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USE OF A STRUCTURED DESCRIPTIVE ASSESSMENT METHODOLOGY TO IDENTIFY VARIABLES AFFECTING PROBLEM BEHAVIOR

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This study evaluated a variation of functional assessment methodology, the structured descriptive assessment (SDA). The SDA is conducted in an individual's natural environment and involves systematically manipulating antecedent variables while leaving consequences free to vary. Results were evaluated by comparing the results of an SDA with results obtained from an analogue functional analysis with 4 children who exhibited problem behavior. For 3 of 4 participants, the results of the two assessments suggested similar hypotheses about variables maintaining problem behavior. Interventions based on the results of the SDA were implemented for 3 children and resulted in significant reductions in rates of problem behavior.

DESCRIPTORS: functional assessment, functional analysis, intervention, problem behavior

Research has demonstrated the utility of the analogue functional analysis methodology developed by Iwata, Dorsey, Slifer, Bauman, and Richman (1982/1994) for identifying sources of reinforcement that maintain aberrant behavior. This methodology systematically assesses situations hypothesized to be analogueous to those in the natural environment by directly manipulating putative antecedents and consequences for problem behavior. The major advantage of this methodology compared to other methods of functional assessment is that it allows greater control over the environment, resulting in a more direct inference of functional relations.

In contrast to the analogue functional analysis, descriptive assessments involve direct observation of behavior and events in the individual's natural environment and involve less control over environmental variables. Descriptive assessments may yield information about naturally occurring schedules of reinforcement and idiosyncratic variables associated with problem behavior (e.g., Fisher, Adelinis, Thompson, Worsdell, & Zarcone, 1998; Mueller, Sterling-Turner, & Scattone, 2001). As a result, descriptive assessments may enhance understanding of how reinforcement operates in the natural environment.

Recent research suggests that descriptive assessment may be beneficial in augmenting analogue functional analyses. For example, hypotheses about environment–behavior relations might be developed via descriptive assessment when results of an analogue functional analysis are inconclusive (Mace & Lalli, 1991). Descriptive assessments also may be useful when it is difficult or impossible to conduct analogue functional analyses.

Despite these potential benefits, a number of limitations are associated with commonly used methods of descriptive assessment. First, data obtained via descriptive assessment provide only correlational information about environment–behavior relations, and therefore do not allow causal statements to

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be made (Mace, Lalli, & Shea, 1992). Second, if behavior is reinforced only occasionally, it may be difficult to identify reinforcing consequences (Lerman & Iwata, 1993; Sulzer-Azaroff & Mayer, 1977). Third, because antecedent and consequent stimuli are not controlled, functionally relevant stimuli may not occur during the observation period. This may occur, for example, if care providers have modified the environment such that discriminative stimuli or establishing operations that occasion problem behavior are removed in an attempt to prevent the occurrence of such problems.

One strategy that might increase the utility of the descriptive assessment is to program the occurrence of specific antecedent conditions (i.e., task presentation, removal of tangible items, attention deprivation) that have been demonstrated, by research employing the analogue functional analysis, to be functionally related to challenging behavior. To illustrate, Freeman, Anderson, and Scotti (2000) evaluated 2 individuals' problem behavior using a structured descriptive assessment (SDA). The SDA was conducted by typical care providers in the individuals' natural environment and involved implementing specific antecedent conditions similar to those found in the analogue functional analysis while observing naturally occurring consequences. Results of the SDA were compared to those of analogue functional analyses and typical descriptive assessments. Results indicated that the SDA resulted in greater occurrence of targeted environmental events (e.g., antecedents mentioned above and specific consequences such as attention delivery, task removal, delivery of tangible items) when compared to the descriptive assessment. Also, the patterns of responding in the SDA were similar to those observed in the analogue functional analysis, resulting in similar hypotheses about the function of problem behavior for the 2 participants.

Although the results obtained by Freeman et al. (2000) tentatively support the utility of the SDA, the results were limited for several reasons. First, the authors did not determine if specific environmental events occurred more often in conjunction with problem behavior (i.e., conditional probabilities were not calculated), so it is difficult to draw conclusions about potential functional relations. Second, because the study was conducted with only 2 participants, the generality of these findings were limited. Finally, the utility of this method remains unclear because interventions were not evaluated.

Given that descriptive assessments are a potential alternative or adjunct to analogue functional analyses, it is important to continue to evaluate the utility of the SDA. The purpose of this study was to conduct further evaluations of the SDA by comparing results obtained with the SDA to results obtained with the analogue functional analysis with 4 participants. A second purpose of this study was to evaluate the extent to which the SDA led to development of an effective treatment. If so, a case may be made for use of the SDA as an adjunct to or replacement for an analogue functional analysis under certain circumstances. Finally, research on the SDA may provide additional insights as to how behavior is reinforced in the natural environment.

STUDY 1: FUNCTIONAL ASSESSMENT

Method

Participants and Setting

Four children who had been referred for the assessment and treatment of severe behavior problems participated. Drew was an 8-year-old boy who had been diagnosed with autism and moderate to severe mental retardation. He had been referred for treatment of self-injurious behavior (SIB), aggression, and disruption. Jane, a 13-year-old

girl who had been diagnosed with Down syndrome and profound mental retardation, had been referred for treatment of SIB. Lyle was a 13-year-old boy who had been diagnosed with moderate to severe mental retardation. He had been referred for treatment of aggression and disruption. Mitch was a 6-year-old boy who had been diagnosed with autism and had been referred for treatment of aggression.

Analogue functional analyses for all participants were conducted in a therapy room equipped with a one-way mirror. SDA sessions with Drew were conducted in his home. SDA sessions for Jane, Lyle, and Mitch were conducted in their classrooms.

Response Definitions, Data Collection, and Interobserver Agreement

Analogue functional analysis. Definitions for problem behavior were developed from interviews with parents (Drew), teachers (Jane, Lyle, and Mitch), and direct observations conducted prior to beginning the study. Target behaviors included SIB (Drew and Jane), defined as head banging, head hitting, ear scratching, slamming the body against hard surfaces, and banging an arm or hand against a hard object; aggression (Drew, Lyle, and Mitch), defined as hitting, kicking, pinching, and pulling hair of others; and disruption (Drew, Lyle, and Mitch), defined as throwing objects and knocking over furniture. Due to the severity of her SIB, Jane wore a boxing helmet to protect her ears. All target behaviors were scored using continuous frequency recording.

Frequency data were collected on the following therapist responses for all participants: (a) prompt, defined as providing a verbal, gestural, or physical request; (b) attention delivery, defined as 3-s to 5-s verbal statements that were not prompts; (c) delivery of tangible items, defined as placing a preferred object within the reach of the participant; and (d) removal of tangible items, defined as removing a preferred object from the participant. Partial-interval data were collected on the occurrence of the following variables across consecutive 5-s intervals: (a) attention deprivation, defined as the absence of attention for a complete interval; (b) escape, scored only if a prompt occurred in a preceding interval, the participant was not engaged in a previously requested task, and prompts to engage in the task were not presented for the entire interval; and (c) tangible deprivation, defined as the removal of a preferred tangible item for at least one complete interval. Therapist behaviors were coded as soon as they occurred, and the order of occurrence was recorded if they occurred within the same interval as a child problem behavior. When a therapist response continued to occur across adjacent intervals, it was rescored in each new interval until the event ended. For example, after attention had been absent for one complete interval, attention deprivation was scored in each subsequent interval until attention was reinstated. If both the therapist and participant continued to respond across intervals, the original order of responding was maintained at the beginning of each interval.

Sessions were coded either during the session or from videotapes using a computerized data-collection system. Interobserver agreement was calculated for frequency measures by breaking sessions into consecutive 10-s intervals and dividing the smaller number of responses recorded by an observer by the larger number of responses recorded by the other observer. The resulting fractions were averaged across intervals and multiplied by 100%. Mean interobserver agreement across participants was 91% for problem behavior (range, 83% to 100%), 98% for prompts (range, 95% to 100%), 97% for attention delivery (range, 93% to 100%), 99% for delivery of tangible items (range, 98% to 99%), and 95% for removal of tangible items (range, 93% to 100%). For par-

tial-interval measures, percentages of occurrence and nonoccurrence agreement were calculated by dividing the number of intervals in which both observers agreed on the occurrence or nonoccurrence of the response by the total number of intervals and multiplying by 100%. Mean occurrence and nonoccurrence agreement scores for therapist behaviors across subjects were as follows: attention deprivation, occurrence 98% (range, 92% to 99%), nonoccurrence 99% (range, 97% to 100%); tangible deprivation, occurrence 100%, nonoccurrence 100%; escape, occurrence 100%, nonoccurrence 100%.

Structured descriptive assessment. Response definitions for problem behavior were identical to those described above. In addition to the boxing helmet, Jane wore arm splints due to concerns raised by her teacher. However, the splints were loosened so that Jane could contact her head with her hand. Behaviors exhibited by participants and therapists were videotaped and scored using a computerized scoring system. Data on therapist behavior were collected using 5-s partial-interval recording. Target therapist (teacher or parent) behaviors included prompts, attention delivery, tangible delivery, attention deprivation, escape, and tangible removal. Prompts were defined as an instruction to complete an action, including physical prompts, and an ongoing instructional context. Requests to verbalize a statement (e.g., "say hi") were coded only for Mitch, who was verbal. Attention delivery was scored when the therapist interacted with the participant in a noninstructional manner. This included reprimands, verbal statements toward the child (e.g., "you look nice today"), and physical interaction (e.g., hug, pat on the shoulder). Tangible delivery was defined as allowing the participant access to the predefined preferred stimulus. Tangible delivery was coded if the therapist handed the item to the child, told the child that he or she could have it, or simply allowed the child to independently obtain the item. Response definitions for attention deprivation, escape, and tangible removal were identical to those used in the analogue functional analysis.

Interobserver agreement, calculated as described above, was obtained for at least 30% of all sessions for all participants. Mean agreement for problem behavior was 84% (range, 74% to 100%), 94% (range, 86% to 100%), 80% (range, 50% to 99%), and 92% (range, 82% to 100%) for Drew, Jane, Lyle, and Mitch, respectively. Mean occurrence and nonoccurrence agreement scores for therapist behaviors across participants were as follows: prompt, occurrence 94% (range, 91% to 99%), nonoccurrence 98% (range, 98% to 99%); attention delivery, occurrence 88% (range, 80% to 94%), nonoccurrence 91% (range, 85% to 100%); tangible delivery, occurrence 70% (range, 0% to 100%), nonoccurrence 99% (range, 98% to 100%); instruction delivery, occurrence 94% (range 91% to 99%), nonoccurrence 99% (range, 98% to 99%); attention deprivation, occurrence 94% (range, 83% to 99%); nonoccurrence 97% (range, 94% to 99%); tangible removal, occurrence 100%, nonoccurrence 100%; escape, occurrence 93% (range, 82% to 100%), nonoccurrence 90% (range, 75% to 100%).

Procedure

The analogue functional analysis was conducted prior to the SDA for all participants except Jane, whose assessments were conducted simultaneously. All sessions were 10 min in length. In both analyses, sessions were conducted until response differentiation was observed or (for Jane) until rates of problem behavior were relatively stable across conditions. Definitions for preferred stimuli were obtained through parental interviews and direct observation conducted prior to beginning the study. Preferred stimuli for each participant were as follows:

Drew, cookies and a mechanical singing plant; Jane, paper; Lyle, automobile magazines and toy cars; and Mitch, a train video and toy trains.

Analogue functional analysis. Participants were exposed repeatedly to four or five experimental conditions similar to those described by Iwata et al. (1982/1994). Conditions were randomly presented in a multielement design. All participants were exposed to attention, task, and play conditions. A tangible condition was implemented with Jane, Lyle, and Mitch, and an alone condition was implemented with Jane and Drew, both of whom exhibited SIB. The tangible condition was not conducted with Drew, because his mother indicated that removal of tangible items never evoked problem behavior and requested that the tangible condition not be conducted. Trained graduate and undergraduate students served as therapists.

Structured descriptive assessment. Participants were exposed repeatedly to four experimental conditions: attention, task, tangible, and play. The classroom teacher served as therapist for Jane, Lyle, and Mitch. Drew's mother served as his therapist. For all participants except Drew, sessions were conducted during times of the day when certain activities pertaining to each SDA condition normally occurred (e.g., attention sessions occurred when the therapist typically was unable to interact directly with the child). Sessions with Drew were conducted in random order, because his mother reported that no specific activity schedule was followed. Prior to each session, therapists were given specific instructions about the antecedent condition (detailed below) and were asked to respond to problem behavior as they typically would. Because antecedent conditions were controlled as part of the assessment, therapists were asked to reestablish antecedent events if the designated event had not occurred for 2 min in the absence of problem behavior.

The purpose of the attention condition was to establish the antecedent of attention deprivation. This condition was conducted during times when the therapist typically did not directly interact with the child (e.g., was working with another child). Two minutes prior to beginning the session, the therapist was told, "Please play with the child as you typically do. Do not give requests or ask the child to engage in any demands at this time." Upon initiation of the session, the therapist was told, "In this role-play we would like you to pretend this is a time that you cannot directly interact with the child. You may interact with other children or engage in another activity, such as working at your desk." The therapist also was asked to keep preferred tangible items out of sight and reach of the child. The task condition, designed to establish the antecedent of presentation of requests to work, was conducted when the participant was expected to complete tasks. Jane, Lyle, and Mitch worked on preacademic tasks, specified in their individualized education plans. Drew worked on daily living skills (e.g., copying letters) and receptive language tasks. Similar tasks were used in the analogue functional analysis and the SDA. Removal of preferred tangible items or activities did not occur within 2 min of initiating this condition. At the start of the task condition, the therapist was told, "In this role-play we want to see how the child responds to requests. Please work with the child on activities that you typically engage the child in and use prompting strategies you normally use." The tangible condition, conducted when access to preferred items was ending (access had occurred for at least 2 min), was designed to establish the antecedent of removal of preferred tangible items. At the beginning of the condition, the therapist was told, "In this role-play we want to see how the child reacts when preferred

activities end. When we tell you to begin, please remove [preferred item]. You may interact with the child as you desire, but please refrain from attempting to engage the child in work activities." The play condition was designed to simulate an enriched environment, similar to the play condition of the analogue functional analysis. Preferred items were available, and the therapist was told, "In this role-play we would like to see how the child responds when you are not making requests and preferred items are available. Please play with the child as you normally do."

Data Analysis

Mean rate (number of responses per minute) of problem behavior was compared across conditions for the analogue functional analysis and the SDA. However, one important way that the SDA differed from the analogue functional analysis was that the occurrence of antecedent and consequent events was not controlled. Although we did exert some control over antecedent conditions, the frequency and timing of these events were somewhat uncontrolled. Thus, conditional probabilities also were calculated for the SDA to determine the relation between environmental events and problem behavior (Blakeman & Gottman, 1997; Freeman et al., 2000; Lerman & Iwata, 1993). All probabilities were calculated based on the first occurrence of child behavior in each interval (i.e., as though child behavior was coded as a partial-interval measure).

Conditional probabilities were calculated for consequences as described by Lerman and Iwata (1993), except that proportions were calculated for environmental events that occurred within 5 s of the problem behavior. Also, proportions were calculated only for problem behavior that occurred in the presence of a given antecedent variable, thus taking into account the presence of putative establishing operations. For example, if a child already had access to a preferred tangible item, emitted problem behavior, and continued to have access to the item, these data were not included in the calculations of tangible delivery as a consequence for problem behavior. This was necessary to control for the fact that therapists may not have implemented the relevant establishing operation throughout some portion of the sessions.

Conditional probabilities were calculated in two ways. First, behavior-based probabilities were calculated to determine the proportion of problem behavior that occurred within 5 s prior to environmental events by dividing the number of intervals containing problem behavior that preceded the environmental event by 5 or fewer seconds by the total number of intervals scored with problem behavior. Second, event-based probabilities were calculated to reveal the proportion of intervals containing environmental events that followed problem behavior and were conducted to control for the possibility that the occurrence of environmental events might vary across conditions. These probabilities were calculated by dividing the number of intervals containing problem behavior that preceded the environmental event by 5 or fewer seconds by the total number of intervals scored with the event.

Results

Figures 1 through 4 depict mean rates of problem behavior across conditions of the analogue functional analysis and the SDA and results of the conditional probability calculations from the SDA for each participant. The mean percentage of session time that antecedent variables were scored in each condition of the analogue functional analysis and the SDA are shown in Table 1. Percentages were obtained by dividing the number of intervals in which an antecedent stim-

Table 1
Mean Percentage of Intervals Containing Antecedent Events Across Conditions of the Structured Descriptive Assessment and Analogue Functional Analysis

		Drew		Jane		Lyle		Mitch	
Condition	Antecedent	Structured	Analogue	Structured	Analogue	Structured	Analogue	Structured	Analogue
Attention	Attention deprivation	97	93	81	83	81	11	91	99
	Prompt	0	0	0	0	0	0	0	0
	Tangible deprivation					0		0	
Demand	Attention deprivation	38	28	18	68	38	23	28	13
	Prompt	75	68	77	23	54	78	68	70
	Tangible deprivation	0		0		0		0	
Tangible	Attention deprivation			67	100	58	100	83	100
	Prompt			0	0	0	0	0	0
	Tangible deprivation			94	57	100	93	100	23
Control	Attention deprivation	12	75	18	77	21	73	0	73
	Prompt	9	0	0	0	0	0	0	0
	Tangible deprivation	0	0	0	0	0	0	0	0

ulus was scored by the total number of intervals.

Drew

Drew exhibited the highest rates of problem behavior in the task condition of the analogue functional analysis, suggesting that his problem behavior was maintained by escape from tasks (Figure 1). Drew also emitted the highest rates of problem behavior in the task condition of the SDA. In interpreting the conditional probability data, one would have the most confidence in a hypothesized function (e.g., escape) if that event consistently followed problem behavior, but only in the relevant condition (e.g., task), and other events (e.g., attention delivery, tangible delivery) rarely followed problem behavior in any of the conditions. Figure 1 shows that occurrences of problem behavior were often followed by escape in both the task condition (M = 53%) and the play condition (M = 67%), whereas escape never occurred in the attention and tangible conditions. In addition, attention and tangible delivery rarely occurred in any condition. These results are consistent with the hypothesis that Drew's problem behavior was maintained by escape, with one exception: The conditional probabilities of problem behavior and escape were high in the play condition (not solely in the task condition). However, it should be noted that some prompts were presented in the play condition, which likely evoked escape-maintained problem behavior.

Jane

Jane emitted high rates of SIB in all conditions of the analogue functional analysis, but rates were highest in the task condition (Figure 2). Further analysis of within-session

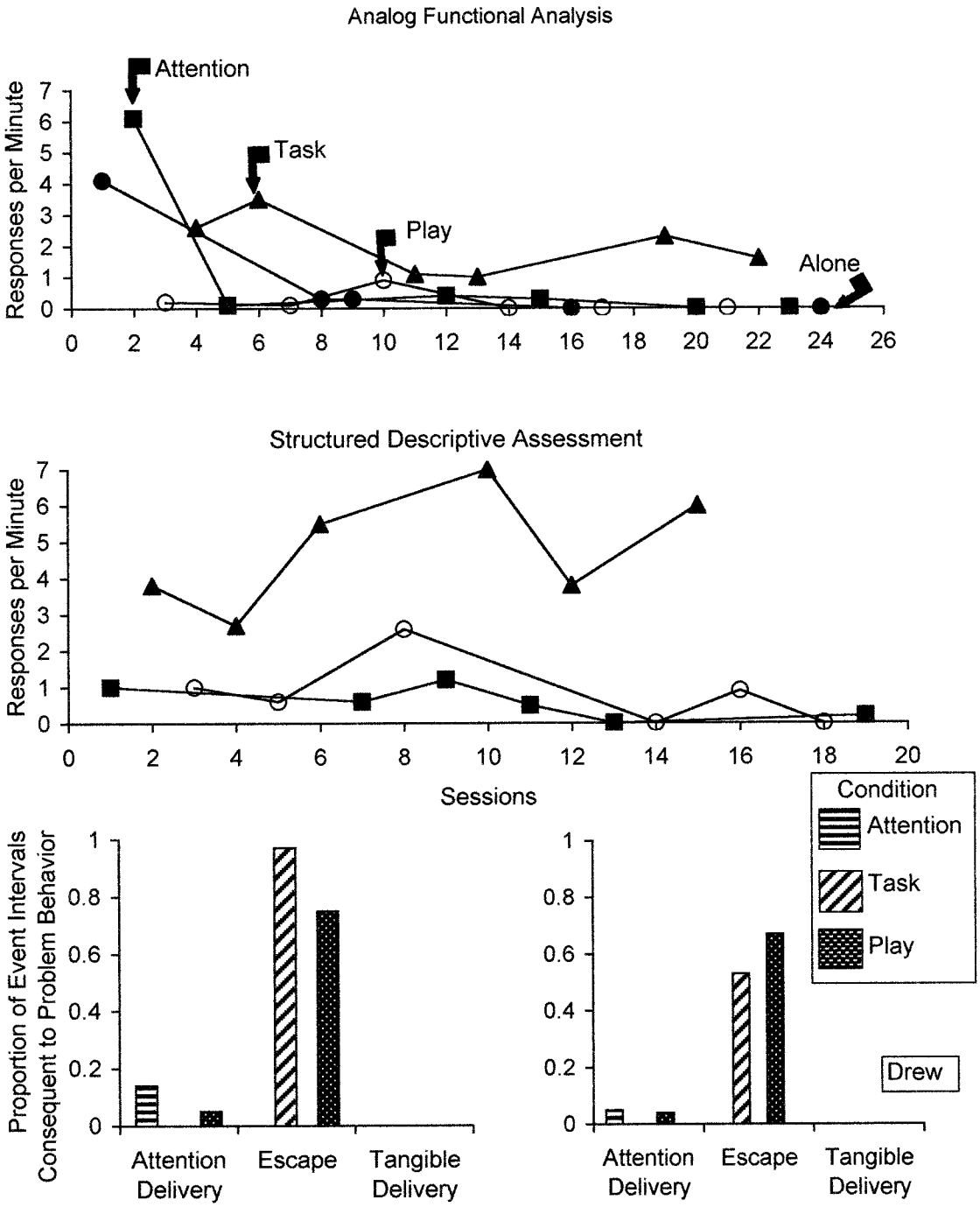

Figure 1. Mean response rate (number of responses per minute) in the analogue functional analysis for Drew (top panel); mean rate of problem behavior across conditions of the SDA (middle panel); proportion of event intervals following problem behavior (bottom left panel); and proportion of problem behavior intervals preceding events (bottom right panel) during the SDA.

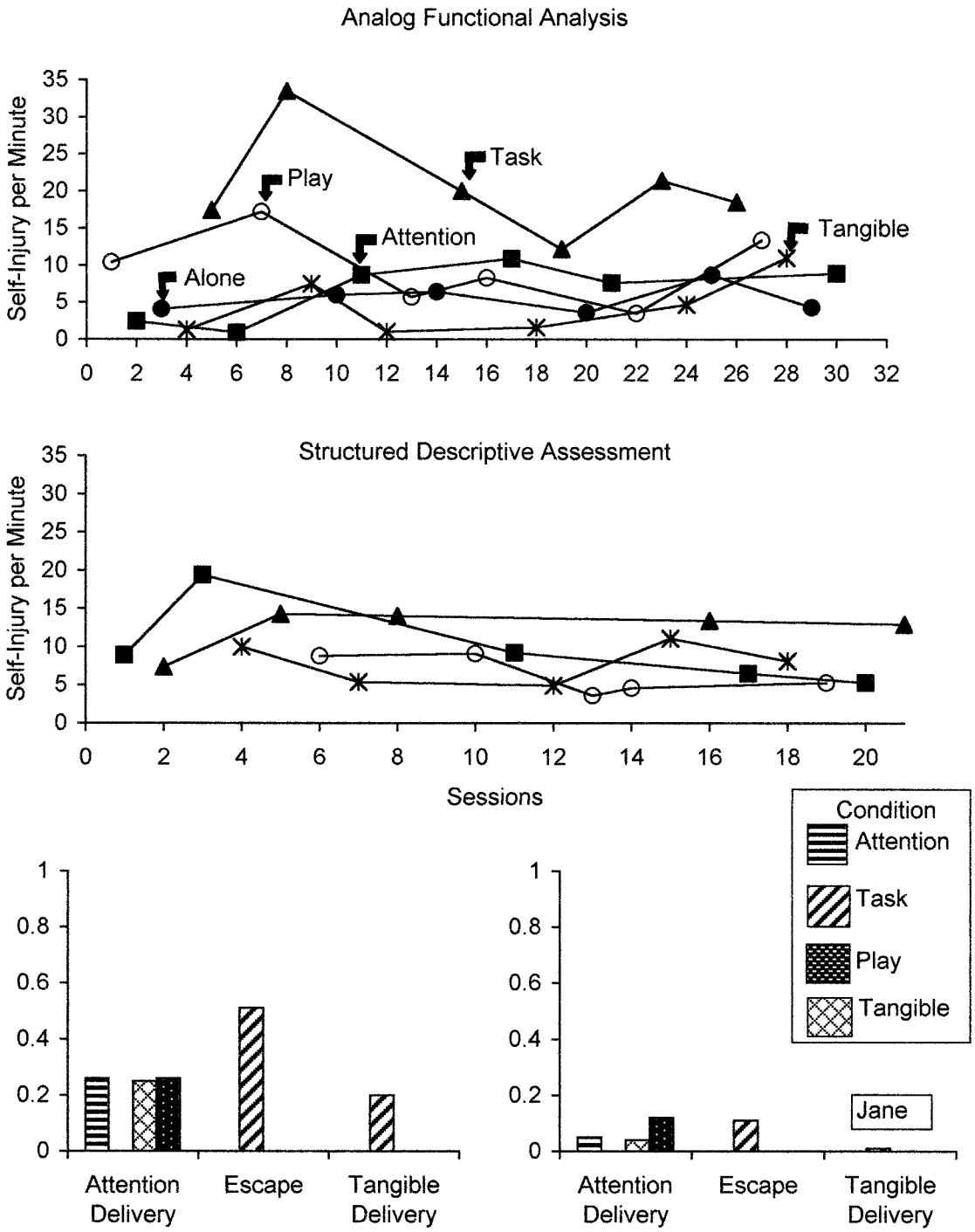

Figure 2. Mean response rate in the analogue functional analysis for Jane (top panel); mean rate of problem behavior across conditions of the SDA (middle panel); proportion of event intervals following problem behavior (bottom left panel); and proportion of problem behavior intervals preceding events (bottom right panel) during the SDA.

patterns of responding revealed that SIB occurred almost continuously throughout the task condition (i.e., during escape intervals as well as when prompting occurred; data are available from the first author upon request). Thus, results suggested that Jane's SIB was either multiply maintained or maintained by nonsocial reinforcement. As in the analogue functional analysis, Jane emitted high rates of SIB across all conditions of the SDA, and rates were slightly higher in the task condition. Event-based conditional probabilities for the SDA revealed that less than half the occurrences of targeted social variables that occurred in the presence of relevant antecedent conditions followed SIB, and escape was only slightly more likely to follow SIB compared to other consequences. Further, very small proportions of SIB were followed by any social consequence when the relevant establishing condition was present. These results suggest that responding was maintained by nonsocial reinforcement because SIB was not differentially related to the presence or absence of social variables.

Lyle

Lyle exhibited problem behavior almost exclusively in the attention condition of the analogue functional analysis, suggesting that problem behavior was maintained by attention (Figure 3). Although he also emitted high rates of responding in the attention condition of the SDA, similar rates were observed in the tangible condition. This finding suggested that Lyle's problem behavior was maintained by both attention and access to tangible items. Conditional probabilities for both the attention and tangible conditions showed that, given the antecedent of attention deprivation, the vast majority of intervals containing attention delivery followed problem behavior, and problem behavior in both conditions was frequently followed by attention delivery (65% in attention, 85% in tangible). Conversely, tangible delivery never followed problem behavior in any condition. This finding suggested that problem behavior was maintained by attention only. Inspection of overall levels of the antecedent events during the SDA (see Table 1) indicates that, in the tangible condition, tangible deprivation was in effect for 100% of the intervals; tangible items were never provided to Lyle contingent on problem behavior in the tangible (or any other) condition. Further, attention deprivation occurred in more than half (58%) of the intervals in the tangible condition. Thus, this condition resembled the attention condition. The presence of attention deprivation and contingent access to attention in the tangible condition likely accounts for the high rates of problem behavior.

Mitch

Mitch emitted the highest rates of aggression in the tangible condition of the analogue functional analysis, suggesting that problem behavior was maintained by access to preferred tangible items (Figure 4). In the SDA, Mitch emitted aggression primarily during the task condition, suggesting that aggression was maintained by escape from or avoidance of tasks. The conditional probabilities showed that the only consequence that occurred contiguous to problem behavior was escape from tasks. As shown in Table 1, tangible deprivation was in effect during a large proportion of the tangible sessions of the SDA, indicating that the relevant establishing operation was in effect (see further discussion below). Nevertheless, Mitch rarely emitted problem behavior in this condition, and when he did, it was not followed by tangible delivery. Further, prompts were presented in almost 70% of the intervals during the task condition, indicating that the relevant establishing operation also was in effect in the task condition.

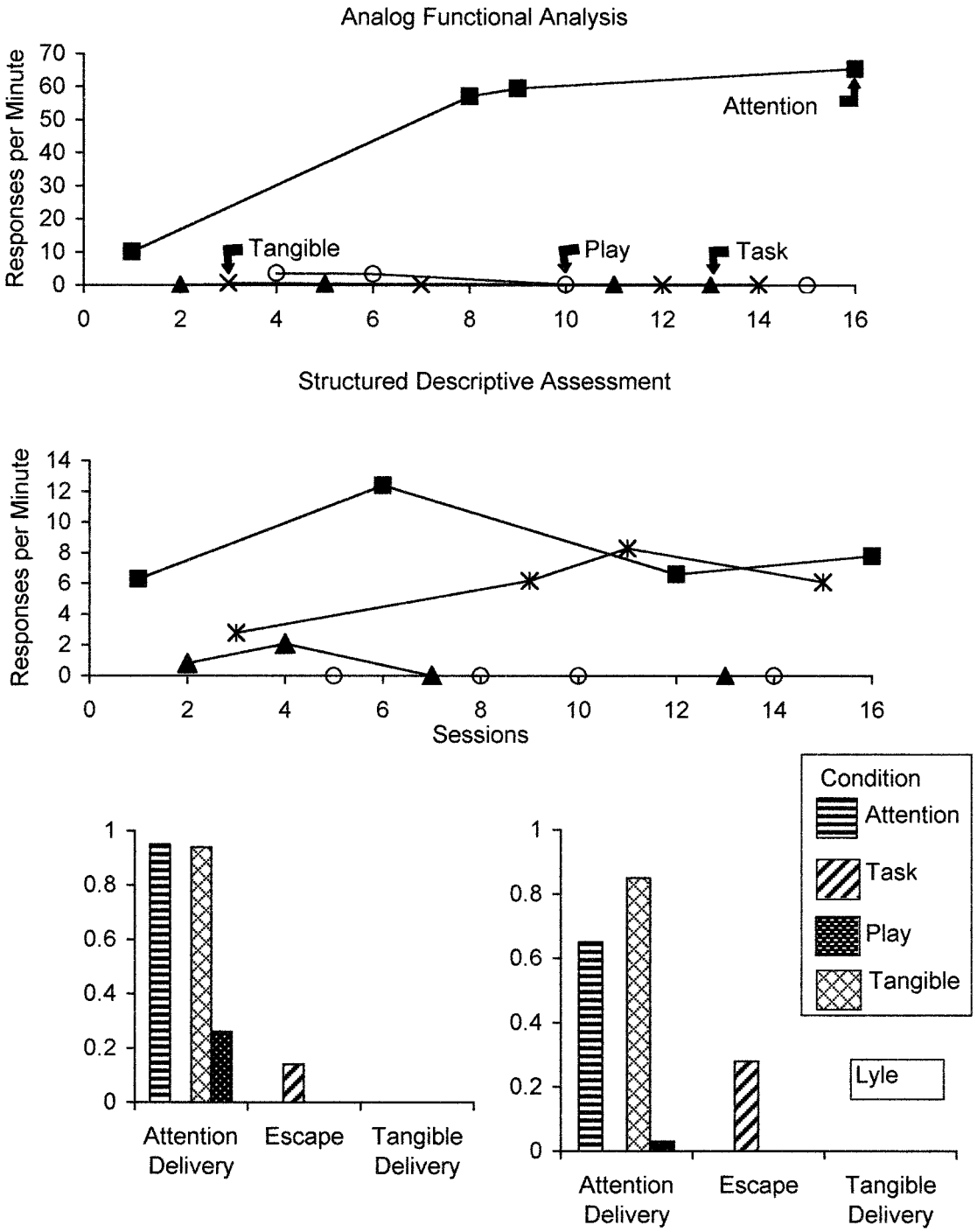

Figure 3. Mean response rate in the analogue functional analysis for Lyle (top panel); mean rate of problem behavior across conditions of the SDA (middle panel); proportion of event intervals following problem behavior (bottom left panel); and proportion of problem behavior intervals preceding events (bottom right panel) during the SDA.

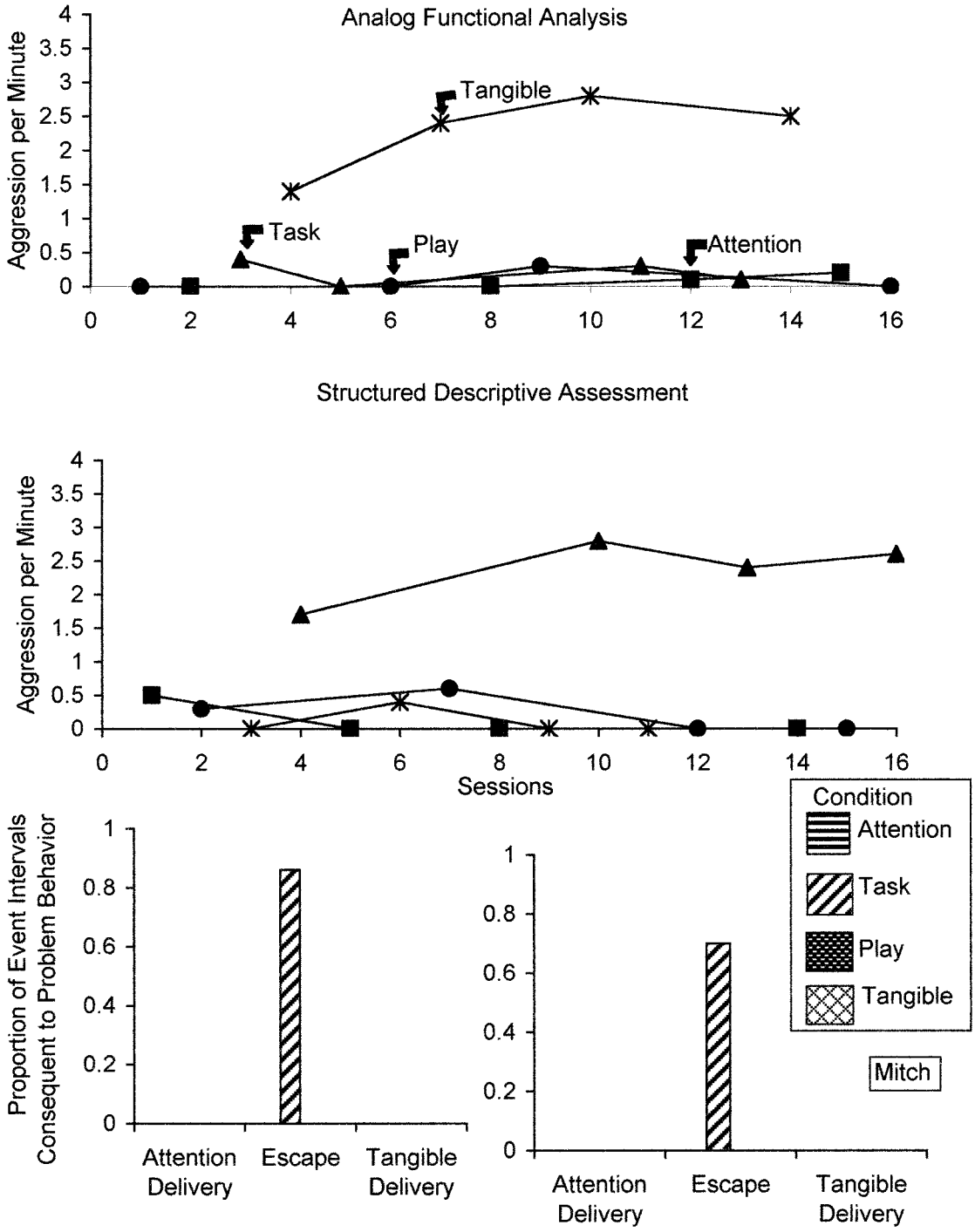

Figure 4. Mean response rate in the analogue functional analysis for Mitch (top panel); mean rate of problem behavior across conditions of the SDA (middle panel); proportion of event intervals following problem behavior (bottom left panel); and proportion of problem behavior intervals preceding events (bottom right panel) during the SDA.

Control over Antecedent Variables

The data presented in Table 1 suggest that therapists implemented antecedent conditions in the SDA with a high degree of integrity; that is, relevant establishing operations were in effect. In fact, levels closely resembled those observed in the analogue functional analysis, during which presentation of antecedents was tightly controlled. In the attention condition, therapists never issued instructional prompts or manipulated preferred tangible items, and attention deprivation was in effect for a large portion of the sessions. In the task condition, prompts occurred in the majority of intervals for all participants, and preferred tangible items were never manipulated. In the tangible condition, tangible items were never re-presented after the session began for all participants except Jane. Thus, tangible deprivation was in effect for all intervals scored. During the tangible condition, none of the therapists issued instructional prompts, and attention deprivation was scored in the majority of intervals for all participants. This finding suggested that the tangible condition resembled the attention condition. In the play condition, therapists never issued instructional prompts (with the exception of Drew's mother, who issued prompts in 9% of intervals), and tangible deprivation did not occur. Attention deprivation occurred in less then 25% of intervals for all participants.

STUDY 2: TREATMENT

Method

Participants and Setting

Drew, Lyle, and Mitch participated. Jane did not participate because the frequency of her SIB decreased markedly shortly after completing the assessments and, as a result, her parents declined treatment. Intervention for Drew was conducted in his home during speech therapy sessions. Drew's speech therapist served as the therapist. Drew's mother implemented the intervention outside session times, but she declined to participate in the study because the presence of observers reportedly made her nervous. Lyle's treatment was conducted in the classroom, and his primary teacher served as therapist. Mitch's assessment was conducted at the end of the academic year, and he began the next school year in a new class. Thus, the treatment evaluation took place in a new classroom for typically developing children. A teacher's aide implemented the intervention during sessions.

Response Measurement and Interobserver Agreement

Response definitions for problem behaviors were identical to those in Study 1. Sessions were 10 min long and were conducted one to three times per day, two to four times per week. Observers used frequency recording to collect data during sessions. Interobserver agreement was assessed on child behaviors during at least 30% of all sessions. Agreement coefficients were calculated as in Study 1. Mean percentage agreement across baseline and treatment was 98% (range, 91% to 100%), 93% (range, 88% to 100%), and 93% (range, 82% to 100%) for Drew, Lyle, and Mitch, respectively.

Procedure

For each participant, intervention was matched to the functions of problem behavior as identified via the analogue functional analysis and SDA. For Drew and Lyle, both assessments suggested similar hypotheses, so only one intervention was implemented. The assessments suggested contrasting hypotheses for Mitch; however, an intervention based on access to tangible items was not evaluated in the classroom because his teacher reported that problem behavior occurred only when Mitch was working on tasks at

his desk, not when tangible items were removed. Thus, it was not possible to fully evaluate the intervention suggested by the analogue functional analysis (intervention based on responding maintained by access to preferred tangible items). However, when follow-up observations were conducted at summer camp approximately 21 months after the intervention was completed, Mitch's camp director indicated that Mitch had difficulty sharing his trains with others. As a result, follow-up data were collected during two situations: a task situation, during which Mitch worked on word recognition tasks, and a social skills situation, which focused on sharing toys with peers.

All data for each participant were collected at times problem behavior was reported to occur (during therapy sessions for Drew, throughout the day for Lyle, and during table work times for Mitch). An ABAB design was used to evaluate treatment effects with both Drew and Lyle. An ABC design was used with Mitch because, although his teacher had agreed to a brief return to baseline prior to implementing intervention, she was unwilling to do so once the intervention had actually been implemented.

Drew. Data were collected when Drew was working on match-to-sample and receptive language tasks, which were identified by the speech therapist as tasks that evoked problem behavior most often. During baseline, the therapist was instructed to respond as she normally did when problem behaviors occurred. If the therapist ceased to deliver instructional prompts for 2 consecutive minutes in the absence of problem behavior, she was asked to reinitiate prompting. Intervention consisted of escape extinction combined with praise and brief (10 s to 30 s) breaks contingent on compliance. Drew's speech therapist also was taught to use a sequential prompting procedure, consisting of verbal, gestural, and physical prompts. If Drew emitted a problem behavior, the therapist immediately physically guided him to complete the task.

Lyle. Sessions were conducted throughout the academic day, but occurred most often when Lyle was not working on academic tasks (e.g., play time). During baseline, Lyle's teacher was asked to respond to problem behavior as she normally did; however, if she interacted with Lyle in a noninstructional manner (i.e., did not prompt him to complete tasks) for 2 consecutive minutes in the absence of problem behavior, she was asked to stop. Intervention consisted of differential reinforcement of other behavior. The teacher was taught to periodically praise Lyle when he was not emitting problem behavior and to ignore instances of problem behavior. Although an attempt was made to have the teacher set a timer to indicate when to deliver praise (based on mean rate of responding in baseline), she indicated that this would be too difficult. Thus, she simply delivered praise periodically throughout the day during times that Lyle was not engaging in problem behavior. On average, the teacher delivered verbal praise once every 2 min.

Mitch. Sessions were conducted when Mitch was expected to be working at his desk. During baseline, Mitch's aide was asked to respond to problem behavior as she typically did. Intervention consisted of escape extinction and differential reinforcement of appropriate behavior. The aide stood behind Mitch, positioning herself at least 1 m from him. If Mitch began to turn his head away from the teacher or the materials in front of him, the aide moved forward and prompted him back to work using a sequential three-step verbal prompting procedure. When Mitch began to work independently, the aide moved away. In addition, Mitch was provided periodic 20-s breaks for working appropriately, during which he was allowed to walk away from his desk with his aide. The aide typically hugged Mitch and engaged him in a brief activity

(e.g., playing "rock, scissors, paper") during breaks. Initially, breaks occurred once every 2 min, but breaks were faded over time until they were occurring once every 5 min.

Follow-up data were obtained with Mitch at a summer program approximately 21 months after the intervention was completed. Data were collected during two situations: a task situation, during which Mitch worked on word recognition tasks, and a social skills situation, which focused on sharing toys with peers. During the latter situation, a toy train was used and Mitch was expected to allow a peer to play with the train when the peer requested to do so. Mitch could have the train back if he stated, "train please." Mitch's camp director indicated that initially this situation evoked high rates of problem behavior (providing anecdotal support for the hypothesis obtained in the analogue functional analysis), but that a combination of escape extinction for problem behavior combined with differential reinforcement for manding had resulted in substantial decreases in problem behavior. Thus, during follow-up, treatments based on both assessments were used.

Results

Results obtained for each participant are shown in Figure 5. In baseline, Drew emitted an average of 3.6 problem behaviors per minute. Intervention resulted in significant decreases in problem behavior, and a reversal to baseline conditions was implemented to assess functional control. During the return to baseline, Drew's therapist was instructed to no longer implement physical guidance upon occurrence of problem behavior, but instead to respond as in baseline. Following reimplementation of escape extinction, rates of problem behavior once again decreased, and a mean reduction of over 90% below baseline rates was achieved.

Lyle emitted an average of 7.8 problem behaviors per minute in baseline. Intervention also resulted in significant reductions in problem behavior, and a reversal was conducted to demonstrate functional control. During the final phase of intervention, Lyle averaged 0.8 responses per minute, slightly greater than a 90% reduction over baseline.

Intervention for Mitch also resulted in significant reductions in problem behavior. In fact, Mitch did not emit any instances of problem behavior during the last eight sessions conducted prior to follow-up. During follow-up, he continued to emit low rates of problem behavior during work periods. In addition, he used a mand to request trains, averaging 0.7 mands per minute during follow-up sessions.

GENERAL DISCUSSION

For 3 of 4 participants, results of the analogue functional analysis and SDA led to similar hypotheses about the function of problem behavior. Findings from the SDA also were helpful for developing effective interventions for 2 of the 3 children who participated in Study 2. Results for Mitch, however, suggested that both assessments were necessary to identify all variables that were functionally related to problem behavior and to develop an intervention that would be effective in all relevant contexts. Thus, the findings of this study suggest that the SDA may be useful as a substitute for or an adjunct to the analogue functional analysis.

For Drew and Jane, evaluation of overall levels of problem behavior across conditions of the SDA and the analogue functional analysis resulted in similar hypotheses about the function of problem behavior. Examination of overall rates in the SDA conducted with Lyle would have led to identification of an irrelevant function (access to tangible items). It was necessary to analyze conditional probabilities to identify the function of his problem behavior. A comparison of results obtained with Mitch from the two

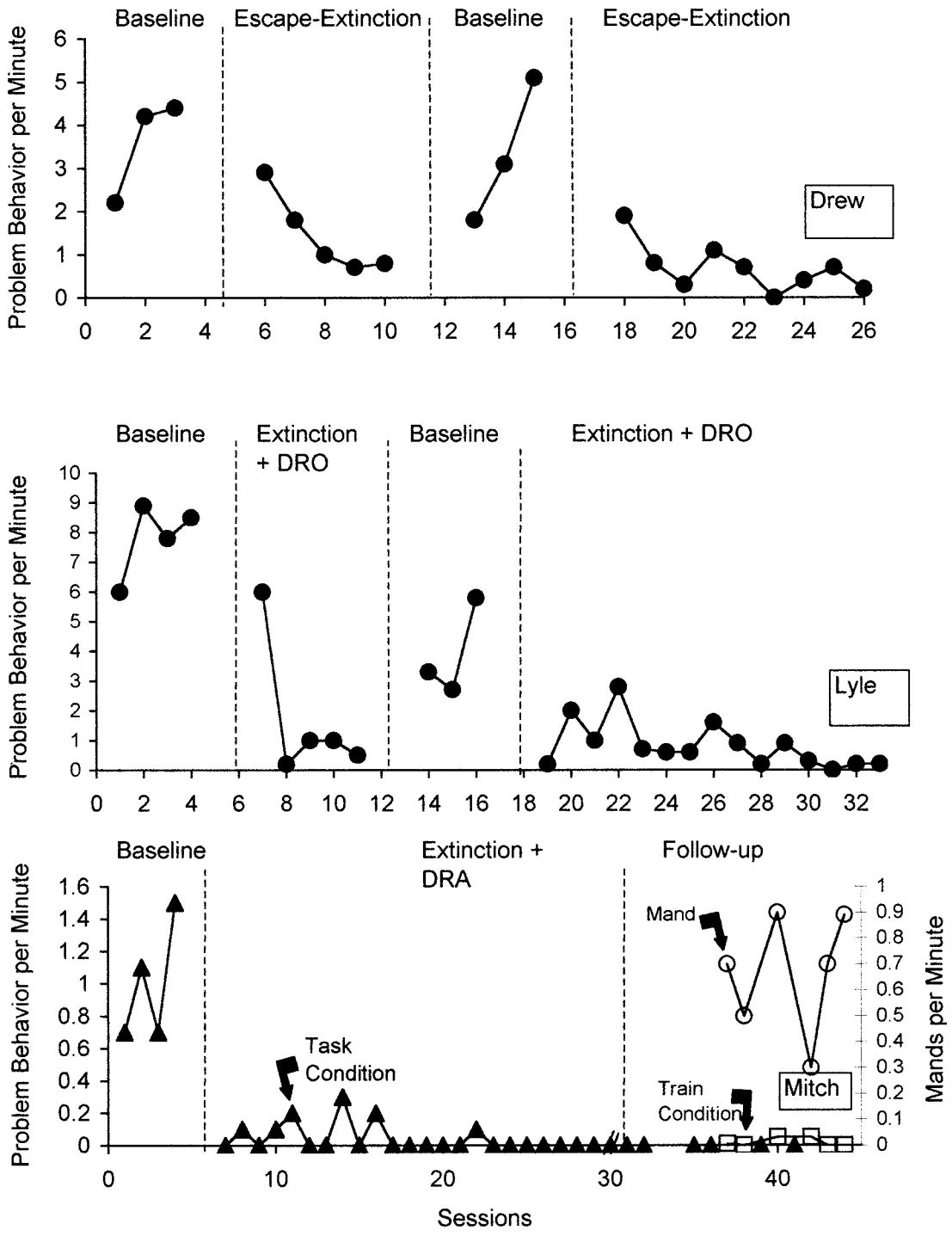

Figure 5. Mean rate of problem behavior during the intervention for Drew (top panel), Lyle (middle panel), and Mitch (bottom panel). On Mitch's graph, closed triangles represent aggression per minute in work settings, open squares represent aggression per minute in the train-sharing condition, and open circles depict mands emitted per minute.

assessments suggested that the SDA might have identified a functional relation that was not identified in the analogue functional analysis. Specifically, the SDA suggested that tasks often evoked problem behavior and that, in the presence of tasks, problem behavior was maintained by escape from or avoidance of tasks. Conversely, results also indicated that the analogue functional analysis identified a functional relation that was not identified in the SDA—that problem behavior might have been maintained by access to tangible items.

Anecdotal information provides some possible reasons for the discrepancies between the findings of the analogue functional analysis and the SDA for Mitch. First, the prompting procedure used in the classroom (repeated verbal prompts issued quite rapidly) was markedly different than that used in the analogue functional analysis. It is possible that an escape function would have been identified if a prompting strategy more similar to that used in the classroom had been used in the analogue functional analysis. With regard to the tangible function identified in the SDA, upon removal of the tangible item during the tangible condition of the SDA, Mitch's teacher immediately engaged him in another activity, so as to distract him from the loss of the item. It is possible that tangible removal did, at one time, evoke problem behavior (supporting the results of the analogue functional analysis), but that she had developed an effective antecedent intervention with which to decrease the likelihood of problem behavior.

Results of Study 2 suggested that the SDA may be useful when the goal of assessment is to design effective treatments. One potential advantage of the SDA is that it is not necessary to remove the individual from his or her natural environment or disrupt his or her routine. Thus, the utility of the SDA may prove beneficial for practitioners who are not able to conduct analogue functional analysis. The SDA might also be useful in providing information about reinforcement contingencies in the natural environment (e.g., schedules of reinforcement, stimuli that commonly follow problem behavior). For example, with the exception of Jane, tangible items were never delivered contingent on problem behavior. Thompson and Iwata (2001) evaluated naturally occurring response–consequence relations and also found infrequent presentation of tangible items following problem behavior. Future research should examine the extent to which procedures in the tangible condition of the analogue functional analysis replicate naturally occurring events.

Further refinements and evaluation of the SDA are needed to examine the extent to which the SDA can augment or be used as an adjunct to analogue functional analysis. First, research should evaluate the external validity of the SDA and analogue functional analysis. One strategy for doing so would be to conduct the SDA and the analogue functional analysis and then implement intervention evaluations using baselines matched to hypothesized functions of problem behavior. Research also is needed to evaluate the extent to which the SDA might be used to develop relevant hypotheses without determining conditional probabilities. A reasonable next step would be to conduct the SDA with more participants and to evaluate the results obtained from examining overall response patterns compared to conditional probabilities, and then conducting treatment evaluations to evaluate the utility of discrepant hypotheses.

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STUDY QUESTIONS

1. What limitations of descriptive analysis methodology were noted by the authors, and how might the structured descriptive analysis (SDA) address these limitations?

2. Describe some of the similarities and differences between the functional analysis and the SDA.

3. Briefly describe the SDA conditions and the purpose of each condition.

4. Why did the authors calculate conditional probabilities? What was the difference between the two types of calculations?

5. Summarize the results obtained from the functional analysis and the SDA.

6. How did the authors explain discrepancies between results of the functional analysis and the SDA for Lyle and Mitch?

7. Briefly describe the treatments evaluated for each participant.

8. What appears to be the major advantage and disadvantage of the SDA relative to the functional analysis?

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