*TRIAL-BASED FUNCTIONAL ANALYSIS AND FUNCTIONAL
COMMUNICATION TRAINING IN AN EARLY CHILDHOOD SETTING*

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Problem behavior is common in early childhood special education classrooms. Functional communication training (FCT; Carr & Durand, 1985) may reduce problem behavior but requires identification of its function. The trial-based functional analysis (FA) is a method that can be used to identify problem behavior function in schools. We conducted trial-based FAs and FCT with 3 children in an early childhood special education setting. All trial-based FAs resulted in identification of behavioral functions, and subsequent FCT led to reductions in problem behavior and increases in communication.

Key words: functional analysis, functional communication training, problem behavior, school-based intervention

Problem behavior is a concern in early childhood special education (Campbell, 1995). One particularly effective treatment strategy consists of a two-step sequence that involves (a) identification of the reinforcers that maintain problem behavior via a functional analysis (FA; Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994), and (b) provision of the reinforcers differentially, contingent on appropriate communication (i.e., functional communication training [FCT]; Carr & Durand, 1985).

Functional analysis of problem behavior (Iwata et al., 1982/1994) provides the best method for identifying reinforcers that are functionally related to problem behavior. However, these procedures may require adaptation for use in some settings. One recent adaptation to the traditional FA is the trial-based FA (Bloom, Iwata, Fritz, Roscoe, & Carreau, 2011; Sigafoos & Saggers, 1995). This

adaptation may be especially useful for early childhood settings because it can be conducted in a format that allows brief assessment trials embedded into regularly scheduled classroom activities throughout the day.

To date, no research has demonstrated that teachers using trial-based FAs can assess and treat problem behavior using a function-based intervention in an early childhood setting. Thus, the purpose of this study was to evaluate whether FCT based on a teacher-conducted trial-based FA resulted in problem behavior reduction and appropriate request increase.

METHOD

Subjects and Setting

Two girls (Chris and Pat) and one boy (Danny) (3 to 4 years old) who had been diagnosed with a developmental delay and were receiving special education services served as subjects. Chris communicated using gestures, picture cards, and one-syllable vocalizations and received speech, occupational, and physical therapy. Pat communicated using one-word phrases and picture cards and received speech therapy. Danny communicated using gestures

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and picture cards and received speech therapy. An itinerant special education teacher (working on a masters degree in special education) served as the therapist during the trial-based FAs and FCT. She read Bloom *et al.* (2011), received copies of session descriptions, and participated in a 1-hr training session that consisted of reviewing the session descriptions, role-playing trials, and receiving performance feedback until she performed without errors for each trial type.

The study was conducted at a preschool center that the subjects attended 3 hr per day, 2 days per week. Each subject spent 45 min in a general education classroom and the remainder of the time in a special education classroom. Trial-based FAs were conducted in special education classrooms. FCT was conducted in both classrooms.

Response Measurement

The special education teacher was the primary data collector for all components of this study. Trial-based FA data were collected on the occurrence or nonoccurrence of problem behavior during each trial segment and were expressed as a percentage of trials with problem behavior. Data on the frequency of problem behavior and alternative responses were collected during FCT. Both were converted to rate.

Chris and Danny engaged in aggression, which was scored any time an instance of hitting, pushing, biting, scratching, or pinching was observed. Pat engaged in tantrums, which was scored any time an instance of screaming, shouting, whining, stomping, kicking, throwing, or hiding under tables (which had a 5-s criterion) was observed. An alternative response was scored any time a subject independently touched the therapist with a picture card (Chris and Danny) or vocally requested (Pat) a functional reinforcer (as identified by the trial-based FA).

Reliability

Paraprofessionals trained to collect data served as reliability observers for 35% of all trials and for 28% of all sessions. We calculated reliability for FA trials by comparing the two

observers' trial segment occurrence data and dividing the number of segments with agreement by the total number of segments and multiplying by 100%. Reliability was 100%.

FCT sessions were divided into 1-min intervals. The frequency of problem behavior and alternative responses was recorded in each interval, and data records were compared across observers for agreement (interval by interval). Reliability was calculated by dividing intervals in which both observers scored the same number of responses by the total number of intervals in each session ($M = 93\%$; range, 83% to 100%).

Procedural Fidelity

Paraprofessionals served as fidelity observers and recorded correct consequences (e.g., discontinuing a segment contingent on problem behavior during a trial-based FA or providing a break contingent on a request during FCT) per opportunity during trial-based FA trials, baseline, and intervention sessions. Procedural fidelity was calculated by dividing the number of times the teacher provided a correct consequence by the total number of opportunities and multiplying by 100%. Fidelity was evaluated during 30% of all FA trials and averaged 92% (range, 88% to 100%). Trials in which the teacher believed that procedural fidelity was compromised were not included in the trial-based FA (but were included in the fidelity calculation). Fidelity was evaluated during 26% of all baseline and treatment sessions ($M = 96\%$; range, 93% to 100%).

Trial-Based FA

Trials (attention, escape, tangible, ignore) were conducted as described by Bloom *et al.* (2011), with two exceptions. First, only 10 trials of each type were conducted. Second, Bloom *et al.* used two control segments (one before and one after the test segment). We included only one control segment based on Bloom *et al.*'s findings that suggested a risk of carryover from test to control segments. Instead, control segments were conducted before test segments.

A multiple-stimulus without replacement preference assessment (DeLeon & Iwata, 1996) was conducted to identify highly (used in tangible trials) and moderately (used in attention trials) preferred items. Ten to 12 trials were conducted per week and were embedded into regularly scheduled classroom activities. For example, escape trials were conducted during work periods. Each trial consisted of a 2-min control segment (motivating operation absent) that was followed by a 2-min test segment (motivating operation present) except for the ignore trials, which consisted of two consecutive test segments that did not end if problem behavior occurred. Rather, they always continued the full 2 min, regardless of problem behavior, to determine if problem behavior persisted across both. However, if problem behavior occurred during a control segment for attention, escape, and tangible trials, the teacher provided no consequence but ended that segment and initiated the test segment. If problem behavior occurred during the test segment, the teacher delivered the putative reinforcer and the trial ended. If no problem behavior occurred, segments ended after 2 min. For example, attention trials began with a control in which attention was provided non-contingently. If problem behavior occurred, or if 2 min elapsed without problem behavior, then the test segment began, in which attention was provided only contingent on problem behavior. Ignore trials were not conducted for aggression (Chris and Danny), and tangible trials were conducted only when the teacher suspected a potential tangible function (Chris).

Intervention

A multiple baseline design across subjects was used to evaluate the effects of FCT. Sessions lasted 5 min and were conducted one to three times per day, three to six times per week. The same teacher who conducted the trial-based FAs conducted the sessions in the subjects' special education and inclusion classrooms.

Baseline. The antecedent and consequence used in baseline were the same as the test

segment of the trial-based FA for the condition associated with the highest level of responding. Contingent on problem behavior, the teacher provided the subject with brief access to the functional reinforcer. For example, if problem behavior was maintained by escape, demands were issued until problem behavior occurred, at which time the subject was allowed a 30-s break. After the break, the demands were re-presented.

FCT. An intervention was developed for each subject based on the results of the trial-based FA. Each intervention consisted of extinction for problem behavior and differential reinforcement of appropriate communication. At the start of each session, the teacher placed the picture card within reach of the subject and stated that the subject could ask for the functional reinforcer. Then, prompting was provided three to five times per session based on the frequency of subjects' independent responses. Prompting initially consisted of manual guidance to touch the teacher with a picture card while a vocal request was modeled and was faded to the vocal request alone. Prompts were eliminated (by Session 3, 4, or 5) based on the subjects' level of independent requesting and problem behavior. If the teacher was prompting the child to work, she briefly interrupted instruction to provide an FCT prompt. When a subject engaged in the FCT response (prompted or independent), the teacher delivered the reinforcer.

RESULTS AND DISCUSSION

Figure 1 displays the results of the trial-based FAs for all three subjects. Data were analyzed by comparing the percentages obtained during control segments to the percentages obtained during test segments. Responding in the ignore condition was analyzed by examining whether problem behavior occurred in, and persisted across, both test segments. Except for the ignore condition, functions were indicated when more problem behavior occurred during the test

Figure 1. Percentage of trials with problem behavior during control and test segments of each trial-based FA condition for Chris, Pat, and Danny.

Figure 2. Responses per minute of problem behavior and alternative responses during baseline and FCT for Chris, Pat, and Danny. FCT = functional communication training; EXT = extinction.

segments than in the control segments of any given condition. An automatic-reinforcement function would have been indicated if responding occurred and persisted across both segments of the ignore condition. The special education teacher identified and provided treatment only to address the function for which there was the largest degree of separation of problem behavior between control and test segments during the

trial-based FA. All other identified functions were addressed after this study.

Chris's problem behavior occurred in the test segments, and not in the control segments, of the attention, escape, and tangible conditions. These results suggested that aggression was sensitive to all three sources of reinforcement (attention, escape, and tangible). Problem behavior occurred at the highest level during the escape condition (test segment). This

context was selected for treatment. Pat's problem behavior occurred in the test segments, and not in the control segments, of the attention and escape conditions. These results indicated that both consequences maintained tantrums. Problem behavior occurred at the highest level during the escape condition (test segment). This context was selected for treatment. Danny's problem behavior occurred in the test segments of the attention and the escape conditions. However, problem behavior also occurred in the control segments of those conditions with differentiation apparent only in the attention condition. Thus, only an attention function was identified for Danny. This context was selected for treatment.

Figure 2 displays the results of FCT for all subjects. Problem behavior was high and stable, and no FCT responses were observed during baseline for all subjects. During intervention, all subjects acquired the FCT response and problem behavior decreased.

In all cases, the teacher was able to identify at least one function for problem behavior and successfully treated that function using FCT. These results demonstrated that interventions based on the outcome of teacher-conducted trial-based FAs could reduce problem behavior and increase appropriate communication in an early childhood setting. One limitation is that the study did not include interventions for all identified functions. Although the teacher did treat all functions successfully, we did not report those results because she did so in a less formal fashion than the methods we described. This study was an initial foray into this area, but future studies should examine the effectiveness of interventions for all functions identified by trial-based FAs. Also, the same teacher

conducted all of the trial-based FA-informed interventions. This teacher was pursuing an MS in special education and had taken a course in educational applications of applied behavior analysis, which could have influenced her proficiency in the use of trial-based FA and function-based intervention. Thus, the generality of these findings to other teachers or settings other than early childhood is unknown. These findings should be replicated in other settings and with other populations.

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