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A PRELIMINARY COMPARISON OF FUNCTIONAL ANALYSIS RESULTS WHEN CONDUCTED IN CONTRIVED VERSUS NATURAL SETTINGS

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A preliminary evaluation of the correspondence between functional analysis outcomes across settings was conducted with 2 children who had been diagnosed with autism and who engaged in challenging behavior. Differences across settings (a therapy room and a classroom) were demonstrated in ABAB reversal designs. Three potential patterns of results that may occur when comparing functional analyses across environments are described, and one possible explanation for the occurrence of discrepancies between environments (differing learning histories within separate environments) is offered.

DESCRIPTORS: autism, contrived settings, functional analysis, natural settings, assessment

The results of studies using the analog functional analysis procedure described by Iwata, Dorsey, Slifer, Bauman, and Richman (1982/1994) have greatly increased the understanding of the contingencies that maintain behavior and the subsequent ability to treat challenging behavior. This procedure involves exposing children who engage in problem behavior to multiple test conditions in which potential reinforcing consequences (e.g., escape from demands or the delivery of adult attention) are withheld and delivered only following problem behavior. The levels of problem behavior in each test condition are then compared to a control condition in which the same reinforcers are delivered independent of problem behavior. Test conditions that result in elevated levels of problem behavior relative to the control condition indicate that problem behavior is sensitive to that particular reinforcer, and thus treatment decisions can be directed towards the identified behavioral function. For instance, for an individual whose problem behavior is sensitive to attention as a reinforcer, withholding attention following problem behavior is more likely to result in a decrease in problem behavior than would issuing instructions (a potential treatment for problem behavior maintained by escape; Iwata, Pace, Cowdery, & Miltenberger, 1994).

The settings in which functional analyses have been conducted vary from highly contrived settings, such as hospitals, outpatient clinics, and unoccupied rooms in schools (e.g., resource rooms or cafeterias) to relatively uncontrolled settings such as bedrooms in children's homes and classrooms with other children present (Hanley, Iwata, & McCord, 2003). Although functional analyses have been conducted suc-

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cessfully across each of these settings, there remains debate regarding the ideal settings in which to conduct these behavioral assessments.

Functional analysis requires the precise manipulation of establishing operations, discriminative stimuli, and reinforcement contingencies to occasion problem behavior. To the extent that the procedural integrity of these assessments is compromised (e.g., peers may deliver attention during a test condition for automatic reinforcement), functional analyses may yield inaccurate outcomes. Thus, there is a clear advantage to conducting functional analyses in contrived settings. However, contrived settings may lack important evocative or discriminative stimuli necessary to occasion problem behavior (e.g., Carr, Yarbrough, & Langdon, 1997; Ringdahl & Sellers, 2000; Tiger, Hanley, & Bessette, 2006). Thus, there are also clear advantages to conducting functional analyses in more natural settings.

Despite the potential for divergent functional analysis outcomes to be obtained across settings, research has yet to directly examine the correspondence of functional analysis outcomes conducted across settings. Such information would provide guidance to practitioners who implement functional analyses. The current study offers a preliminary procedural approach to conducting such an evaluation by comparing functional analysis outcomes across a highly contrived setting (i.e., an empty assessment room) and a more natural setting (i.e., the students' classrooms) with 2 children with autism.

METHOD

Participants, measurement, and interobserver agreement. Kelly, a 12-year-old girl, and Erin, a 7-year-old girl, were nominated for participation in this study by the director of their school due to the frequency and intensity of their challenging behavior. Both participants had been diagnosed with autism and had no spoken language; they communicated via gestures. Both received seizure medication throughout the study. The dosage, type, and administration time of this medication were not altered during the study. Dropping to the floor (both knees on the ground), aggression (hitting the therapist with palm of hand), elopement (leaving or attempting to leave the assessment area), and head hitting (striking her own head with palm of hand) were target behaviors for both participants. Data on target behaviors were collected with paper and pencil using a 10-s partial-interval procedure. Data were converted to a percentage by dividing the number of intervals in which target behavior occurred by the number of intervals in the session, and this ratio was converted to a percentage.

Measurement of interobserver agreement was conducted on 40% of sessions across all phases of the study; agreement was calculated using an interval-by-interval method. The number of intervals in which both observers agreed (occurrence plus nonoccurrence) was divided by the total number of intervals (agreements plus disagreements), and this ratio was converted to a percentage. Mean interobserver agreement for target behaviors was 94% (range, 80% to 98%) for Kelly and 95% (range, 80% to 100%) for Erin.

Settings. All sessions were conducted on the grounds of a private school that specialized in the education of children with autism. Separate functional analyses were conducted in an empty assessment room at the school and the children's usual classroom. The assessment room was approximately 3 m by 3 m and contained a table and two chairs. Erin and Kelly had no previous experience in this room prior to the assessment. The classroom was approximately 5 m by 7 m and contained typical classroom items (e.g., tables, chairs, a colorful rug, posters, toys). A teacher, two teaching assistants, and four to six other children with similar diagnoses were present in the classroom during sessions. The functional analysis was implemented in a corner of the classroom (a typical instructional

arrangement). Data collectors observed through a one-way mirror near this area. The other students also received instruction or engaged in other typical classroom activities while the procedures were implemented. All assessments were conducted in the morning hours sometime before the children received lunch.

Functional analyses. Challenging behaviors for both girls were assessed during 5- min sessions across three conditions; attention, escape, and play (control) in a manner similar to that described by Iwata et al. (1982/1994). An alone condition was not conducted, because staff reported neither participant engaged in challenging behavior when left alone. During the attention condition, the therapist sat in a chair next to the participant and assumed the appearance of reading a notebook. The participant was given free access to appropriate toys and was instructed to play while the therapist worked. Five seconds of attention in the form of a redirection back to the toys was delivered contingent on the occurrence of challenging behavior. For the escape condition, academic activities appropriate for each of the girls were chosen by consulting with the classroom teachers. Erin was asked to place different plastic shapes into their corresponding slots, and Kelly was asked to point to pictures of common objects. If the participant did not respond to the demand after 5 s, the therapist gave a gestural prompt indicating the correct response. If the participant still did not respond, then she was physically prompted. The demands were terminated, and the demand materials were temporarily removed for 5 s contingent on the occurrence of challenging behavior. During the play condition, no educational tasks or materials were presented, and toys were present. The child had unrestricted access to the toys during the entire session. The therapist maintained close proximity to the child and provided verbal praise and physical contact at least once every 30 s. All challenging behavior was ignored. During no session did challenging behavior become severe enough to warrant termination of the session.

Functional analysis conditions were alternated in multielement designs in each setting. The influence of the setting (i.e., assessment room vs. classroom) was systematically examined using an ABAB design, in which A represented the assessment room and B represented the classroom. The same sequence and number of sessions of each of the functional analysis conditions were repeated across each ABAB phase of the reversal design. The same therapist (a trained doctoral student) conducted all sessions across each setting for each participant.

RESULTS AND DISCUSSION

There are three potential patterns of results that may occur when comparing functional analysis outcomes across settings. The first pattern is one in which both functional analyses identify the same behavioral function or functions (i.e., positive correspondence). Kelly's data (Figure 1) conform to this pattern; her challenging behavior was elevated in both the escape and attention conditions relative to the play (control) condition in both settings. Thus the same conclusion, that her challenging behavior was maintained by both the delivery of attention and escape from academic demands, would be made regardless of the assessment setting.

The second pattern (not observed in the current study) is one in which neither functional analysis identified a behavioral function. In these instances, it is likely the case that neither functional analysis captured the evocative situations that occasion problem behavior. In these cases, additional observations in the natural environment may lead practitioners to conduct a modified functional analysis to test for novel reinforcement contingencies (e.g., Bowman, Fisher, Thompson, & Piazza, 1997; Fisher, Lindauer, Alterson, & Thompson, 1998).

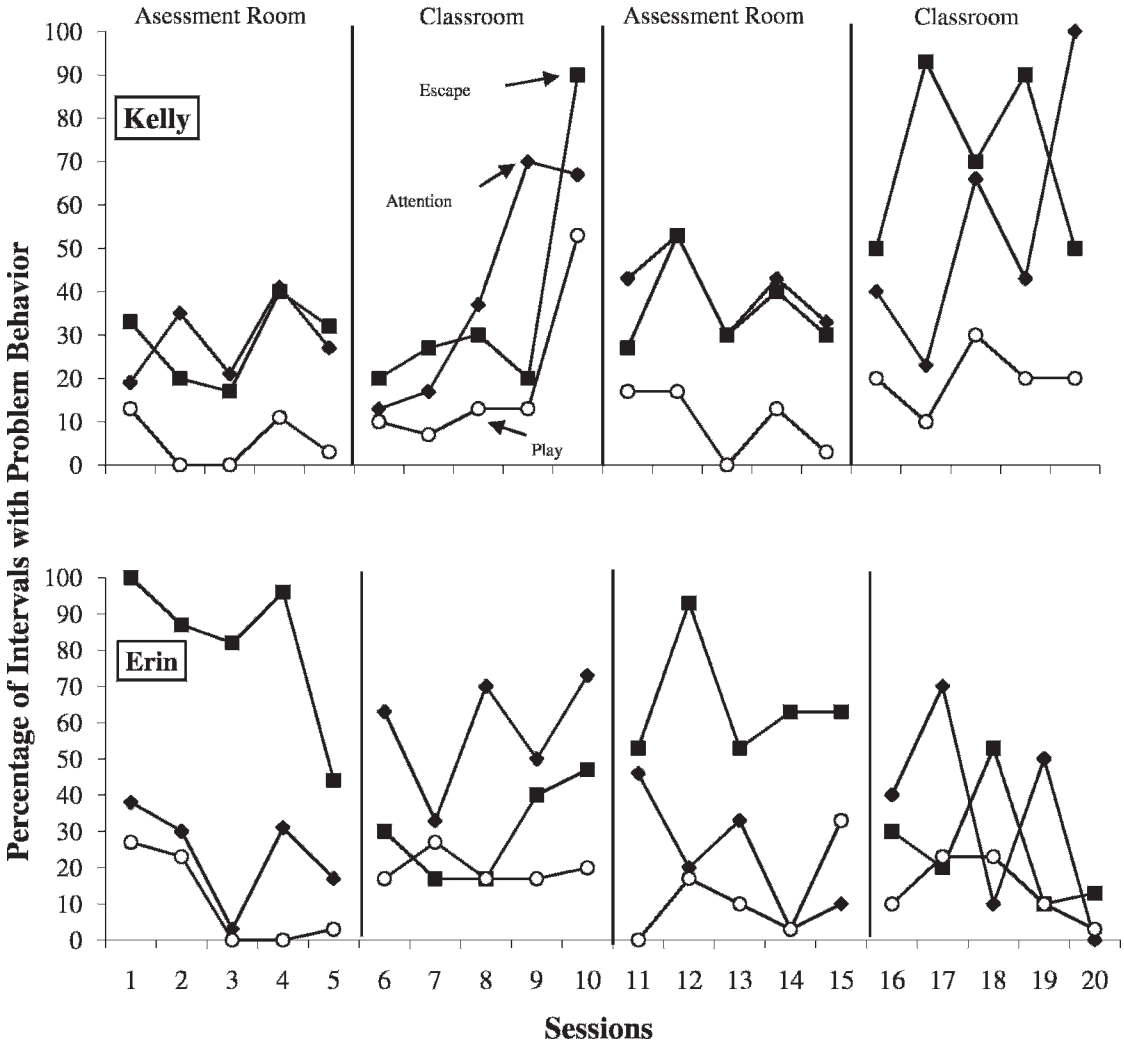

Figure 1. Results of the functional analyses in the clinical and classroom settings for Kelly and Erin.

The third pattern is one in which the functional analyses result in different outcomes across settings (i.e., negative correspondence). Erin's data are an example of this pattern (Figure 1). During the functional analysis conducted in the assessment room, levels of challenging behavior were elevated during both the attention and escape conditions relative to the play (control) condition. However, unclear results were obtained in the classroom, particularly in the final phase of the functional analysis.

One important question is why functional analyses differ across settings. There have been a number of carefully controlled studies that have demonstrated that functional analyses may fail to yield conclusive results if idiosyncratic controlling stimuli are absent in contrived settings (e.g., caregivers, Ringdahl & Sellers, 2000; particular toys, Carr et al., 1997; Van Camp et al., 2000). Further investigation may identify additional stimuli that control problem behavior.

Additional research may also investigate the challenges to procedural integrity likely to be present when the assessment environment is not a highly controlled clinical setting to determine

the extent to which these factors may impinge on accurate functional analysis outcomes. In Erin's case, there may have been an alternative source of reinforcement (e.g., peer attention) that competed with the contingencies arranged during the classroom functional analyses. In addition, it is interesting to note that, for Kelly, overall mean levels of challenging behavior were higher in the classroom ($M = 41\%$) than in the assessment room ($M = 24\%$). One of many possible explanations is that both participants had a prior learning history in which a higher frequency of challenging behavior was needed to obtain reinforcement in the classroom (i.e., a history of intermittent reinforcement) relative to the continuous schedule of reinforcement arranged in the novel assessment room.

Finally, if there is a high prevalence of discordance between functional analysis outcomes across settings, two additional questions become important. First, if two functional analyses identify different maintaining operant relations, it is necessary to identify which assessment yielded the accurate outcome. Such a determination can be made by comparing the effectiveness of behavioral interventions based on each behavioral function in the setting in which challenging behavior was originally reported as problematic (e.g., in the classroom or home). Second, research should be directed towards determining which settings are most often associated with accurate assessment outcomes. Such information would provide important data for practitioners (i.e., statements can be made regarding the likelihood of obtaining an accurate functional analysis outcome in a home, a school, or a clinic). Although the current data set is too preliminary to answer this question, it describes a procedure by which to begin to ask these questions.

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