The Effects of Advance Notice on Problem Behavior Occasioned by Interruptions of an Ongoing Activity in a Young Girl with Autism

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Published online: 21 April 2017

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Abstract The current study describes a trial-based functional analysis of problem behavior conducted in a home setting for a 7-year-old girl with autism. Problem behavior was occasioned by interruptions to an ongoing activity. Advance notice, in the form of a 2-min warning, and the sound of a timer were used to signal termination of a current activity and were effective at reducing problem behavior along with increasing compliance to the interruptive demands. A trial-based functional analysis, which are not common in the applied literature, was conducted in a home setting for young girl with autism, using antecedent and consequence modifications described by Hagopian, Bruzek, Bowman, and Jennett (2007), identified the variables that occasioned and maintained problem behavior were interruptions to an ongoing activity followed by regaining uninterrupted access to the previous activity. Mixed findings have been reported regarding the effectiveness of advance notice for decreasing problem behavior. Results of the current study show that an advance notice treatment package was effective for a child with autism; no escape extinction was necessary. Interruptions are part of everyday life and tolerating these changes is critical for habilitation for individuals with autism.

Keywords Problem behavior · Interruptions · Functional analysis · Advance notice · Timer · Rules · Children · Autism

Problem behavior (e.g., self-injury, aggression) is more prevalent in individuals with autism compared to other developmental disabilities (Cohen, Yoo, Goodwin, & Moskowitz, 2011). Such behaviors pose a serious health risk to the individual or others, limit educational opportunities, and restrict independence. The purpose of a functional analysis (FA; Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994) is to identify variables that evoke and maintain instances of problem behavior. With the advent of the FA, numerous treatment options are available when treatment and operant function are matched (Mace, 1994). Although FAs often produce clear outcomes, some studies have reported ambiguous results that cannot be interpreted. This may occur if test conditions during the FA fail to include relevant antecedents or consequent events that lead to the identification of idiosyncratic functions of the problem behavior (for a review, see Schlichenmeyer, Roscoe, Rooker, Wheeler, & Dube 2013).

For example, following inconclusive FA outcomes, Hagopian, Bruzek, Bowman and Jennett (2007), evaluated the extent to which interruptions of ongoing activities occasioned problem behavior of three individuals. Hagopian et al. conducted an interruption analysis. During the test condition of the interruption analysis, the experimenter issued an interruptive demand (e.g., “stand up,” when the participant was seated) that was incompatible with the preferred activity and removed stimuli from the ongoing activity every 30 s. Problem behavior resulted in termination of the request and the participant regained access to the previous ongoing activity until the next interruptive demand. During the control condition of the interruption analysis, preferred activities were

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uninterrupted and there were no programmed consequences for problem behavior. Problem behavior occurred at higher rates in the test conditions compared to the control condition suggesting that problem behavior was maintained by termination of interruption of an ongoing activity. A treatment package consisting of reinforcement of appropriate mands, noncontingent reinforcement, and demand fading was successful for decreasing problem behavior for all participants. Hagopian et al. noted that although interventions such as functional communication training with extinction can be effective at decreasing problem behavior occasioned by activity interruption, there may be situations during which requests to postpone or terminate the activity cannot always be reinforced (e.g., scheduled activity transitions in classrooms). Furthermore, extinction procedures may be difficult for practitioners to implement, thereby reducing treatment integrity. Thus, evaluations of treatments to reduce problem behavior and increase compliance to interruptive demands in similar contexts are warranted.

One potential treatment that may be effective in this context is advance notice. For example, Tustin (1994) assessed the effects of advance notice on stereotypy emitted by an individual with autism and moderate intellectual disabilities between work-related activities (i.e., packing materials). Two conditions were evaluated: immediate change and advance notice. During the immediate change condition, following 30 min of access to a work activity, the supervisor requested that the participant immediately transitioned to a new activity, removed materials from the current activity, and replaced them with materials for the new activity. Praise was provided contingent on engagement with the new activity and stereotypy produced no programmed consequences. During advance notice, following 30 min of access to the current activity, experimenters placed materials for the new activity next to the participant and the supervisor asked if he would like to transition to the new activity and then left the room. After 2 min, the supervisor returned to the room and delivered praise contingent on engagement with the new activity. Consistent with the immediate change condition, if the participant failed to transition to the new activity during the 2 min, the supervisor removed the previous activity; no consequences were arranged for stereotypy. Results indicated that advance notice effectively decreased stereotypy. However, without a FA, it remains unclear as to why advance notice reduced stereotypy (e.g., additional time to complete the activity, removing “uncertainty” associated with the timing of the current activity and/or nature of the upcoming task)—especially given that the stereotypy was likely maintained by automatic

reinforcement as it was occurring at high levels in baseline when there were no programmed consequences.

The purpose of the present paper was to (a) conduct a trial-based functional analysis to assess the influence of interruptions on problem behavior during discrete trial sessions and (b) evaluate the effect of advance notice (without extinction) as a treatment for problem behavior and compliance with interruptive demands.

Methods

Participants, Setting, and Materials

Mary was a 7-year-old girl diagnosed with autism. She could follow vocal instructions, had an extensive imitative repertoire, and communicated vocally using 3- to 4-word sentences. Anecdotal observations and caregiver report suggested that Mary was most likely to engage in problem behavior when interrupted from an ongoing activity.

Sessions were conducted in the participant’s home in a playroom containing a table, two chairs, and various toys. All toys were stored to minimize distraction during session. The materials used during session included white boards, writing journal, writing utensils, scissors, glue stick, construction paper, and a variety of toys. Experimenters conducted sessions four times per week.

Measurement

We collected data on the occurrence and nonoccurrence of problem behavior and compliance during each trial. *Problem behavior* was defined as any instance of loud vocalizations, screaming accompanied by whining, crying, or aggression (e.g., hitting others, striking, or knocking over objects). *Compliance* was defined as the participant ceasing to engage in the current activity and independently starting the next activity within 30 s of the interruption (e.g., the timer beeping and the experimenter saying, “Time is up”).

A second, independent observer collected data during 33% of FA trials and 90% of treatment sessions. Interobserver agreement was assessed using a trial-by-trial method. An agreement was defined as both observers recording the occurrence or nonoccurrence of the target behaviors within each trial. Agreements were summed and divided by the total number of intervals per session and multiplied by 100. IOA coefficients were 100% for both problem behavior and compliance during the FA and treatment evaluation. We also assessed implementation of the independent variable during 20% of FA trials and treatment sessions. Independent variable integrity checks were calculated by dividing the number of components implemented correctly by the total number of

opportunities to implement each treatment component and multiplying by 100%. Integrity values were 100% across all sessions.

Trial-Based Functional Analysis

Procedure

A trial-based functional analysis was conducted based on procedures described by Bloom, Iwata, Fritz, Roscoe, and Carreau (2011) with antecedent and consequence modifications based on Hagopian et al. (2007). Each session of the FA consisted of sequential 2-min control-test trials. During each control trial, Mary accessed a predetermined academic activity (e.g., copying a picture, answering math problems) without interruption. During this condition, the experimenter did not issue any interruptive demands. Problem behavior resulted in no programmed consequence. For each 2-min test trial, experimenters gave Mary one of the predetermined activities to complete. After Mary had worked on the activity for about 1 min, the experimenter stated, “Mary you are all done,” and removed the materials that were being utilized. We also issued a simple request which was incompatible with the ongoing activity, (e.g., sorting blocks) and reading. Compliance resulted in descriptive praise and/or physical contact (e.g., tickles, high fives). If Mary did not comply with the request, we initiated a three-step prompting sequence (i.e., sequential verbal, gestural, and physical prompt). Problem behavior produced termination of the interruptive demand and Mary was allowed to return to the original activity.

Advance Notice Treatment Evaluation

Baseline Baseline was similar to the test condition of the trial-based FA. That is, during baseline, Mary was given access to one of the activities for 1 min. During each session that consisted of five trials, a single activity was randomly presented without replacement. The experimenter signaled termination of the current activity by saying, “Mary you are all done,” removed the materials from the ongoing activity, and issued a simple request that was incompatible with the ongoing activity. Compliance produced descriptive praise and/or physical contact. Problem behavior resulted in the termination of the incompatible request and Mary regained access to the activity until it was completed. For both baseline and treatment sessions, trials were interspersed throughout Mary’s typical therapy session.

Advance Notice The advance notice condition was identical to baseline with the following exception. Two minutes prior to the interruptive demand, the experimenter started a concealed timer and placed materials related to the new activity in front of Mary which provided the opportunity to move on to the

next activity. In addition, the experimenter stated, “You have two minutes to finish X (i.e., the ongoing activity). When the timer sounds, you have to start working on Y (i.e., the new activity).” When the timer rang after 2 min, the experimenter stated, “Time is up.” If Mary began working on the new activity, the experimenter provided descriptive praise and/or physical contact. If Mary did not transition to the new activity, the therapist prompted the transition using three-step guided compliance. Problem behavior resulted in termination of the interruptive demand or prompting sequence and Mary was allowed to finish the original activity. That is, extinction was not a programmed component of the advance notice condition. The effect of advance notice was evaluated using an ABAB design.

Results and Discussion

A trial-based FA was conducted in the client’s home based on procedures described by Bloom et al. (2011) with antecedent and consequence modifications described by Hagopian et al. (2007) to identify the variables that occasioned problem behavior when interruptions occurred during an ongoing activity for a young girl with autism. Figure 1 shows that Mary engaged in problem behavior during 85% of test trials in comparison to 0% of control trials, suggesting that problem behavior was occasioned by interruptions to ongoing activities and maintained by regaining access to the prior activity. One important finding of the current study is the extension of the trial-based FA format to problem behavior maintained by an idiosyncratic function, further demonstrating the feasibility of conducting a trial-based FA in the context of practice—in the home of the client.

The results of the advance notice treatment evaluation are depicted in Fig. 2. Mary emitted high percentages of problem behavior during baseline ($M = 100\%$) and the percentage of compliance to an interruptive demand was low ($M = 0\%$). Advance notice produced an immediate decrease in problem behavior to near zero levels ($M = 4\%$). Conversely,

Fig. 1 Results of trial-based FA depicting percentage of trials with problem behavior across conditions

Fig. 2 The percentage of trials with the target behavior for Mary; problem behavior is depicted with *closed circles*, whereas compliance is shown as *open square symbols*

compliance increased and remained high across all treatment sessions ($M = 94\%$). Thus, another noteworthy finding of this study was that advance notice was effective at reducing problem behavior occasioned by interruptions of an ongoing activity and increasing compliance with an interruptive demand, consistent with Tustin's findings (1995).

At first blush, it may be surprising that we obtained treatment effects with advance notice without using extinction given several reported failures in the literature (e.g., Wilder, Nicholson, & Allison, 2010). Researchers have suggested the effectiveness of advance notice depends on the controlling variables of problem behavior or compliance (Brewer, Strickland-Cohen, Dotson, & Williams, 2014). McCord, Thomson, and Iwata (2001) previously found that advance notice was ineffective when problem behavior was controlled by the termination of a preferred activity or the initiation of an unpreferred activity (2001). In contrast, advance notice tends to be effective when the timing of the end of the current activity and/or the nature of the next activity is unpredictable (e.g., Flannery & Horner, 1994). Related to this study, problem behavior was occasioned by an interruption of an ongoing activity. Thus, it is possible that advance notice made the timing of the interruption more predictable.

One limitation of the current study is that we did not assess whether the client could temporally discriminate the timing of the interruption before and after treatment. However, using the verbal warning to reduce "uncertainty" of the timing of the interruption to the current activity may have not been the treatment mechanism if the timing of the interruption was already highly predictable; recall that the interruptive demand reliably occurred after a minute of task engagement. An area for future applied research could be varying the timing of the interruptive demand. Another potential treatment mechanism was the opportunity to choose to transition to new task materials before the timer signaled the termination of the current activity. Additional analyses indicate that Mary did not transition before the sound of the timer (data are available upon request). Despite the absence of a component analysis, we suspect the timer may have been a necessary component of

the treatment package. Although anecdotal observations prior to the start of the study suggested that a timer alone was not sufficient to produce treatment effects for this participant in this context, rules associated with timers were regularly used in her classroom and therapy sessions. The rule, a contingency-specifying stimulus, plays the role of an antecedent, describes the operating contingencies of reinforcement, and can be a function-altering event (Schlinger, 1990). That is, the participant may have been engaging in rule-governed behavior rather than the effects of advance notice. Future applied research might examine the effects of timers to signal an interruptive demand on problem behavior and compliance without the aforementioned extra-experimental history.

Unpredictable interruptions are part of everyday life and tolerating these changes without engaging in problem behavior represents an important life skill that enhances opportunities for children to access least restrictive environments. Practitioners may benefit from the findings of the current study as it represents the first study to demonstrate the feasibility of conducting an idiosyncratic FA of problem behavior occasioned by interruptions in task demands in the home. From a treatment perspective, we effectively decreased problem behavior and increased compliance with interruptive demands for a young girl with autism. Our user-friendly advance notice package can be used by many (e.g., caregivers, teachers), across a variety of settings (e.g., home, school, public outings) and does not involve extinction (which is often difficult to implement with fidelity and can be a source of stress). Overall, these results contribute to applied literature that demonstrates advance notice can be effective for treating problem behavior, as well as promoting compliance.

Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

Ethical Approval All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964

Helsinki declaration and its later amendments or comparable ethical standards.

Informed Consent Informed consent was obtained from all individual participants included in the study.

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