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# *FUNCTIONAL ANALYSIS AND TREATMENT OF PROBLEM BEHAVIOR IN EARLY EDUCATION CLASSROOMS*

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We conducted functional analyses (FA) with 4 typically developing preschool children during ongoing classroom activities and evaluated treatments that were based on FA results. Results of each child's FA suggested social-positive reinforcement functions, and differential reinforcement of alternative behavior plus time-out was effective in decreasing problem behavior and increasing appropriate behavior. We discuss the utility of classroom-based FAs and potential compromises to experimental control.

*Key words:* preschool children, functional analysis, function-based treatment, problem behavior, classroom

Typically developing young children sometimes display problem behaviors such as tantrums, aggression, and disruption (Briggs-Gowan, Carter, Skuban, & Horwitz, 2001; Webster-Stratton, 1997). Although often considered developmentally transient, such behavior may persist and interfere with the development of appropriate social and communicative behavior (Briggs-Gowan, Carter, Bosson-Heenan, Guyer, & Horwitz, 2006; Campbell, Shaw, & Gilliom, 2000). Therefore, early identification, assessment, and treatment of these problems may be important factors in children's future success.

Although functional analysis (FA) methodology has been replicated successfully and extended across various behaviors, populations, and settings, Hanley, Iwata, and McCord (2003) found that only 12% of the studies they reviewed targeted the behavior of typically developing children. Solnick and Ardoin (2010) reported that 35% of the school-based FAs they reviewed targeted typically developing children, but noted that only 15.7% of classroom-based FAs were conducted in preschools. These data suggest that typically developing young children who engage in problem behavior in early education settings represent a relatively understudied area in the assessment and treatment of problem behavior. Given potential challenges to conducting FAs in classroom environments (e.g., uncontrolled sources of influence), it is unclear whether FAs conducted during ongoing classroom activities can accurately predict responses to treatment for problem behavior displayed by preschoolers. Therefore, the purpose of the current study was to conduct FAs of problem behavior with typically developing children in preschool classrooms and to validate assessment results by evaluating treatments based on the identified functions of problem behavior.

## METHOD

### *Subjects and Setting*

Four typically developing children from a university-based preschool program participated. The children were nominated by their teachers, who observed that they engaged in higher levels of (or higher intensity) problem behavior than their peers. Dillon (2 years old)

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and Missy (1 year 4 months old) engaged in aggression. Doug (4 years old) and Jim (1 year 9 months old) engaged in aggression and property destruction. Sessions were conducted in each child's classroom. Classroom teachers were undergraduate students who were fulfilling practicum requirements in early childhood education. Sessions occurred during regularly scheduled activities such that subjects engaged in the ongoing activities with the other children in the classroom.

*Response Measurement and Interobserver Agreement*

Graduate student therapists (classroom supervisors) conducted all sessions, which lasted 10 min and were divided into 10-s intervals. Undergraduate research assistants collected data on the frequency of *aggression* (behavior that could result in injury to another individual, e.g., hitting, pushing, hair pulling, biting) and *property destruction* (inappropriate use or damage of materials, e.g., throwing, banging, or ripping objects). Functional play (e.g., banging a hammer) and object mouthing were not scored as property destruction. During treatment sessions, data were collected on the frequency of *independent mands*, defined as vocal requests for the putative reinforcer.

A second observer independently collected data on aggression, property destruction, and independent mands (treatment only) during 35% of FA sessions and 22% of treatment sessions. An agreement was defined as both observers recording the same number of responses in a 10-s interval. Interobserver agreement coefficients were calculated using the proportional agreement method in which the smaller number of responses was divided by the larger number of responses within each interval. These fractions were then summed and divided by the total number of intervals; the result was converted to a percentage. Across subjects, mean agreement was 99.9% (range, 94% to 100%), 97% (range, 70% to 100%), and 94% (range, 75% to 100%) for aggression, property destruction, and independent mands, respectively.

*Functional Analysis*

The assessment consisted of four test conditions (ignore, attention, demand, and tangible) and one control condition (play) initially arranged in a multielement design. We used different-colored shirts, different therapists, presession statements that described antecedent conditions, and a fixed-order presentation of conditions (ignore, attention, play, demand, and tangible) to facilitate differential responding. However, pairwise or an extended series of ignore sessions were used to clarify undifferentiated responding for Missy, Doug, and Jim. Classroom teachers were instructed to minimize their interactions with subjects and allow the therapist to implement session contingencies. However, teachers blocked aggression directed toward other children and repositioned children to ensure safety (if necessary).

During the ignore condition (Doug and Jim), the therapist said, "I'm wearing the [color] shirt; I can't play now" and ignored all behavior displayed by the target child (while interacting continuously with the other children). During the attention condition, the therapist said, "I'm wearing the [color] shirt; I'll be over here playing with your friends" and interacted continuously with the other children (minimizing interaction with the target child). Problem behavior resulted in brief attention (e.g., statements of concern or disapproval) from the therapist. All other responses were ignored. During the play (control) condition, the therapist said, "I'm wearing the [color] shirt; let's play together," allowed access to all play items, and interacted continuously with the target child, refraining from instruction delivery. Problem behavior was ignored. During the escape condition, the therapist said, "Look, I'm wearing the [color] shirt; it's time to follow directions" and presented instructions (commonly embedded during classroom play activities) using a graduated three-step prompt procedure.

Compliance resulted in brief praise. Problem behavior resulted in a 30-s break from instructions. All other responses were ignored. During the tangible condition, the target child had access to classroom play items for 2 min prior to the start of session. Subsequently, the therapist removed items from the child's immediate vicinity and said, "I'm wearing the [color] shirt; it's my turn to play with your toys." Access to play items was blocked, but other children were allowed to interact with the items. Problem behavior resulted in 30-s access to play items. All other responses were ignored.

*Treatment*

Results of the FA showed that problem behavior was maintained by social-positive reinforcement for all subjects (attention for Missy, Doug, Jim; attention and tangible items for Dillon). Treatment consisted of differential reinforcement of alternative behavior (DRA) combined with either extinction (EXT) or time-out. A reversal design was used to evaluate treatment in the attention context for Missy, Doug, and Jim. A multiple baseline design across behavioral functions (attention and tangible) was used to evaluate the effects of treatment for Dillon. Presession statements describing session contingencies (e.g., "If you hurt your friends or toys, I can't play with you; but, if you say 'play with me,' we can play together.") were used to facilitate discrimination and to model the alternative response (mand).

Data from the FA attention and tangible sessions served as initial baseline data, although additional sessions were conducted with Dillon. In DRA plus EXT (Missy, Doug, and Jim), mands for attention ("play with me") resulted in brief attention (verbal praise) from the therapist and problem behavior was ignored. In addition, the therapist prompted the subject to mand (i.e., "Remember to ask for attention") every 60 s in which no independent mands occurred. Mands that occurred within 5 s of a prompt were not scored as independent. In the tangible context (Dillon), the DRA procedure consisted of providing 30-s access to play items contingent on mands for tangible items ("toys please"). Prompts to mand were delivered every 60 s in which no independent mands occurred. In DRA plus time-out, the DRA component was identical to previous DRA procedures, although problem behavior resulted in a 1-min time-out. The child was guided away from (but near) the play area and was required to sit facing the area without access to toys or attention, and problem behavior was ignored. Implementation of DRA plus time-out by the teachers was evaluated for Missy, Doug, and Jim.

## RESULTS AND DISCUSSION

Functional analysis results (Figure 1) suggested that problem behavior was maintained by social-positive reinforcement for all subjects. Although undifferentiated responding occurred during the multielement phase for Missy, Doug, and Jim, the children engaged in differentially higher levels of problem behavior in the attention condition relative to the play condition in subsequent pairwise and extended alone phases of the FA. Differential responding in the attention and tangible conditions was observed during the multielement evaluation for Dillon.

Treatment results for Missy, Doug, and Jim (Figure 2) showed DRA plus EXT was ineffective in maintaining low rates of problem behavior. However, low rates of problem behavior and consistent rates of independent mands were observed during DRA plus time-out. Nevertheless, DRA plus time-out was not effective when implemented by the teachers. Analysis of treatment integrity data (based on errors of omission) showed moderate levels of DRA integrity (range, 26% to 85%) and low levels of time-out integrity (range, 0% to 67%). In situ training (prompting and feedback) for Missy's and Jim's teachers produced increases in treatment integrity, and resulted in decreased rates of problem behavior. Training was not conducted with Doug's teachers due to time constraints.

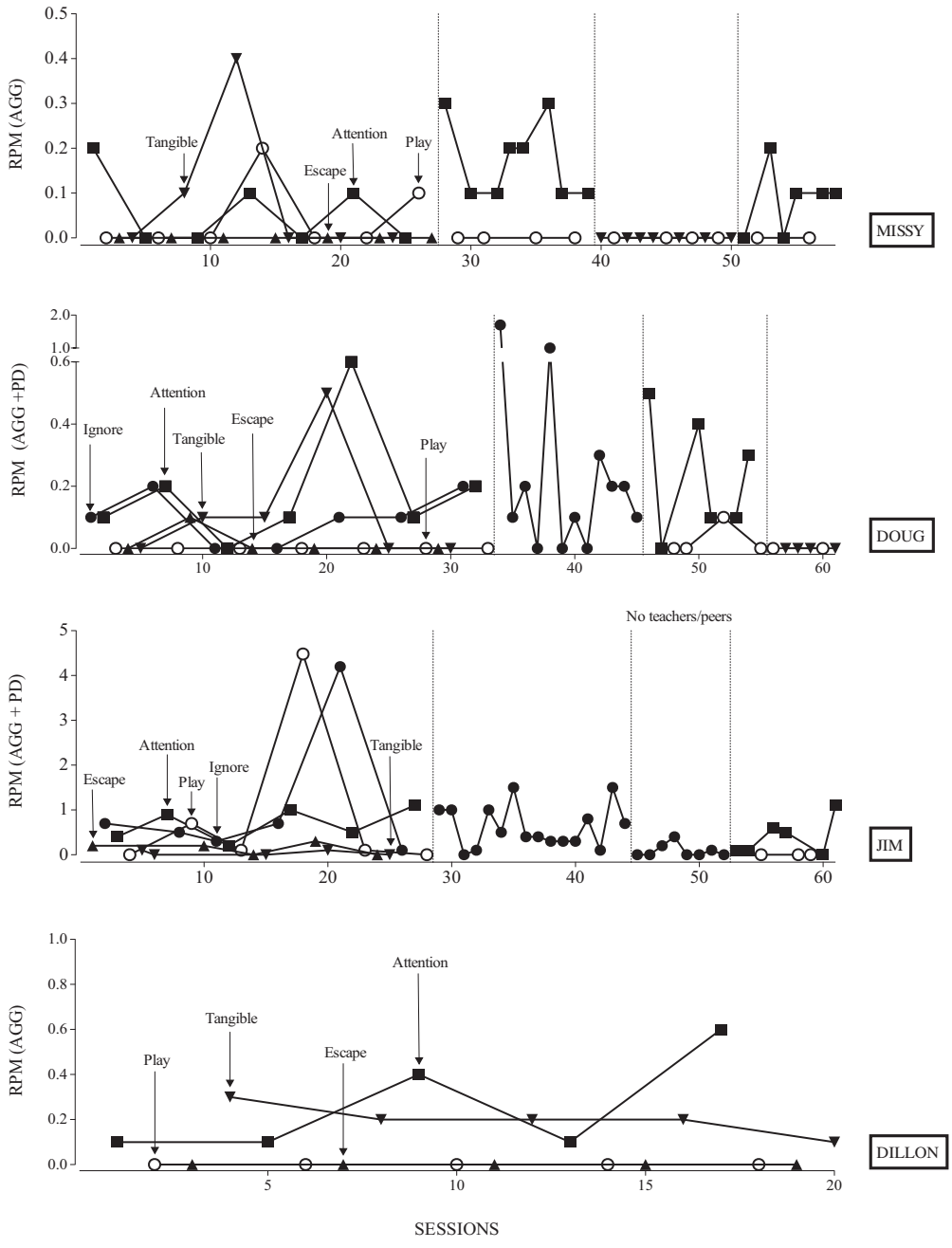


Figure 1. Responses per minute of aggression (Missy and Dillon) or aggression and property destruction (Doug and Jim) during the functional analysis.

Given the ineffectiveness of DRA plus EXT with Missy, Doug, and Jim, only DRA plus time-out was evaluated for Dillon (Figure 3). Moderate to high rates of aggression occurred during baseline in both the attention and tangible conditions. In the attention condition, DRA plus time-out resulted in low rates of aggression and high rates of mands. In the tangible context,

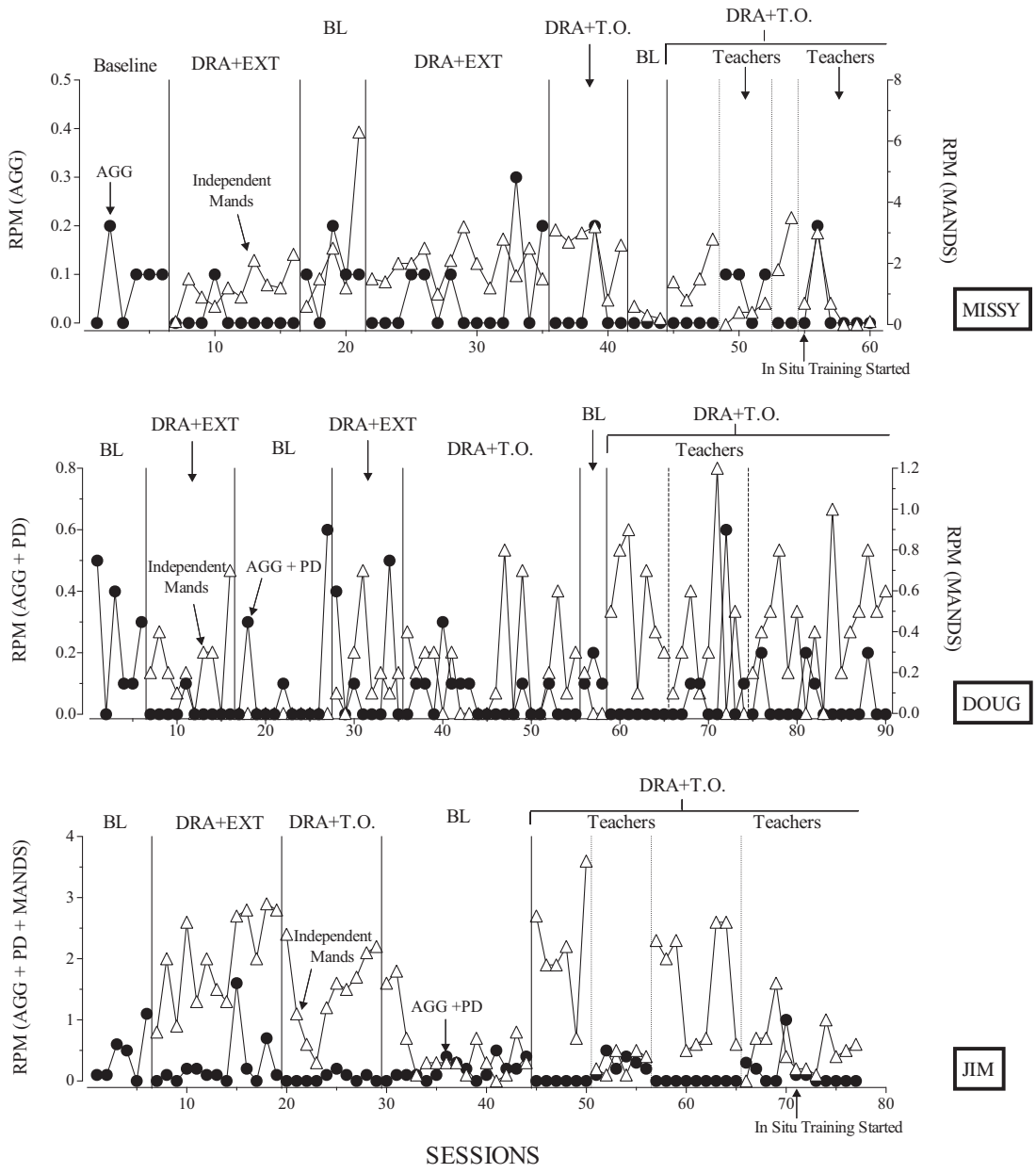


Figure 2. Responses per minute of problem behavior and independent mands across baseline, DRA plus EXT, and DRA plus time-out (T.O.) for Missy, Doug, and Jim. Data on independent mands are scaled to the right *y* axis for Missy and Doug.

we observed an increase in aggression during baseline that was correlated with the introduction of treatment in the attention condition. However, DRA plus time-out produced decreases in aggression and high rates of mands for tangible items. Time constraints prevented evaluation of teacher-implemented treatment.

Overall, results suggest that FAs can be conducted with typically developing young children in the context of preschool classrooms.

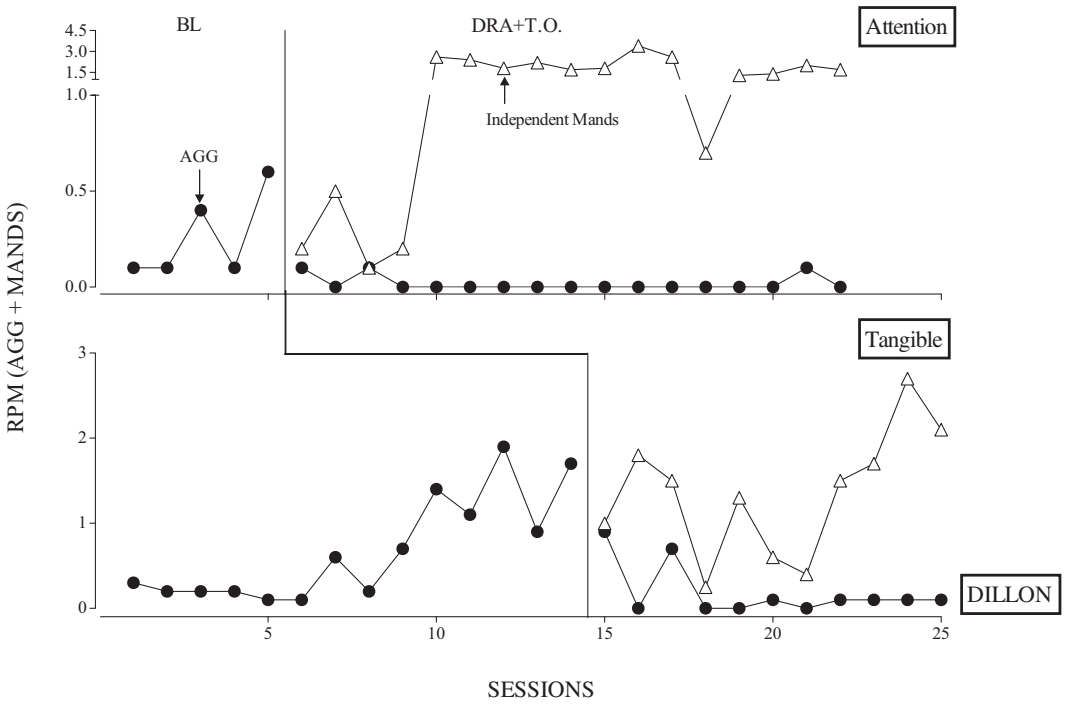


Figure 3. Responses per minute of aggression and independent mands across baseline and DRA plus time-out for Dillon.

However, several limitations warrant discussion. First, DRA plus EXT was ineffective for all children with whom it was implemented, potentially due to (a) insufficient exposure to extinction, (b) degradations in treatment integrity (e.g., changes in the magnitude, quality, or latency of therapist attention when mands occurred), or (c) uncontrolled sources of influence in the classroom. For example, for all subjects, the likelihood of attention from peers following problem behavior (i.e., conditional probability) was often higher than the overall likelihood of peer attention (i.e., unconditional probability) during FA and treatment sessions (data available from the second author). This uncontrolled source of potential influence may have minimized the effectiveness of DRA plus EXT and limited the degree of internal validity. Future research might focus on more direct evaluations of the role of peer attention, as it is unclear whether training very young peer confederates to respond differentially to problem behavior is feasible (or advisable). We did not include a direct test for peer-mediated reinforcement during the FA because the children were extremely young. However, if peer attention is likely an influential variable, perhaps reinforcement could be arranged for young peer confederates who provide noncontingent (continuous) attention to the subject or who ignore the subject's target problem behavior during the functional analysis.

Second, DRA plus time-out treatment integrity by the teachers was surprising low prior to in situ training. This raises questions about the integrity with which teachers implemented classroom management protocols (which included DRA and time-out) prior to the study. If integrity was low, supplemental training may have increased integrity and resulted in decreased problem behavior, circumventing the need to

conduct the FA. Researchers and clinicians might consider analyzing treatment integrity by teachers with respect to ongoing classroom management strategies as a first step in the functional assessment of young children's problem behavior.

Finally, each child's FA required a protracted number of sessions and multiple experimental design arrangements that may not be feasible in most early childhood settings. In many child-care settings, especially those in which resources are limited, the complexity of and time required to conduct an FA in the classroom may be too difficult or effortful. In these cases, modified FA methods such as brief (Northup et al., 1991), trial-based (Bloom, Iwata, Fritz, Roscoe, & Carreau, 2011), or precursor analyses (Najdowski, Wallace, Ellsworth, MacAleese, & Cleveland, 2008) may be reasonable alternatives.

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