

Classroom-Based Functional Analysis and Intervention for Students with Emotional/Behavioral Disorders

Glenna L. Wright-Gallo, Thomas S. Higbee,
Kara A. Reagon, and Bryan J. Davey

Utah State University

Abstract

We conducted functional analyses of disruptive behavior in a classroom setting for two students of typical intelligence with emotional/behavioral disorders (E/BD) using the classroom teacher to implement functional analysis conditions. The functional analyses suggested that both participants' disruptive behavior was maintained by escape from task demands and access to attention. Based on this information, we implemented a DRA procedure in which participants could request either escape or attention while disruption was placed on extinction. DRA decreased the disruptive behavior of both participants and the schedule of reinforcement was successfully thinned to a level that was practical for the classroom teacher to consistently implement.

KEY WORDS: classroom-based functional analysis, differential reinforcement of alternative behavior, emotional/behavioral disorders

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Behaviors that are distractive or disruptive occur more commonly than severe behaviors and comprise the majority of school-based disciplinary referrals (Sterling-Turner, Robinson, & Wilczynski, 2001). Decreasing disruptive behavior may be of particular importance for students classified with emotional and behavioral disorders (E/BD), as this is often the primary reason they are placed in restrictive educational placements outside of the general education classroom. In recent years, the experimental functional analysis methodology developed by Iwata, Dorsey, Slifer, Bauman, & Richman (1994) in an institutional setting has been increasingly used in educational,

Correspondence to Thomas S. Higbee, Dept. of Special Ed. and Rehab., Utah State University, 2865 Old Main Hill, Logan, UT 84322-2865. Phone: 435-797-1933. Fax: 435-797-3572; e-mail: tom.higbee@usu.edu.

Author Note: Glenna L. Wright-Gallo is now at the Utah State Office of Education. Bryan J. Davey is now at the May Institute. Portions of this article served as the thesis for the first author under the direction of the second author in partial fulfillment of the requirements of the M.S. degree. We thank David P. Wacker and a panel of anonymous reviewers for their helpful comments on an earlier version of this manuscript.

residential, and vocational settings (Hanley, Iwata, & McCord, 2003). Within the educational setting, several researchers have demonstrated the effective use of structural/antecedent analysis to address the inappropriate behavior of students classified as E/BD (e.g., Ervin et al., 2000; Kern, Delaney, Clarke, Dunlap, & Childs, 2001; Lee, Sugai, & Horner, 1999; McComas, Thompson, & Johnson, 2003; Meyer, 1999). While multiple studies have documented the effectiveness of classroom-based functional analyses involving the manipulation of environmental consequences with individuals with various other disabilities (e.g., Ervin, DuPaul, Kern, & Friman, 1998; Sasso et al., 1992), relatively few classroom-based functional analyses have been conducted with students with E/BD.

Ellis and Magee (1999) conducted analog and in-class functional analyses with three students with E/BD who exhibited disruptive classroom behaviors. Graduate students conducted the initial analog functional analyses while participant's teachers, with assistance from graduate students, conducted the in-class assessments with 2 of 3 participants. Results of the two functional analyses were generally consistent with one another and one of the in-class assessments produced clearer results than did the analog assessment. For the two participants who experienced both functional analyses, interventions were developed and implemented based on the results of the in-class functional analyses. The intervention for the third participant, who did not receive an in-class functional analysis, was developed and implemented based on the results of the analog functional analysis. Treatment results were evaluated using an A-B design. All participants' inappropriate behaviors decreased from baseline levels indicating that the functional analyses had accurately identified the behavioral function of the participants' inappropriate behavior.

Moore and Edwards (2003) conducted functional analyses with four participants who exhibited problem behaviors and were enrolled in K-12 general education classrooms, one of which was classified with an emotional disturbance. All of the sessions were conducted by the teacher during ongoing instruction within the participants' class. As functional analyses indicated that all participants' aberrant behaviors were escape maintained, additional analyses of the demand condition, including a concurrent operants analysis, were conducted in an attempt to identify the specific aspects of the demand context which were producing participants' aberrant behavior. While these procedures were successful in identifying the sensitivity of participants' aberrant behavior to various elements of the instructional context, treatment data demonstrating the applied utility of this information were not included in the study.

The purpose of the present study was to provide further evidence for the utility of classroom-based functional analyses, based on the model developed by Iwata et al. (1994), for students with E/BD. This was accomplished by conducting classroom-based functional analyses with two students of average intellectual functioning who were classified with E/BD. To validate the functional analysis results, a treatment evaluation was conducted in which interventions based on the results of the functional analysis were implemented in the classroom and their effect on disruptive behavior measured.

Method

Participants and Setting

Two males classified with E/BD, Mike and Tim, served as participants in the study. Mike, was 14 years 6 months, and had a full scale IQ of 88 (as measured by the WISC-IV). Tim, was 12 years 9 months, had a full scale IQ of 111 (as measured by the TONI-III). Teacher reports indicated that both participants engaged in high rates of disruptive behavior in the classroom.

The participants were receiving services in a self-contained special education classroom for students with E/BD located within a public middle school. Student entry into the classroom was determined by an IEP team and was based upon a student history of demonstrating a sufficient level of aberrant behavior so as to preclude placement in a less restrictive, more inclusive setting. The IEP team recommendation was then reviewed by a district placement committee consisting of psychologists, speech/language pathologists, administrators, and district personnel, all of whom needed to agree that a more restrictive self-contained classroom was appropriate for the student, before placement in the current classroom was finalized. The classroom included eight other students as well as a teacher and staff assistant. All experimental sessions took place within the participants' self-contained special education classroom. Functional analysis sessions took place at a table in the back of the classroom while treatment evaluation sessions took place at participants' desks.

Response Measurement

The primary dependent measure for all phases of the study was disruption. Disruption was defined as talking-out to peers and teacher without teacher permission, using profanity or sexually-related language, leaving their desk during instruction, making distracting facial expressions or obscene hand gestures to others in the classroom, and making repeated audible noises with tangible items (e.g., tapping pencil or paper clip repetitiously on desk).

Replacement behaviors were also measured during the treatment validation portion of the study. Replacement behaviors for both participants included raising the hand and verbally requesting either a brief (30-second) break from instruction (e.g., "Can I have a break please?") or a brief (30-second) social interaction with staff or another student (e.g., "Can I talk to _____ please?").

Data Collection

All experimental sessions were 10-minute in duration. Data were collected using a 10-second partial interval recording procedure, with data being collected on the number of intervals of disruptive classroom behavior. Rate of replacement behaviors demonstrated by the participant during the treatment evaluation portion of the study were measured in responses per minute. Both experimental functional analysis conditions and the subsequent function-based treatment utilized during the treatment evaluation portion of the study were implemented by the classroom teacher. All treatment evaluation sessions took place at the participants' desks during independent seatwork activities, as the teacher reported that the highest levels of disruption occurred during these activities. While there was some natural variation in terms of the content of independent seatwork activities from session to session (e.g., reading vs. math vs. science, etc.), this content did not vary systematically with experimental conditions. Sessions were conducted 1-3 times per day, 3-5 days per week, depending upon academic schedule with the exception of Tim's last seven intervention sessions and Mike's last five intervention sessions which were conducted within one school day, due to the early withdrawal from school of both participants for the summer. There was a minimum of a 5-minute break between sessions when multiple sessions were conducted in one day.

Interobserver Agreement

A second observer collected data for purposes of interobserver agreement (IOA). IOA was calculated using the point-by-point agreement method (number of agreements divided by the number of agreements + disagreements \times 100%), where an agreement was defined as both observers scoring either an occurrence or nonoccurrence of the target behavior during a particular observation interval, for disruptive behavior and the total agreement method for replacement behaviors (smaller total divided by the larger total \times 100%). An average agreement score was calculated separately for each participant for both functional assessment and treatment sessions. For Mike, IOA data were collected during 41% of functional analysis sessions, $M=89%$, range=73%-97%

and 42% of treatment evaluation sessions, $M=92\%$, range=78%-100%. For Tim, IOA data were collected during 36% of functional analysis sessions, $M=96\%$, range=85%-100% and 16% of treatment evaluation sessions, $M=92\%$, range=88%-97%.

Procedures: Functional Analysis

Standard experimental functional analysis conditions (escape, attention, no interaction, control) were run with both participants similar to those used by Iwata et al., 1994 with one notable exception: as the participant's teacher reported that the target behavior only occurred while students were engaged in independent seatwork activities, materials used in these activities (i.e., academic worksheets) were placed in front of the individual during all test conditions with the exception of the control condition (Romaniuk et al., 2002). Additionally, the tangible condition was included in Mike's functional analysis because information obtained through interviews with his teacher suggested that gaining access to the computer might play a role in his aberrant behavior. Participants were seated at a table in the back of the classroom for all functional analysis sessions in order to prevent peer interaction during test conditions. Each test condition is outlined in detail below.

Attention. During this condition, the teacher was standing approximately 6 feet from the participant. At the beginning of the session, the participant was instructed to complete his academic seatwork task and then the teacher withdrew her attention (e.g., no eye contact given, directing attention towards another student, pretending to read papers she was holding, etc.) Each time the participant engaged in disruption, the teacher gave immediate brief (<10-second) verbal attention in the form of task redirection and/or a verbal reprimand (e.g., "You need to get back on task," "You need to not talk out."). In addition to the verbal attention, the teacher also temporarily increased her physical proximity to the participant. Following the brief interaction, the teacher again withdrew attention and moved away to a distance of approximately 6 feet until the next instance of disruption. The task materials (worksheets) remained in front of the student during the entire session and were not removed contingent on disruption. Teacher prompts to complete the worksheets were not scheduled and only occurred as part of the brief interaction following instances of disruption.

Tangible. As interviews with Mike's parent and teacher suggested that disruption might be occurring to produce access to the classroom computer (a highly preferred activity), a test condition was run to test this hypothesis. During this test condition, Mike was given access to

the computer for 2-minute prior to the experimental session. Once the session began, access to the computer was ended. Upon each occurrence of disruption, he received 20-second of computer access. Repeated engagement in target behaviors within the 20-second computer access time resulted in continual computer time since each occurrence of disruption extended the access time by 20 seconds.

Escape. During this condition, participants were prompted to engage in the academic seatwork task every 30 seconds. Each instance of disruption resulted in the academic task being removed for 30 seconds. The teacher provided praise for completion of academic seatwork activities at the same rate as was typical in the classroom.

No interaction. During this test condition, participants remained at the table at the back of the classroom, but received no interaction from the teacher, nor did they have access to tangible items (other than a pencil and academic worksheet) during this time. Because classroom peers were engaged in classroom instruction and sessions were taking place at the back of the classroom, it was possible to remove peer attention as well.

Control. The participant was provided with continuous access to tangible stimuli (computer for Mike, drawing materials for Tim), experimenter attention (either verbal or physical) delivered on a fixed-time (FT) 30-second schedule and all academic task demands were removed.

Conditions during the functional analysis were alternated within a multi-element (alternating treatments) research design. Sessions continued for each condition until clear patterns were observed through visual inspection of the data. Based on the patterns of responding observed with both participants, attention and escape conditions were alternated for several additional sessions in an attempt to produce differentiated responding.

Procedures: Treatment Evaluation

In an attempt to validate the results of the functional analysis, a differential reinforcement of alternative behavior (DRA) procedure was implemented with both participants. As the functional analysis indicated that disruption appeared to be maintained by both escape and attention for both participants, the intervention was designed to target both behavioral functions. In the DRA procedure, engaging in one of the two targeted alternative behaviors (hand-raising and verbally requesting staff attention or a brief break from task demands) produced the requested functional consequence (escape or attention). In an effort to minimize delivery of the hypothesized functional reinforcers (escape or attention) following the target behavior, a

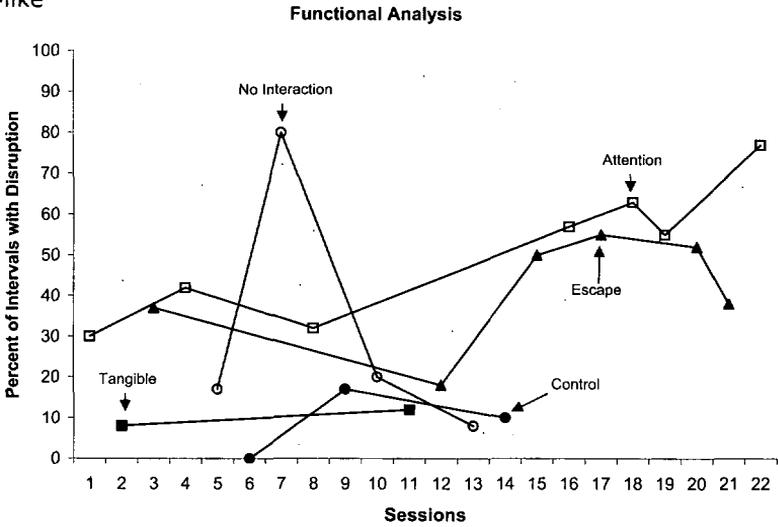
single, fixed instruction to “get back on task” was provided following each instance of disruption. When escape was requested, instructional materials were removed and the individual was given a 30-second in-seat break. At the end of the 30-second break, instructional materials were returned and the individual was given a brief instruction to resume independent seatwork. When students requested attention, they were allowed to leave their seat for 30 seconds to talk with either a peer or staff member (whoever they had requested). At the end of the 30 seconds, the student was instructed to return to his seat and resume independent seatwork. Participants were taught to use the alternative response by their classroom teacher during a 10-minute training session in which procedures were described and modeled for participants including examples and non-examples of the alternative behaviors. Both participants readily and independently demonstrated both alternative behaviors during the training session.

The effectiveness of the DRA procedure was evaluated using a B-A-B withdrawal design. In the initial treatment phase, the alternative behavior produced the requested reinforcer on a CRF schedule. The schedule was subsequently thinned so that requests produced the functional reinforcer 75% of the time (at session 20 for Mike and session 26 for Tim) and then 50% of the time (session 31 for Mike and 29 for Tim). Intermittent reinforcement was provided using a predetermined schedule that semi-randomly assigned an ignoring response to one (75%) or two (50%) out of every four requests. As treatment effects were significantly decreased at the 50% reinforcement level for both participants, the schedule was again increased to 75% (Mike, session 32; Tim, session 30). Following the initial treatment phase, a brief reversal phase ensued where requests for escape and attention were placed on extinction and disruption produced consequences identical to those in the escape and attention functional analysis conditions. Following the brief reversal phase, DRA was reintroduced at the 75% reinforcement level.

Results

The results of the functional analysis for Mike are presented in the upper panel of Figure 1. With the exception of one no interaction session, Mike demonstrated low levels of responding during no interaction, tangible, and control sessions during the functional analysis. Based upon these data, these conditions were discontinued after session fourteen. Because responding during escape and attention conditions occurred at similar levels and was consistently higher than during other conditions, escape and attention conditions were continued in an alternating fashion in an effort to determine the role that

Mike



Tim

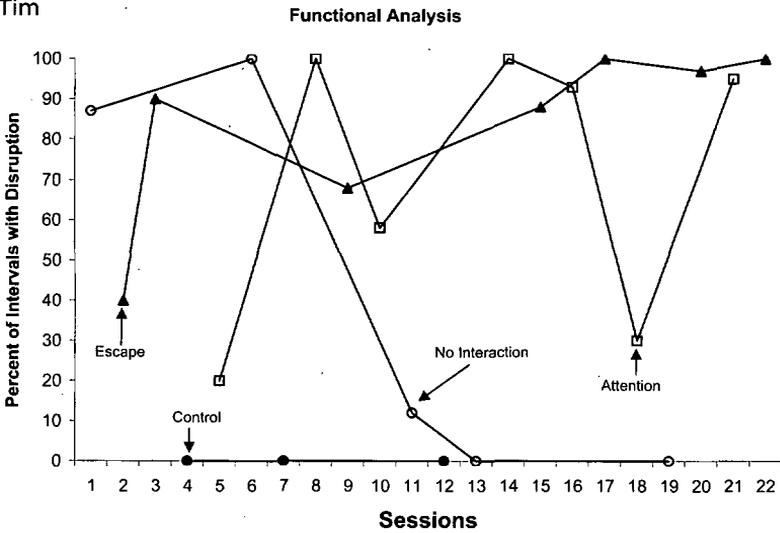


Figure 1. Functional analysis results for Mike, upper panel, and Tim, lower panel. Functional analysis data are presented as the percentage of intervals in which disruption occurred.

each played in maintaining Mike's disruptive behavior. Responding continued, however, at similar levels for both conditions.

The results of the functional analysis for Tim are presented in the lower panel of Figure 1. Tim demonstrated a similar pattern of responding with persistent high rates of responding during attention and escape conditions and an initial high rate of responding followed by a complete decrease in responding during no interaction sessions. As with Mike, attention and escape conditions were alternated several additional times in an unsuccessful attempt to produce differentiated responding between the two conditions.

The results of the treatment analysis for Mike are presented in the upper panel of Figure 2. When DRA was implemented on a CRF schedule, Mike's disruption immediately dropped to near zero levels while the replacement behavior of requesting escape occurred at a rate of 0-0.3 responses per minute. Interestingly, Mike did not request attention at any point during this or any subsequent phase of the treatment evaluation. Reinforcement was then thinned to 75% (sessions 27-30) which resulted in an initial increase in disruption followed by decreased responding over the next three sessions. During these sessions disruptive behavior ranged from 0% to 37% of intervals, with a decreasing trend and requesting remained at fairly low rates (escape requests 0-0.3 responses per minute; attention requests 0 occurrences). Reinforcement was then thinned to 50% for session 31. Analysis of the data show disruptive behavior occurring in 37% of the intervals, with a requesting rate of 0.2 responses per minute for escape and zero requests for attention. After consulting with Mike's teacher, it was determined that the 50% reinforcement schedule was actually leaner than what was typical practice for the classroom. Based on this information, the decision was made to return to the 75% reinforcement level which the teacher suggested was practical for her to implement in the classroom. The 75% reinforcement rate was reinstated for session 32-36. During these sessions, disruptive behavior ranged from 15% to 32% of session intervals. Escape requests were variable with a range of 0 to 1 responses per minute, and again, no requests were made for attention. A brief return to baseline phase was then conducted. During the reversal sessions (37-41), Mike demonstrated high levels of disruptive behavior. The first reversal session Mike engaged in disruptive behavior 10% of the intervals, and requested escape at a rate of 0.2 responses per minute and attention zero times. The next 4 reversal sessions had a significant increase in disruptive behavior, ranging from 63%-78% of the intervals and no requests for escape or attention were made. A subsequent return to the 75% reinforcement rate reduced disruptive behavior in sessions 42 and 43 to 35% and 1%,

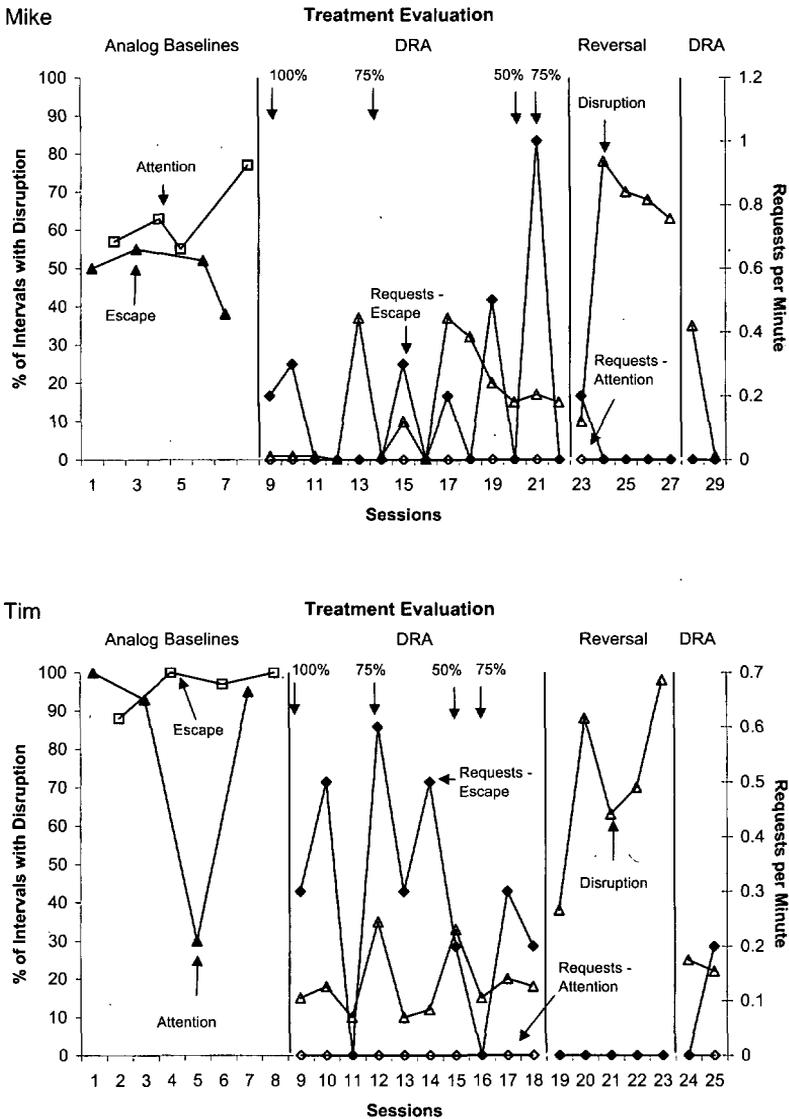


Figure 2. Treatment evaluation results for Mike, upper panel, and Tim, lower panel. The last four data points for the attention and escape conditions of the functional analysis are presented as analog baselines for comparative purposes. Disruption is presented during analog baselines and treatment phases as the percentage of intervals in which disruption occurred and is scaled on the primary Y-axis. Rate of appropriate requests for attention and escape per minute during the treatment evaluation are scaled on the secondary Y-axis. Percentages represent the reinforcement schedule in effect for requests for attention and escape during treatment phases.

respectively. No replacement behaviors were observed in these last two sessions.

The results of the treatment evaluation for Tim are presented in the lower panel of Figure 2. When DRA was implemented on a CRF schedule, Tim's rates of disruption immediately decreased, ranging from 10%-18% of intervals, in comparison to levels observed during escape and attention conditions of the functional analysis. The replacement behavior of requesting escape occurred at a rate of 0-0.5 responses per minute. As with Mike, requests for attention did not occur during this or any other phase of the treatment evaluation. Reinforcement was then thinned to 75% and, following an initial increase, the percentage of intervals with disruption was similar to those observed under the CRF schedule (range: 10%-35%) and requests for escape increased slightly with rates ranging from 0.3-0.6 responses per minute. Reinforcement was thinned to 50% for one session resulting in 35% of intervals with disruption and a request rate of 0.2 responses per minute for escape and no requests for attention. The 75% reinforcement schedule was reinstated for the practical reasons described above and disruption ranged from 15% to 20% of intervals while requests for escape ranged from 0-0.3 responses per minute while no requests were made for attention. A five session return to baseline phase resulted in an increase in Tim's disruptive behavior to 38%-98% of session intervals and zero requests for either escape or attention. DRA was then reintroduced on the 75% schedule and Tim's disruption decreased to 25% and 22% of the session intervals for these two sessions and requests for escape occurred at rates of 0 and 0.2 responses per minute, respectively, with no requests for attention.

While formal data on treatment fidelity and social validity of the current procedures were not collected, the classroom teacher did provide the experimenter with anecdotal information about her views of the procedures during an informal interview at the conclusion of the study. She indicated the experimental FA provided useful information to her regarding possible functions of aberrant student behavior and that the intervention component was valuable and effective in reducing problem behavior within her classroom setting. When questioned about the amount of time it took to conduct the experimental functional analysis and apply the results to the treatment intervention for validation, she felt that the presence of the experimenter allowed her to still continue with her classroom routine so that no classroom instruction time was wasted. She further offered that it was not a time-consuming process and that she would continue to use it when aberrant behavior could not be decreased through existing classroom behavior management routines.

Discussion

Results of both Mike and Tim's functional analyses suggested that escape and attention may have functioned as reinforcers maintaining participants' disruptive behavior. Based on this information, a DRA procedure was implemented in which participants were taught to request either escape or attention and the delivery of the functional reinforcers following disruptive behavior was minimized. This intervention successfully decreased rates of disruption in both participants and the schedule of reinforcement was successfully thinned to an intensity that was considered practical by the participants' classroom teacher without a loss of treatment effects.

Interestingly, when both functional reinforcers were concurrently available, both participants exclusively requested escape. One possible explanation for this is that escape may have been a more potent functional consequence than attention, despite the fact that both produced similar levels of disruption when each was available singly during functional analysis conditions. An alternative explanation might be that while the establishing operation for attention (i.e., attention withheld) was present during the attention test conditions of the functional analysis, attention was not purposefully withheld during the treatment evaluation and thus it is unclear to what extent it was present during this portion of the study. Thus, the response pattern observed, exclusive requests for escape, might have been due to differences in the prevailing establishing operations in place (task demands present, attention not withheld) between functional analysis and treatment conditions rather than being an indication of the general reinforcing potency of either functional consequence.

The decision to include task demands in all functional analysis conditions except control sessions could have potentially confounded the functional analysis results. Because task demands were present in all conditions except control, the establishing operation for escape was also likely present. Even though scheduled prompts to complete tasks were not delivered and task materials were not removed contingent on disruption, the high levels of responding seen during the attention condition could have occurred because of the establishing operation in place for escape, rather than the establishing operation for and contingent delivery of attention. Thus, a third explanation for the treatment evaluation results is that the response levels observed during the attention condition might represent a "false positive" for attention as a maintaining variable. The subsequent lack of responding to produce attention during the treatment evaluation may represent a confirmation of this hypothesis.

Another limitation of the present study involved the procedure used during DRA. In this procedure, participants could request either attention or escape. Since students would be allowed to leave their seats to interact with another person in the classroom when they requested attention, this consequence functionally consisted of both attention and escape from task demands. Given that requests for attention would provide a higher quality reinforcer (attention + escape) than requests for escape (escape only), the finding that participants exclusively requested escape is somewhat perplexing and contrary to findings from previous studies (DeLeon, Neidert, Anders, & Rodriguez-Catter, 2001; Lalli & Casey, 1996; Lalli et al., 1999; Piazza et al., 1997; Zarcone, Fisher, & Piazza, 1996). Possible factors that may account for this response pattern could include response effort (more effortful to leave the desk and find someone to talk to vs. stay in the desk and put my head down) or participants' history of reinforcement with both consequences. Future researchers may clarify the effects of these variables.

An additional limitation is that only two participants participated in the present study and that both were from the same classroom. Replication of these procedures with additional participants in additional settings will serve to verify the generality of these findings.

A practical concern that sometimes arises when using DRA in the classroom, particularly when a brief break from instruction is used as the reinforcer, is that the student might engage in the alternative behavior at a rate that significantly disrupts instruction. That is, the student might request breaks so frequently that he/she effectively avoids all instruction. In the present study, this did not prove to be a concern as breaks were requested at relatively low rates throughout the treatment evaluation. Additionally, the rate of reinforcement was successfully thinned to a schedule that was deemed manageable by the classroom teacher. While not a concern in the present case, rates of engagement in the alternative behavior is something that should be carefully monitored when using DRA.

These findings confirm those of previous studies indicating that experimental functional analyses can be successfully used in public school classrooms to identify the function(s) of aberrant behavior and that interventions designed based on these results can effectively decrease these behaviors. Further, in the current study, both the functional analysis and function-based intervention were successfully implemented by the classroom teacher. While some studies have investigated ways of training educators to implement functional analyses (e.g., Moore et al., 2002; Sasso et al., 1992; Wallace, Doney, Mintz-Resudek, & Tarbox, 2004), further research is needed to refine

training methods and determine the amount of supervision necessary for successful implementation of these procedures.

While not formally designed as such, procedures during the treatment evaluation portion of the present study approximate a concurrent operants analysis of the relative reinforcing potency of the two identified functional reinforcers. When functional analysis results suggest that behavior is sensitive to multiple types of reinforcement, as was the case in the current study, concurrent operants analyses, may be useful in clarifying the relative potency of each type of reinforcer. In conducting analyses of this type, it would be important to ensure that the relevant establishing operations for each of the functional reinforcers being evaluated were in place and that each consequence was as functionally distinct as possible so that valid interpretations of response patterns could be made. This more specific information about functional reinforcers might aid practitioners in designing interventions that are not only effective, but efficient in reducing aberrant behavior. Future researchers might confirm the utility of analyses such as these and determine under which conditions they are most likely to be useful.

In summary, the present study adds to the body of research on functional analysis in several ways. It represents an additional demonstration of the effectiveness of a classroom-based functional analysis, in which the classroom teacher implemented experimental conditions, in identifying the functional variables that maintained the disruptive behavior of two students with E/BD. It includes a treatment validation phase in which results of the functional analysis were confirmed by designing and implementing an intervention that successfully reduced participants' disruptive behavior. Finally, the reinforcement procedures used as part of the intervention were then thinned to a reinforcement schedule that was deemed acceptable by the classroom teacher, thus increasing the likelihood that the intervention would continue to be implemented once the present study was completed.

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SOURCE: Education and Treatment of Children 29 no3 Ag 2006
PAGE(S): 421-36
WN: 0621303477006

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