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BRIEF PRACTICE

Incorporating Interview-Informed Functional Analyses into Practice

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Abstract
We replicated and extended the effects of an assessment and treatment model employed by Hanley et al. (*Journal of Applied Behavior Analysis*, *47*, 16-36, 2014) with one participant receiving home-based services. Following a functional analysis, we taught the participant multiple functional communication responses (FCRs) and to tolerate delays and denials to requested items. The participant learned the FCRs and the delay to reinforcers was increased to 34 min. Results generalized across stimuli, people, settings, and time. Social validity results supported that the behaviors were important, the treatment was acceptable, and the effects were significant.

Keywords Assessment · Communication · Delay · Functional analysis · Generalization

Strengths and Considerations

The value of assessment procedures can be determined by the ability to use the results to design effective treatments. Hanley et al. (2014) describe an assessment model that incorporates a functional analysis (FA) that differs from the FA described by Iwata et al. (1994). In Hanley et al.'s FA, rather than testing all generic classes of reinforcement, and doing so separately, the authors identified several putative reinforcers for problem behavior via an open-ended interview and synthesized the reinforcers in a single test condition. For example, if the interview identified a child escaped work and accessed a toy following problem behavior, escape and a toy were delivered contingent on problem behavior in the test condition. Using open-ended assessments and synthesizing variables in a functional analysis following undifferentiated data has occurred for quite some time (see Jessel et al. 2016 for a brief summary); however, Hanley et al. was first to highlight the use of this technique during an *initial* FA. Hanley et al. validated their assessment model by designing an effective treatment based on the assessment results. The experimenters first taught participants functional communication responses (FCRs) and then taught participants to tolerate delays to the requested items. During delays, participants were taught to engage in less preferred and contextually appropriate activities or adult-led instruction. Results showed decreases in problem behavior and increases in FCRs and tolerance responses across participants thus supporting the results produced by the assessment. Santiago et al. (2016) replicated and extended the results of Hanley et al. to a school and home setting.

The results of Hanley et al. (2014) are encouraging, and although there have been several replications of the *assessment* (e.g., Jessel et al. 2016) or *initial* treatment (Slaton et al. 2017) process, currently, there are *no* replications of the entire assessment and treatment process other than Santiago et al. (2016) and Jessel, Ingvarrson, Metras, Kirk, & Whipple (2018), which include authors from the same research lab. Replications from various researchers and

- This study replicated and extended Hanley et al. (2014) by demonstrating the use of an open-ended interview to inform the design of a functional analysis, which quickly identified the function of one participant's problem behavior in a home setting.
- Our open-ended interview suggested one function as opposed to a synthesized function, and the treatment effects demonstrated generality of the delay and denial tolerance protocol, further suggesting its utility for practitioners in applied settings.
- We demonstrated the efficacy of this procedure across settings by dedicating only 1 to 2 h per week to the described treatment and its durability across time, which offers implications for those selecting potential treatment options for FCT with limited service hours.
- We implemented FCT across a variety of responses, rather than the omnibus mand "My way" reported by Hanley et al. (2014), which may support the application of these procedures with learners with more advanced verbal repertoires.

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practitioners are critical to establish the generality of the procedures. As noted, the true merit of an assessment is the ability to identify effective treatment; hence, more research is needed on the assessment and treatment process as a whole to determine the generality of the procedures. Furthermore, there are limited studies that socially validate the assessment and treatment process in applied settings (Santiago et al. 2016).

Our purpose was to evaluate the generality of the assessment and treatment model described in Hanley et al. (2014) with a child receiving 6 h of ABA services per week with 1 to 2 h dedicated to the described treatment and assess the social validity of the procedures. We assessed generalization across caregivers, novel stimuli, settings, and time. We highlight considerations for practitioners.

Method

Participant and Setting

Ally was a 7-year-old girl diagnosed with autism who received home-based behavior analytic services. Ally spoke in full sentences and complied with multi-step instructions. Ally received 6 h of services per week with a behavior therapist (BT) and 4 h of services per month with a BCBA® (2 h was in the home; 2 h was related to paperwork). Of the 6 h, approximately 1 to 2 h were spent conducting the assessment and treatment procedures described herein. All sessions, except for the community probe, occurred at the child's home (e.g., kitchen, playroom, backyard) within the context of her regular service delivery.

Measurement and Design

Trained observers collected data via video using data collection software. Observers recorded freqrate of problem behavior (e.g., flopping, crying, aggression, self-injury, bolting, and vocal protesting), simple FCR (S-FCR; e.g., two-word vocal phrase in the form of "[item] please," in the absence of problem behavior); complex FCR (C-FCR; e.g., "Excuse me," [wait for adult to respond] "May I have the [item] please" in the absence of problem behavior); and tolerance response (e.g., independently stating "okay" in the absence of grunts, growls, grimace, and problem behaviors and engaging with a less preferred toy or completing homework). All dependent measures graphed represent *independent* responses.

We used a multi-element design during the FA and a changing criterion design to evaluate the treatment.

Interobserver Agreement and Procedural Integrity

Two independent observers recorded data on 47% of sessions across all measures and conditions. We calculated interobserver agreement (IOA) using mean count-per-interval with 10 s intervals. The mean agreement for all measures was 98% (range, 57% to 100%). Procedural integrity (PI) data were collected for 27% of sessions using a task analysis of all required steps for each phase of the experiment. PI averaged 95% (range, 75 to 100%) across all measures.

Procedures

Functional Assessment The BCBA® conducted a 45-min open-ended interview (Hanley et al. 2014) with Ally's mother. The BCBA® designed the FA conditions based on the interview results. FA sessions were implemented by the BCBA® and were 5 min each. The analysis was completed in 30 min.

Test Results of the interview suggested that Ally's problem behavior was maintained by access to items that were denied. During the test condition, the BCBA® removed a preferred item (e.g., a ball). If Ally engaged in problem behavior, the ball was delivered for a period of 15 s. After 15 s, the ball was removed. All other responses were ignored. The items used in the FA were identified via the caregiver interview and previous preference assessments.

Control During the control condition, Ally had free access to the preferred item (e.g., ball) throughout the session. The BCBA® ignored Ally's problem behaviors.

Treatment Initially, sessions were 5 min. Session length increased when the delay exceeded 5 min (detailed later). All treatment sessions were conducted by the BT. Activities utilized during the treatment phases included iPad®, TV, clay, ball, Play-Doh®, sand, balloon, football, and playing tag. Tangibles were identified via the caregiver interview (i.e., the mother reported these items occasioned problem behavior when denied or removed) and previous preference assessments, and at the start of each session, the therapist held the item out to see if Ally would reach toward the item. We used multiple items to reduce the likelihood of satiation and increase the likelihood of generalization to novel stimuli. The treatment evaluation was similar to that described in Hanley et al. (2014) and behavior skills training was used to teach communication and toleration. At the start of each treatment condition, the skill was instructed, modeled, and role-played. Prompting occurred throughout the session as described below.

Baseline Test sessions from the FA served as the baseline.

Simple Functional Communication Training The BT removed the preferred item, as in the test condition of the FA, and used most-to-least vocal prompts (full vocal, partial vocal) with a 5-s time delay to teach the S-FCR. The tangible was delivered

for 30 s contingent upon an independent or prompted S-FCR. If problem behavior occurred, the reinforcer was not delivered, prompting was implemented, and only S-FCRs were reinforced. The prescribed criterion to move to the next condition was 90% independent S-FCRs with zero rates of problem behavior for two consecutive sessions; there were a few deviations from this criterion. The S-FCRs were taught first because they required less response effort than the C-FCRs to access the reinforcer.

Complex FCT Teaching procedures during complex FCT (C-FCT) were identical to simple functional communication training (S-FCT) except that Ally was taught to emit the C-FCR. Criterion to begin the next condition was the same as above.

Delay and Denial Baseline The delay and denial baseline sessions were identical to the test sessions in the FA, except that if Ally engaged in the C-FCR, the BT said "Not right now" or a similar phrase following approximately 3 of every 5 FCRs. The BT delivered the item contingent upon problem behavior.

Delay and Denial Training Delay and denial training included the same session structure as the previous condition, except that Ally was prompted to engage in the tolerance response using model prompts during the trials where the C-FCR was not immediately reinforced. The item that was requested was delivered contingent upon engaging in the tolerance response for the prescribed delay length. The length of the delay began at 0 s (i.e., tolerance response was reinforced immediately) and was doubled (2, 4, 8 s, etc.) after one session of emitting the tolerance response independently during 90% of the opportunities to emit the tolerance response and problem behavior was at zero. For the tolerance response, Ally was required to engage in contextually relevant activities as determined through the interview with her mother (e.g., homework, playing with a less preferred toy that was available).

The programmed delay length and duration of access to the reinforcer was systematically randomized once a 256-s delay was reached to make the contingencies indiscriminable. That is, the delay length for each session was predetermined by the BCBA® and varied up to a certain point until the terminal schedule (34 min) was reached and the delay length was not signaled to the participant. Additionally, the duration of access to the reinforcer was randomly predetermined and varied between 25 and 50% of the delay length.

Treatment Extension Four probes were conducted using the same procedures as delay and denial training. First, the BCBA® delayed access to a novel stimulus (dollhouse) for 34 min. Second, the participant's mother delayed access to the TV for 34 min and instructed Ally to complete homework tasks while she was able to hear her brother watching TV in the next room. Third, the BCBA® delayed access to the iPad® for 25 min and instructed Ally to take a shower (a task with a strong history of evoking problem behavior when she was instructed to terminate a preferred activity to shower). The shower was not programmed during treatment due to limited teaching opportunities (i.e., Ally took at most one shower per day). Fourth, the BT delayed access to pushing the grocery cart in a grocery store for 90 s. This probe was conducted after a 6-week vacation.

Social Validity The mother completed a questionnaire with seven questions pertaining to whether the target behaviors were important, the assessment and treatment were acceptable, and the effects were satisfactory. The questionnaire used a 7-point Likert scale (with a range of *1 strongly disagree* to *7 strongly agree*).

Results and Discussion

Figure 1 displays the results of Ally's FA. Problem behavior was observed at a high level with some variability during the test condition and at zero during the control condition. The results support that a function of problem behavior was access to tangibles. Figure 2 displays the results of the treatment evaluation. During baseline, S-FCR, C-FCRs, and tolerance responses were at zero, and problem behavior was high and variable. S-FCRs, C-FCRs, and tolerance responses increased when the criterion for the skill increased. However, complex FCRs decreased during the latter portion of tolerance training. This decrease is due to the increase in the delay to reinforcement (denoted by the vertical lines), which resulted in less opportunities to emit the response. Problem behavior (top panel) decreased to near zero levels after the introduction of teaching S-FCRs and initially increased in variability during the teaching of C-FCRs; however, it decreased to a low level for the latter part of the teaching phase. We observed an increasing trend in problem behavior during the return to baseline. As Ally learned to emit the tolerance skill and the delay increased, we observed a decrease in variability of problem behavior, which remained at low levels for the remainder of the condition. Although problem behavior continued to occur

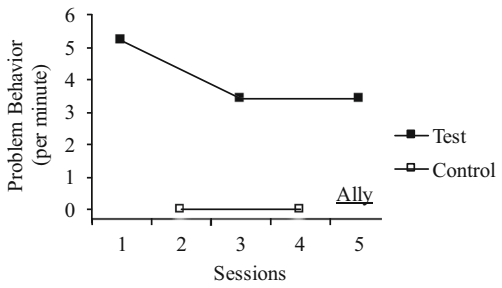

Fig. 1 Depicts rate of problem behavior across conditions

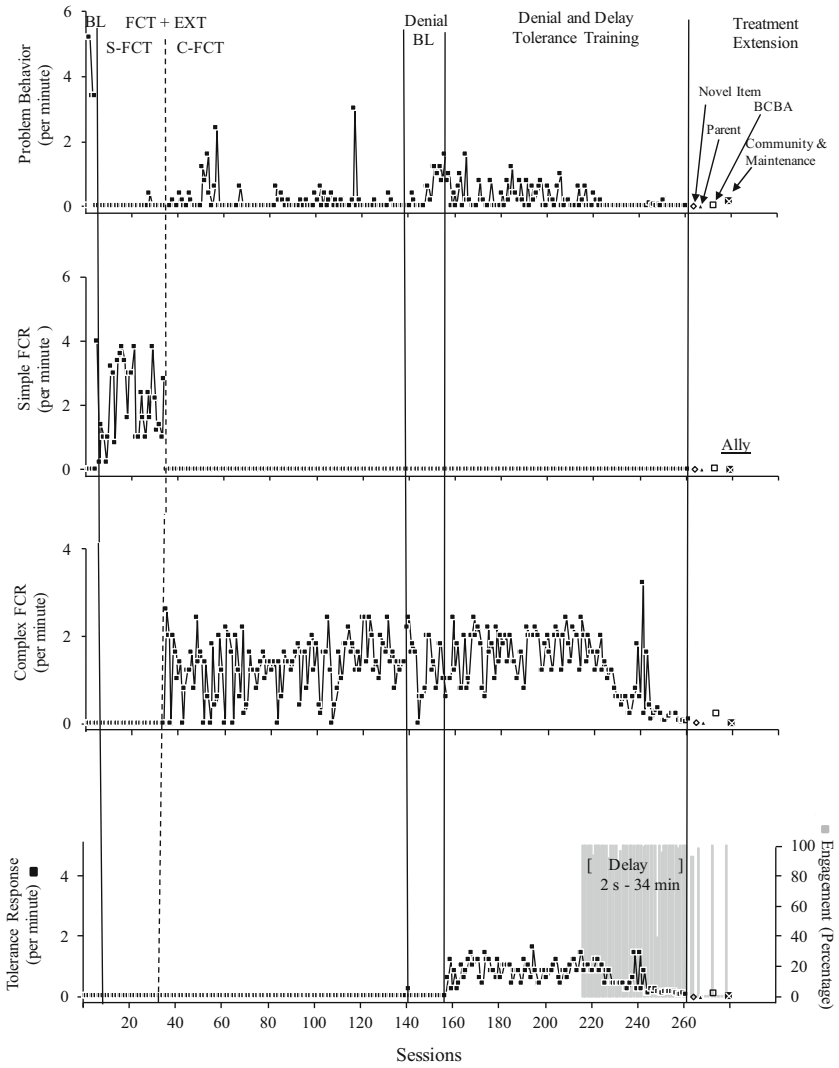

Fig. 2 Depicts the dependent variables across conditions. Vertical lines above sessions 218–259 on the bottom panel depict the delay systematically increasing from 2 s to 34 min. BL = baseline

at low levels during tolerance training, anecdotally, the intensity of problem behavior was greatly reduced (e.g., loud screaming reduced to short and low whine). During the treatment extension, Ally emitted the C-FCR and tolerance response while problem behavior remained at zero during three of the probe conditions. In sum, we thinned the delay to 34 min while requiring Ally to engage in less preferred activities (shower and homework) as she waited for highly preferred items (TV and iPad®). Additionally, results maintained following a 6-week vacation. The results of the social validity questionnaire demonstrated that Ally's mother *strongly agreed* that the behaviors were important (mean, 7), assessment and treatment process was acceptable (mean, 7), and the effects were satisfactory (mean, 7). Furthermore, she wrote that it was a wonderful experience and how pleased she was with the services and results with her daughter.

We replicated the results of Hanley et al. (2014), Santiago et al. (2016), and Jessel et al. (2018), which further support the generality of the assessment and treatment model described by Hanley et al. We observed treatment effects across novel stimuli, settings, people, and a 6-week vacation. We extended this line of research in several ways. First, we taught Ally to request the items by name (e.g., "May I have the [item] please"), which might remediate issues related to the social acceptability of teaching "My way," (e.g., it may be less acceptable for a child to state "My way, please" in the community). Our success in teaching specific requests may indicate that these procedures can be generalized across participants with stronger vocal-verbal repertoires, which further illustrates the generality of these procedures. Second, we successfully increased the delay to reinforcement to 34 min. Although Hanley et al. and Santiago et al. taught the children to tolerate delays to reinforcers, delays were relatively short. Based on session length, it can be inferred that the longest delay was at most 10 min. Although a 10-min delay may be a suitable goal for some children, identifying methods to teach children to tolerate longer delays is important to improve the generality. These lengthier delays are especially important if these procedures

are to be applied to participants with more advanced skills, who may be expected to tolerate delays for longer periods. Third, we demonstrated the utility of the assessment and treatment model with a home-based service provider with supervision from a BCBA® once per month and just 1–2 h of therapy dedicated to these goals per week. Santiago et al. (2016) assert they extended previous research by replicating the procedures with less BCBA® supervision, but they did not collect PI data. As the authors noted, when procedures are transmitted from experts to practitioners with varied training and education in less controlled environments, data on procedural integrity are necessary. Our inclusion of PI data in the present study further demonstrates that these procedures can be implemented with high levels of accuracy, even if a BCBA® is not implementing all procedures and/or offering intensive oversight. The results of this study suggest that procedures described by Hanley et al. may be more broadly applied than initially presented.

Compliance with Ethical Standards

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.

Ethical approval This article does not contain any studies with animals performed by any of the authors.

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

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

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