factors such as preferences for tasks (Cooper et al., 1992), pacing of demands (Smith et al., 1995), repetition of tasks (McComas et al., 2000), and the instructional strategy employed (McComas et al.) may influence levels of escape-maintained problem behavior. Furthermore, task difficulty may not have been the only aspect of the demand context that was related to problem behavior for Jacob and Robert. In fact, results for both Jacob and Robert suggested some type of interaction between task difficulty and level of teacher attention, but Phase 3 focused on teacher attention only.

Future research should continue to focus on other factors that give rise to problem behavior in classroom demand contexts, such as the timing of demand presentations, preference for demand materials, and novelty of tasks. With regard to teacher attention, future research should focus on issues of generalization. Namely, past research has used the term *social avoidance* to describe patterns of behavior similar to those demonstrated by Morris and Edgar. The term may imply that these aversive properties would generalize across teachers. No studies, however, have investigated this issue.

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*STUDY QUESTIONS*

1. In the current study, responses were measured using both partial-interval and whole-interval recording. Speculate on why different recording methods were used for various target behaviors.
2. Speculate on why the initial functional analyses contained only attention and demand conditions.
3. What stimulus parameters were manipulated in Phase 2?
4. What were the minimum and maximum amounts of attention that could have been delivered in Phase 2, and how might this have affected the results obtained?
5. Given the results of Phase 2, predict the levels of problem behavior that would have been observed for each student if a play condition had been included in the functional analysis.
6. Summarize the results of Phase 3.
7. What was the difference between Phases 2 and 3 with respect to the functional characteristics of attention?
8. What are the implications of the present data for the treatment of escape-maintained problem behavior?

Questions prepared by Jessica Thomason and Leah Koehler, The University of Florida