

*COMPARING FUNCTIONAL ANALYSIS AND PAIRED-CHOICE
ASSESSMENT RESULTS IN CLASSROOM SETTINGS*

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The results of a functional analysis of problem behavior and a paired-choice assessment were compared to determine whether the same social reinforcers were identified for problem behavior and an appropriate response (time allocation). The two assessments were conducted in classroom settings with 4 adolescents with mental retardation who engaged in severe problem behavior. Each student's classroom teacher served as the therapist for all phases of assessment. The two assessment procedures identified the same social reinforcers for problem and appropriate behavior for 3 of 4 participants.

DESCRIPTORS: functional analysis, paired-choice assessment, problem behavior, mental retardation, classroom

Functional analysis of problem behavior, as described by Iwata, Dorsey, Slifer, Bauman, and Richman (1982/1994), directly tests the effects of social reinforcers on problem behavior. The reinforcers identified via functional analysis can then be manipulated within function-based treatments to reduce problem behavior. Although the effectiveness of function-based treatments is well documented, there have been cases in which functional analysis has been precluded or compromised because of the nature of the

problem behavior. For example, Grace, Thompson, and Fisher (1996) worked with a young man whose self-injurious behavior was covert, making it difficult to deliver social reinforcers contingently. Piazza et al. (1997) reported difficulties in conducting and interpreting functional analysis conditions for elopement. In each study, concurrent-operants (choice) procedures were used to identify reinforcers for adaptive behavior, and these reinforcers were incorporated into a reinforcement-based treatment plan that reduced problem behavior.

The results of the choice assessments used in these studies were not compared to the results of functional analyses of problem behavior. As a result, it is unclear if the reinforcement-based treatments reduced problem behavior because the reinforcers identified through the choice assessment were of greater value than the reinforcers for problem behavior (Ringdahl,

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Vollmer, Marcus, & Roane, 1997; Shore, Iwata, DeLeon, Kahng, & Smith, 1997), or if both sets of behavior (appropriate and problem) were maintained by the same class of reinforcement and thus the reinforcement-based treatment matched the function of problem behavior. The primary purpose of this study was to determine if the same social events would be identified as reinforcers for problem behavior (functional analysis) and appropriate behavior (choice assessment), or if the two procedures would identify different social reinforcers. A secondary purpose was to conduct functional analyses and choice assessments in school settings using classroom teachers as therapists.

METHOD

Participants and Settings

Four students with moderate (Abby) to severe (Lyle, Jack, and Warren) mental retardation who engaged in severe problem behavior participated in the study. Abby, a 12-year-old girl, had been referred for noncompliance to requests and hitting others. Lyle (18 years old) and Jack (19 years old), had been referred for self-injury, aggression, and noncompliance. Warren, a 15-year-old boy, had been referred for aggression and property destruction.

All sessions were conducted in the participants' special education classrooms during regular school hours, with the classroom teacher serving as the therapist. The first and third authors provided coaching to the classroom teachers, and teacher associates assisted other students in the classrooms during the assessment sessions.

Data Collection, Dependent Variables, and Interobserver Agreement

Data were collected for problem behavior, engagement with stimuli, and allocation to each side of the classroom (choice evaluation only) using a 10-s partial-interval scoring system. *Problem behavior* was scored for any instance

of self-injury, aggression, destruction, or non-compliance to demands. *Engagement* was scored if the participant touched leisure or work materials with his or her hand or was facing or touching the teacher appropriately. Time allocation was scored according to the side of the room in which the participant was located. In the event a participant was in both sides of the room (choice evaluation) during one 10-s interval, the interval was scored for the side of the room in which the participant spent the most time during that interval. There were 20 instances in which a participant changed sides of the room during a session across the 30 choice assessment sessions.

Interobserver agreement was measured on a minimum of 47% of the sessions during both assessments. The number of occurrence agreements was divided by the number of agreements plus disagreements and multiplied by 100%. Interobserver agreement for problem behavior ranged from 80% to 100%, with a mean of 96% for the functional analysis and 90% for the choice assessment. Agreement for engagement during the choice assessment ranged from 79% to 100%, with a mean of 92%. Agreement for allocation during the choice assessment ranged from 97% to 100%, with a mean of 99.7%.

Experimental Design

The functional analysis was conducted using a multielement design. A concurrent-schedules design was used to evaluate each participant's allocation of time to the two sides of the room during the choice assessment. Functional analysis and choice sessions were interspersed across days for each student.

Procedure

Functional analyses (Iwata *et al.*, 1982/1994) included tests for attention, escape, tangible (Warren only), and ignore (Warren only) and a control condition (free play). All sessions lasted 5 min, and no more than two sessions of

Table 1
Paired-Choice Conditions

Choice	Alternative 1	Alternative 2
Attention and toys versus alone with nothing	Teacher and preferred leisure items (positive reinforcement)	Empty table (negative reinforcement)
Attention versus toys	Teacher (positive reinforcement)	Preferred leisure items (positive reinforcement)
Attention with task demands versus alone with nothing	Teacher and work task (positive reinforcement)	Empty table (negative reinforcement)
Attention with task demands versus alone with toys	Teacher and work task (positive reinforcement)	Preferred leisure items (negative and positive reinforcement)

one condition were conducted during each day's assessment.

A choice assessment was conducted to identify each participant's relative preferences among the social reinforcers evaluated in the functional analysis. The same reinforcers (i.e., teacher attention, preferred leisure materials, and escape from task demands) used for the functional analysis were made available within a paired-choice arrangement. For each choice session, two tables were placed 1 to 1.5 m apart at one end of the classroom. Stimuli associated with one alternative were placed on one table, and stimuli associated with the other alternative were placed on the other table (see Table 1). The student stood at midline in front of the tables at the start of each session, and the teacher provided a brief demonstration of the activity associated with each table. The choice was repeated verbally to the student approximately every 90 s. The student was allowed to cross back and forth between the two areas at any time within the session, but he or she was not allowed to take materials to the other area. The observers recorded on which side of the midpoint the student was standing for each interval. Standing on the midline was not scored (i.e., neither side was recorded).

Four choice conditions were conducted in a counterbalanced fashion with each student (see Table 1). In the first choice condition, the student chose between engaging in preferred leisure activities with the teacher (attention and toys) and sitting alone with nothing to do (alone). In the second choice condition, the

student chose between talking with the teacher without an activity present (attention only) and playing with preferred leisure items alone (alone with toys). The third choice was between working with the teacher (attention plus demand) and the alone condition. In the fourth choice condition, the choice was between attention plus demand and alone with toys. Each session lasted 5 min.

RESULTS AND DISCUSSION

The results for each student are displayed in Figures 1 through 4. With the exception of Abby, the results for the choice comparison are not presented in sequential order but are grouped according to choice conditions to allow visual inspection of trends within each choice condition.

The results of Abby's functional analysis (Figure 1) indicated that her problem behaviors functioned to escape task demands. Only one session of each choice condition was conducted with Abby, and she always selected the alone side of the room (i.e., she never selected the side of the room associated with teacher attention or demands). When toys were available on the alone side of the room, Abby engaged with the toys during 95% of intervals (see Table 2). No problem behavior was observed.

The results of Jack's functional analysis (Figure 2) indicated that his problem behaviors functioned to escape task demands. Like Abby, Jack almost always selected the alone side of the room (with or without leisure items) rather than

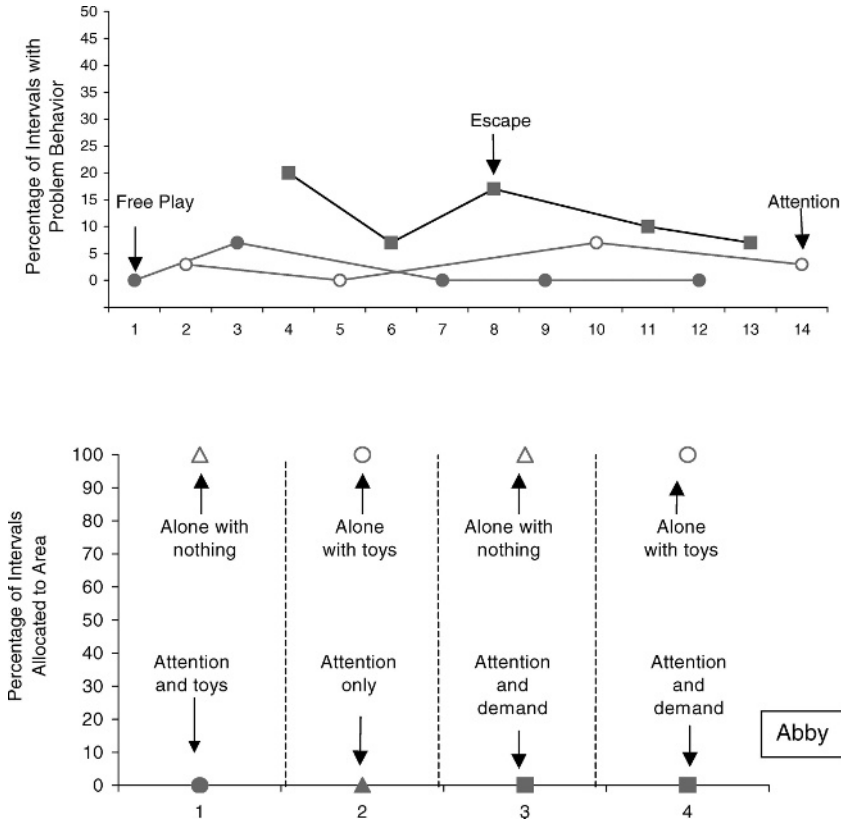


Figure 1. Percentage of intervals with problem behavior across functional analysis conditions (top); percentage of intervals present across choice conditions (bottom) for Abby.

the side with teacher attention. The exception to this pattern occurred during the attention plus toys versus alone condition; Jack sat with his teacher and preferred leisure items during most intervals. Of the intervals that Jack spent on the

side of the room that contained access to leisure materials, attention, or task demands, he engaged in the activity during 80% of intervals (range, 60% to 97%). Only three instances of problem behavior were observed across choice conditions.

Table 2
Percentage of Intervals with Alternative Stimuli

Concurrent-operants comparison	Alternative	Percentage of intervals participants engaged with stimuli while on corresponding side of room ^a			
		Abby	Jack	Lyle	Warren
Attention and toys versus alone with nothing	Attention and toys	Not chosen	81	94	100
Attention only versus toys alone	Attention only	Not chosen	Not chosen	Not chosen	100
	Toys alone	100	97	100	Not chosen
Toys alone versus attention and demand	Toys alone	90	60	Not chosen	57
	Attention and demand	Not chosen	93	86	65
Alone with nothing versus attention and demand	Attention and demand	Not chosen	Not chosen	75	85

^a Number of intervals engaged divided by the number of intervals on side of room multiplied by 100%.

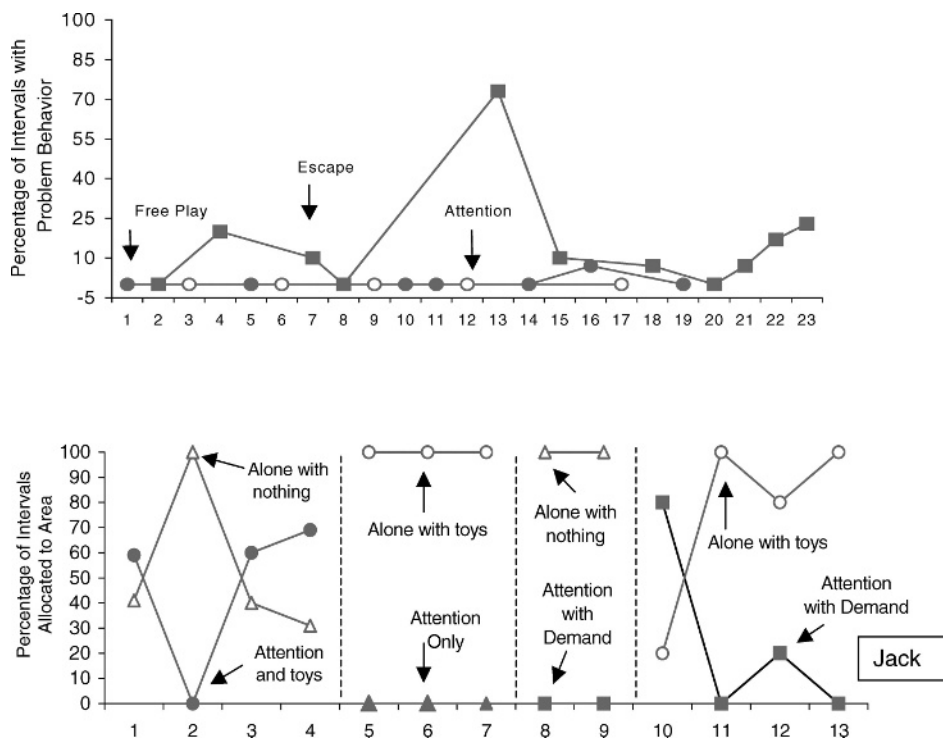


Figure 2. Percentage of intervals with problem behavior across functional analysis conditions (top); percentage of intervals present across choice conditions (bottom) for Jack.

Warren engaged in problem behavior during every condition of the functional analysis (Figure 3), with the highest levels occurring during the contingent attention condition (64% of intervals). Warren consistently selected the side of the room that included teacher attention throughout the choice assessment. He engaged in problem behavior for a mean of 36% of the intervals when attention was paired with task demands. Warren engaged with leisure items, teacher attention, and tasks during 81% of intervals (range, 57% to 100%) when he was on the side of the room that contained those stimuli.

Although Lyle’s functional analysis results (Figure 4) were similar to Abby’s and Jack’s in that problem behavior was most likely to occur during the escape condition, the results of his choice assessment were different. Lyle selected the side of the room with teacher attention for all but one session, regardless of whether

attention was paired with a task demand or with preferred materials. Lyle engaged with leisure items, teacher attention, and tasks during 87% of intervals (range, 75% to 100%) when he was in the side of the room that contained those stimuli. Problem behavior was observed during 8 of the 10 choice sessions and occurred on an average of 10% of intervals (range, 0% to 44%).

We compared the results of functional analyses of problem behavior to the results of choice assessments for 4 students. During choice assessments, access to social reinforcers was contingent on the child’s presence in a specific side of the room. Access to social reinforcers was contingent on problem behavior during the functional analysis. For 3 of 4 participants, the results of the two assessments matched, in the sense that the same class of reinforcement maintained both sets of behavior. Brief evaluations of treatments based on the

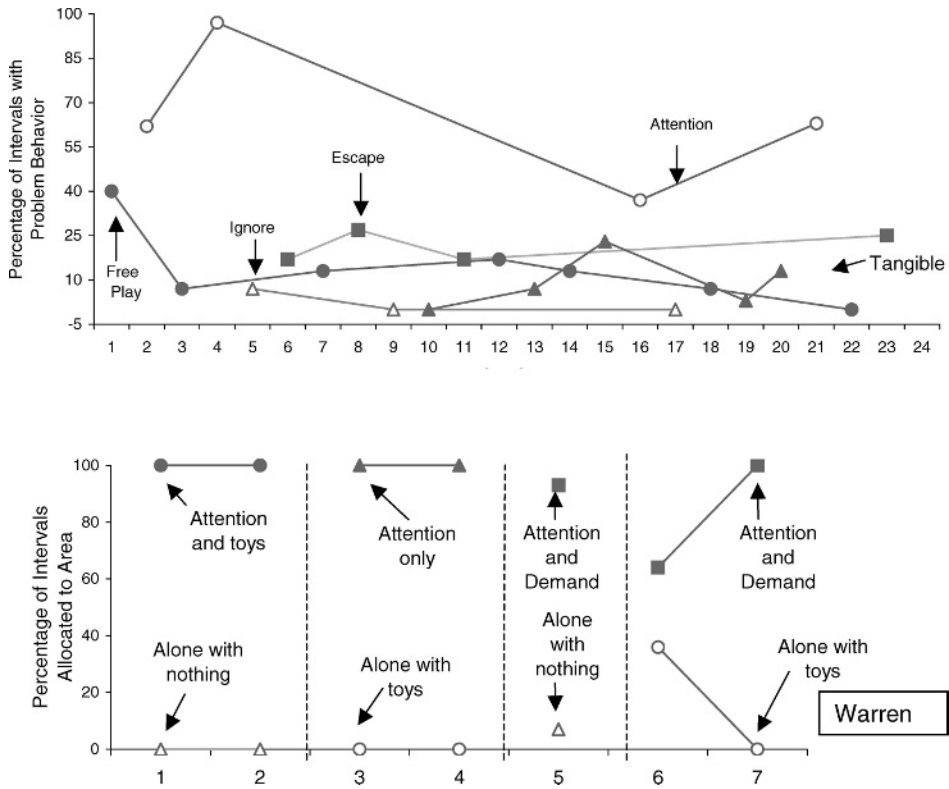


Figure 3. Percentage of intervals with problem behavior across functional analysis conditions (top); percentage of intervals present across choice conditions (bottom) for Warren.

results of the assessments were conducted after the experiment, and reductions in problem behavior were observed for all students. The results for Lyle indicated that problem behavior was maintained by escape and choice allocation was maintained by positive reinforcement. A treatment based on the results of the choice assessment resulted in some reduction in problem behavior. A subsequent treatment based on the outcomes of the functional analysis eliminated problem behavior.

The results for 3 of the 4 participants in the current study and those reported by Grace *et al.* (1996) and Piazza *et al.* (1997) suggest that the choice assessment may be a viable procedure for identifying treatment components to reduce problem behavior when functional analysis is difficult to implement or is otherwise contraindicated. Such a procedure may also be useful to clarify false negative functional analysis

outcomes (e.g., Derby *et al.*, 1992). However, it is notable that when the two assessments identified different classes of reinforcement, the treatment corresponding to the outcomes of functional analysis was more effective in reducing problem behavior.

It may be necessary to consider several dependent variables (i.e., stimuli selected, stimuli avoided, engagement in the stimuli selected, and problem behavior) when interpreting the results of a choice assessment. For example, the participants in the current study demonstrated high levels of engagement and minimal levels of problem behavior during the choice assessment, suggesting that their allocation across sides of the room represented their relative preferences between the available alternatives. However, although Lyle and Warren consistently selected teacher attention with task demands (and engaged in the tasks), they

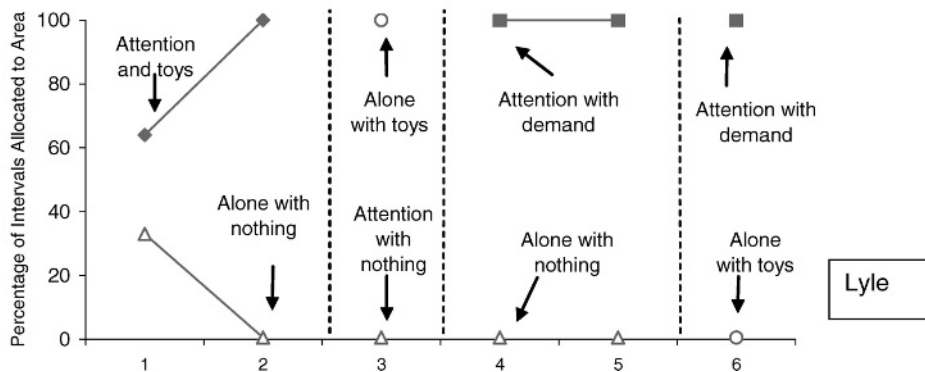
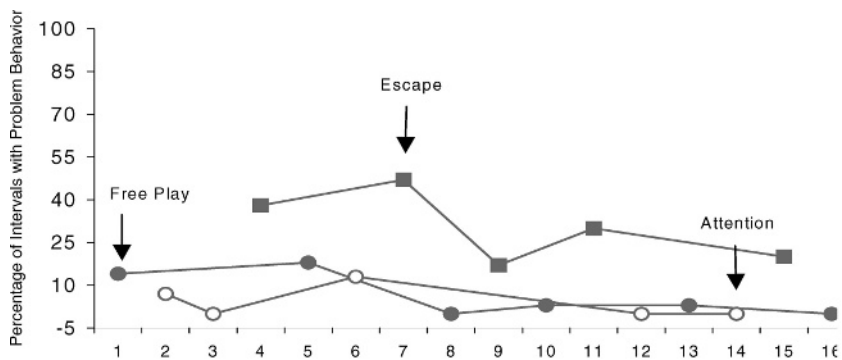


Figure 4. Percentage of intervals with problem behavior across functional analysis conditions (top); percentage of intervals present across choice conditions (bottom) for Lyle.

engaged in problem behavior while on that side of the room. These results suggest that working with the teacher was preferred over sitting alone, but do not suggest that working with the teacher was preferred over other activities such as playing a game with the teacher.

This study was conducted in classroom settings using teachers as therapists and materials common to the settings. On a postexperiment questionnaire, each teacher rated the assessment procedures as being highly applicable to classroom settings and reported that they were willing to use both procedures again. Although the teachers required some coaching, each performed the procedures largely as prescribed. These outcomes provide further evidence of the utility of functional analyses in

classroom settings, where they remain relatively uncommon.

REFERENCES

Derby, K. M., Wacker, D. P., Sasso, G., Steege, M., Northup, J., Cigrand, K., et al. (1992). Brief functional assessments techniques to evaluate aberrant behavior in an outpatient setting: A summary of 79 cases. *Journal of Applied Behavior Analysis, 25*, 713-721.

Grace, N. C., Thompson, R., & Fisher, W. W. (1996). The treatment of covert self-injury through contingencies on response products. *Journal of Applied Behavior Analysis, 29*, 239-242.

Iwata, B. A., Dorsey, M. F., Slifer, K. J., Bauman, K. E., & Richman, G. S. (1994). Toward a functional analysis of self-injury. *Journal of Applied Behavior Analysis, 27*, 197-209. (Reprinted from *Analysis and Intervention in Developmental Disabilities, 2*, 3-20, 1982)

- Piazza, C. C., Hanley, G. P., Bowman, L. G., Ruyter, J. M., Lindauer, S. E., & Saiontz, D. M. (1997). Functional analysis and treatment of elopement. *Journal of Applied Behavior Analysis, 30*, 653–672.
- Ringdahl, J. E., Vollmer, T. R., Marcus, B. A., & Roane, H. S. (1997). An analogue evaluation of environmental enrichment: The role of stimulus preference. *Journal of Applied Behavior Analysis, 30*, 203–216.
- Shore, B. A., Iwata, B. A., DeLeon, I. G., Kahng, S., & Smith, R. G. (1997). An analysis of reinforcer substitutability using object manipulation and self-injury as competing responses. *Journal of Applied Behavior Analysis, 30*, 21–40.

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