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ORIGINAL ARTICLE

An Investigation into the Provision of Choice in Tangible Conditions of a Functional Analysis

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Abstract An experimental investigation of choice was conducted within the tangible condition of a functional analysis for an adolescent male who engaged in self-injury and property destruction. Results indicated that problem behavior was maintained by access to tangibles during sessions which were preceded by the student choosing the item to be used during the session. Access to equally preferred stimuli that were chosen by the teacher (i.e., no-choice) did not evoke the target behavior to the same degree. Procedural variations accounting for possible reinforcing effects of the tangible condition are discussed.

Keywords Functional analysis · Choice · Tangible condition · Self-injurious behavior

Functional analysis is an experimental methodology for identifying the escape, attention, tangible, and automatic functions of children's problem behavior (Hanley et al. 2003). By isolating the conditions that maintain problem behavior, clinicians are more likely to formulate effective intervention plans. Concerning published functional analysis research (Hanley et al. 2003), the tangible consequence has been the least used test condition (34.7%) and the least likely consequence to maintain

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problem behavior (10.1%). Of note, only two studies have shed some light on the differential effects of procedural variations in the tangible condition. Specifically, Moore et al. (2002) manipulated therapist attention during the tangible condition and found an interactive effect wherein the delivery of a tangible paired with attention contingent upon self-injurious behavior produced higher levels of SIB than tangible conditions with attention withheld. In another example, Mueller et al. (2001) found that restricted access to highly-preferred stimuli in the tangible condition evoked higher levels of aggression than less preferred stimuli—regardless of the level of preference for noncontingently available items during the session.

Notwithstanding these studies, there is little research to guide practitioners regarding procedural variations of the tangible condition and the possible evocative effects on problem behavior. As is the case in most school settings, a student's access to preferred items may be dictated by (a) the teacher (i.e., no-choice), or (b) through a choice arrangement in which the student is allowed to select the item from an array. The behavior analytic literature on choice suggests that the provision of choices may have a reinforcement effect because of the differential outcomes afforded to the individual choosing (Fisher et al. 1997). As Fisher et al. propose, access to such differential outcomes may be important due to momentary fluctuations in preference. Indeed, numerous studies on the effects of choice across multiple species, populations, tasks, and target behaviors have suggested that choice is more preferred than not having a choice, even when the reinforcers/tasks across these condition types are held constant (e.g., Bambara et al. 1994; Brigham & Sherman 1973; Catania and Sagvolden 1980; Dunlap et al. 1994; Dyer et al. 1990; Fixsen et al. 1973; Parsons et al. 1990; Tiger et al. 2006).

Despite numerous evaluations of choice-making and preference, the relative effects of offering functional analysis participants choice of items used in the tangible condition have not been reported. Thus, the purpose of this study was to assess the relative effects of providing choice of tangible items in a functional analysis versus a teacher chosen—yet still preferred—item with a student whose problem behavior appeared to be maintained by tangible items via descriptive assessment techniques.

Method

Participant

Larry was a 16-year-old male diagnosed with seizure disorder, mood disorder, and pervasive developmental disorder with a possible right-hemispheric brain lesion. He attended a residential school for students with brain injury in New England. Larry presented with both self-injury and property destruction. Specifically, Larry's self-injury was defined as nose-picking (i.e., tip of finger crossing the plane of a nostril), facial-picking (i.e., tip of forefinger squeezing the flesh of the face with the tip of the thumb), and self-biting (i.e., closure of teeth on the hand or forearm). Nose-picking was identified as a form of self-injury as it was frequently paired with facial-picking and self-biting, and would often lead to nose-bleeds. Property destruction was defined as knocking over of furniture, breaking of objects, and throwing objects onto

the floor or against a wall. Direct observation suggested covariance of self-injury and property destruction—therefore, these topographies were analyzed as one "problem behavior" response class.

Setting & Response Measurement

All sessions were 10-min in duration and conducted in a 3 m×3 m assessment room with an adjoining observation room equipped with a two-way mirror. The only materials within the assessment room were a tablet arm desk for the participant (located in front of the two-way mirror), a chair for the therapist (located 1 m from desk, facing the desk's side), materials necessary for the relevant functional analysis condition, clipboard with datasheets and pencil, a stopwatch to time consequence deliveries, and a vibrating timer to silently prompt the therapist to record problem behavior on a 15-sec partial interval recording system (MotivAider 2000). Data collection for problem behavior began upon the first prompt of the therapist for Larry to engage in the task relevant to the functional analysis condition (see below).

Interobserver Agreement

A second independent observer was present for 37.5% of sessions to record interval-by-interval agreement on the occurrence of problem behavior. Percent agreement was calculated as the number of agreements divided by the number of agreements plus disagreements, multiplied by 100. Mean percent agreement was found to be 95.0% (range, 92.5% to 97.5%).

Descriptive Assessment

The *Functional Analysis Screening Tool* (*FAST*; Iwata and DeLeon 1996) and *Motivation Assessment Scale* (*MAS*; Durand and Crimmins 1992) were administered to one of Larry's one-to-one therapists.

Functional Analysis Screening Tool (FAST) The *FAST* is an 18-item scale based on dichotomous scoring (yes/no) for questions such as, "The behavior usually occurs when the person is being ignored or when preferred items have been taken away." Behavior function is inferred by calculating a summary score for four "likely maintaining variables" (attention/tangible, escape, automatic reinforcement from either sensory stimulation or pain attenuation). Results of the *FAST* suggested that the problem behavior Larry displayed was most likely maintained by social reinforcement in the form of attention and/or preferred stimuli (i.e., tangibles).

Motivation Assessment Scale (MAS) The *MAS* is a 16-item Likert-type scale that ranges from 1 (never) to 6 (always). Four functions are assessed (social attention, access to tangible, escape from demand, automatic reinforcement) by having an informant record a rating to questions such as, "Does this behavior occur when you are talking to other people in the room?" Ratings are summarized to yield a total score suggestive of behavior function. Results of the *MAS* suggested that the problem behavior Larry displayed was most likely maintained by tangible reinforcement.

Functional Analysis

Protocol for the demand, play, and attention conditions of the functional analysis were replicated from Iwata et al. (1982/1994). Specifically, during the demand condition, Larry was prompted to receptively identify numbers presented on flash cards—an academic task from the student's individualized education plan (IEP). Upon any occurrence of problem behavior, the protocol was to terminate the task, remove all materials from the student's desk, and turn away from the student for 30-sec. During the play condition, five items were available on Larry's desk for him to engage with. These five items (toy instruments, paper and pencils for coloring, a book, toy food, and a game) were selected because of their status as preferred stimuli using procedures similar to those described by Mueller et al. 2001. Larry was allowed to freely choose amongst these items during the condition. Moreover, every 30-sec the therapist provided attention in the form neutral non-directive statements (e.g., "That picture is colorful"). Any occurrence of problem behavior during the play condition was ignored by the therapist. Finally, during the attention condition, Larry was seated with the five aforementioned preferred items. Attention condition sessions began with the therapist stating "while you play, I will sit here and so some work." The therapist then pretended to read a book, withholding any interactions and ignoring any communicative attempts by Larry. Upon the occurrence of problem behavior, the therapist would lean towards Larry, placing a hand on his shoulder and stating, "don't do that, you'll hurt yourself." Across these three conditions, three distinctive staff were associated with each condition.

A fourth distinctive staff was used for both the choice and no-choice tangible conditions. These tangible conditions were included in the functional analysis to investigate the effects of procedural variation on tangible condition outcomes. Procedures for the tangible conditions were as follows. During the choice tangible conditions, the five preferred stimuli (referenced above) were offered to Larry as choice alternatives before beginning the choice tangible condition sessions. Specifically, prior to beginning a choice tangible session, Larry was told to "pick one" item and then prompted to sit at a desk with that item. The non-selected items were placed at Larry's feet for him to freely choose from throughout the session. During no-choice tangible conditions, paper and pencils for coloring were the only stimuli presented for Larry to engage with during the sessions. Paper and pencils were selected because Larry's teacher reported that he most often selected these materials during his breaks throughout the school day.[1] During both tangible conditions, after 30-sec of engagement with the item(s), the therapist stated "all done" and would remove the item(s) from Larry's possession, turning his back away from Larry. Upon the occurrence of problem behavior, the item(s) were returned to Larry's possession, with the 30-sec engagement schedule resetting at this time.

[1] The reader will note that the lack of a yoking procedure to control for the numbers of each tangible presentation to Larry across conditions is a deviation from typical choice experiments (see Lerman et al. 1997; Thompson et al. 1998) and may be a confound to our methodology. However, we opted for this deviation in an effort to best replicate the natural classroom setting. Readers should interpret our findings with this caveat in mind.

Results

Results from the functional analysis (Fig. 1) suggest that problem behavior was maintained by access to tangible items selected by the student. Specifically, during the choice tangible conditions, the mean percentage of intervals of problem behavior was 35.8% (range, 27.5% to 47.5%), while during no-choice conditions the percentage of intervals of problem behavior averaged only 1.7% of intervals (range, 0% to 5.0%). Thus, these results indicate a sizeable difference in level of problem behavior across the choice manipulations. Problem behavior was also lower during the demand (M=0%), attention (M=.83%; range, 0% to 2.5%), and play conditions (M=1.88%; range, 0% to 5.0%) of the functional analysis.

Discussion

Previous research regarding the evocative effects of antecedent conditions on problem behavior during functional analysis conditions has exclusively focused on the demand (Smith et al. 1995), attention (Fischer et al. 1997) and alone (Worsdell et al. 2000) conditions. The present study suggests that student choice of materials prior to tangible condition sessions may serve an evocative function for the occurrence of problem behavior. That is, although we don't know the factors that influenced Larry's choice behavior, it might be confidently assumed that the stimuli he selected were "most preferred" at the time choice-making was permitted (i.e., immediately preceding the choice-tangible condition). Thus, it is plausible that while all stimuli used during the tangible conditions in our study were generally equivalent in preference according to a formal preference assessment, extraneous motivating operations may have momentarily altered the reinforcing value of the stimuli which would have subsequently influenced Larry's choice of that stimulus over the other alternatives. Similar to the literature on choice cited above, obtaining access to

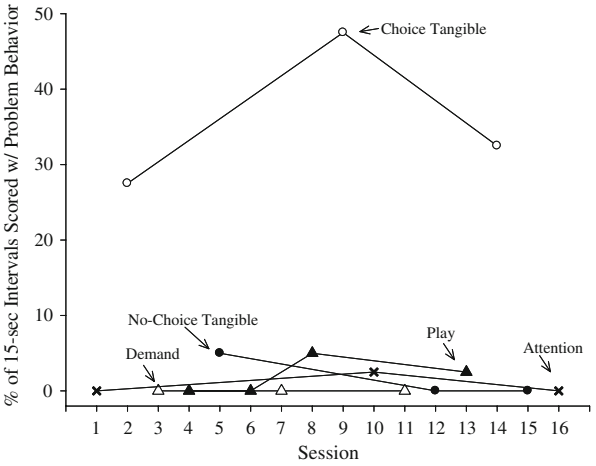

Fig. 1 Percentage of 15-s intervals scored with problem behavior during demand, play, attention, choice tangible, and no-choice tangible functional analysis sessions

various stimuli may be more preferred than withholding choice from the participant, even when the items being "forced" on the participant are seemingly preferred. These factors may help explain the substantial differentiation between the levels of problem behavior during the choice and no-choice tangible conditions. Further research regarding the role of choice variables in the tangible condition of functional analyses is therefore warranted.

Additional research concerning the relative effects of antecedent manipulations such as choice to tangible conditions should also evaluate various qualities of reinforcers—the exclusion of which is a notable limitation in the current study. Specifically, it may be advantageous to investigate possible interactive effects between choice and quality (i.e., low- vs moderate- vs high-preferred stimuli in both choice and no-choice conditions) and their subsequent influences on functional analysis outcomes for students whose behavior is maintained by tangible consequences (cf. Humenik et al. 2008).

Finally, measuring the relative levels of engagement with the stimuli during both the choice and no-choice tangible conditions may offer further validation on these interactive effects. Future studies of this type should yoke the tangibles in the no-choice condition to the items selected by the participant in the choice conditions. In sum, the present study highlights the importance of exploring procedural variations of functional analysis conditions in an effort to better elucidate functional relationships which may be moderated by the provision of choice. Such analyses should advance our knowledge about functional analysis methodologies and the contribution of choice-making as an intervention for problem behavior (Cannella et al. 2005).

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