Incorporating trauma-assumed practices into the assessment and treatment of challenging behavior evoked by corrective feedback

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Abstract

Receiving corrective feedback can be challenging, yet it is essential for teaching new skills. Thus, learning to tolerate corrective feedback from others is a critical skill for accessing less restrictive environments. Our case study details the referral of a 7-year-old boy to a university-based outpatient clinic for the assessment and treatment of increasingly dangerous, challenging behavior. We integrated trauma-assumed approaches by (a) conducting a performance-based functional analysis with synthesized contingencies and (b) evaluating a treatment package (e.g., token system including task choice and graduated exposure across activities) to build tolerance of evocative properties of corrective feedback. We describe how clinical decision-making and trauma-assumed modifications during assessment and treatment reduced challenging behavior, increased tolerance of corrective feedback, and maintained these effects when treatment was extended to caregivers in the home.

Keywords

challenging behavior, corrective feedback, performance-based functional analysis, trauma-assumed

1 Theoretical and Research Basis for Treatment

Functional analysis is an empirical method for identifying environmental contingencies that influence the occurrence of challenging behavior (Hanley, 2012). In their foundational study,

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Iwata et al. (1982/1994) examined the self-injurious behavior of nine participants across multiple isolated test conditions and one omnibus control condition using a multielement design. In the social test conditions, a single putative reinforcer—social positive (i.e., attention) or social negative (i.e., escape)—was delivered contingent on self-injury. In the automatic reinforcement test condition, no social consequences were manipulated. The level of self-injury in each test condition was compared to the control, wherein social positive reinforcement in the form of adult attention and preferred toys were freely available, simulating a play or leisure context. Self-injury produced no social consequences in the control condition. Outcomes were differentiated across conditions within and between subjects, demonstrating an individualized method for identifying the function of self-injury. Researchers have since replicated and extended these procedures, demonstrating the reliability of the methodology across settings, response topographies, and populations (Beavers et al., 2013).

However, in recent years, some researchers have deviated from the original procedures described by Iwata et al. (1982/1994) in pursuit of a more practical, safe, or efficient analysis (Melanson & Fahmie, 2023). One such format is the interview-informed synthesized contingency analysis (IISCA). First described by Hanley et al. (2014) and later referred to as a component of the practical functional assessment (PFA; Rajaraman, Hanley, et al., 2022; Whelan et al., 2021), this format departed from testing isolated functions of challenging behavior in favor of including all suspected reinforcers in a synthesized contingency. The IISCA was informed by an open-ended functional assessment interview (Hanley, 2012), which was used to identify antecedent and consequence events that regularly precede and follow occurrences of challenging behavior. Synthesized reinforcers were presented in a single test and matched control condition, and outcomes of the analysis were evaluated in a multielement design. The only difference between the test and control conditions was the contingency for challenging behavior: synthesized reinforcers were delivered contingent on challenging behavior in the test condition and were freely available in the control. The IISCA was not designed to discriminate between different classes of reinforcers (i.e., discriminant validity; Tiger & Effertz, 2021) but to efficiently gain sufficient information about the variables controlling challenging behavior to develop an effective treatment (i.e., treatment utility; Rajaraman et al., 2022). Many studies have replicated and extended these procedures across participant characteristics (Coffey et al., 2020; Ghaemmaghami et al., 2018), settings (Metras et al., 2023; Santiago et al., 2016), and in consecutive controlled case series (Jessel et al., 2016; Rajaraman, Hanley, et al., 2022; Slaton et al., 2017), demonstrating the reliability and practicality of the analysis format.

Researchers have continued exploring additional IISCA modifications to increase efficiency and embed trauma-assumed approaches (Coffey et al., 2020; Jessel et al., 2023; 2023). The performance-based IISCA was first described by Metras and Jessel (2021) and later evaluated and validated by Iovino et al. (2022), Canniello et al. (2023), and Jessel et al. (2023). The performance-based format deviated from the original IISCA procedures in that the analysis was completed in a single test session. Within-session analysis of the occurrence of challenging behavior across reinforcer present and absent periods was used to establish experimental control (Jessel et al., 2020, 2023). Also unique to this format was the withdrawal of reinforcement based on the participant's performance: reinforcers were withheld only when the participant demonstrated a happy, relaxed, and engaged demeanor (Gover et al., 2022) without challenging behavior.

Jessel et al. (2023) proposed alignment between the performance-based IISCA and the four core commitments of the trauma-informed care framework: (a) acknowledging trauma and its potential impact; (b) ensuring safety and trust; (c) promoting choice and shared governance; and (d) emphasizing skill building (Rajaraman, Austin, et al., 2022). Alignment with these commitments may be beneficial for clients with intellectual and developmental disabilities who experience functional analyses, as they are more likely to experience potentially traumatic events

compared to those who do not (McDonnell et al., 2019; Rajaraman, Hanley et al., 2022). Specifically, Jessel et al. reduced exposure to evocative events, prioritized rapport building, and honored participant assent or assent withdrawal during the functional analysis. Additionally, skill building was prioritized in that the contingencies evaluated in the IISCA were used to design an intervention that taught participants a repertoire of meaningful skills, like functional communication, toleration, and cooperation (Hanley et al., 2014; Jessel et al., 2023; Rajaraman, Hanley, et al., 2022). There exists a robust literature on the efficacy of this treatment package (referred to as "skills-based treatment") in reducing challenging behavior and increasing meaningful, functional skills (Jessel et al., 2018; Layman et al., 2023).

We present this case study as one example of how researchers and clinicians may bridge the well-documented research-to-practice gap (Begeny et al., 2023; Carnine, 1997) and integrate trauma-assumed[1] approaches during the assessment and treatment of challenging behavior. To our knowledge, this complex and idiosyncratic case presentation has not been otherwise shown in the research literature and has presented several clinical obstacles. Specific to our case, multiple adverse childhood experiences (Hartley et al., 2023) were reported during intake, we experienced difficulty suppressing challenging behavior when all suspected reinforcers were provided, and we encountered illusive evocative properties of corrective feedback delivery. The clinical team used a single-session performance-based functional analysis to demonstrate within-session control over challenging behavior (i.e., presentation of instructions, removal of tangibles, and limited attention). In treatment, graduated exposure was used to teach the client to tolerate increasingly evocative properties of corrective feedback while cooperating with instructions. Treatment resulted in challenging behavior suppression, and these effects were maintained when the intervention was transferred to the home setting and implemented by caregivers.

These case complexities led us to adopt a trauma-assumed lens from the onset. We remained responsive to subtle changes in client behavior throughout assessment and treatment, providing a unique opportunity to link existing research to our clinical decision-making process. Our purpose is to provide a case example of how the flexible application of trauma-assumed behavior-analytic approaches can be used to design an individualized assessment and treatment that leads to a successful outcome.

2 Case Introduction

Nash (pseudonym), a 7-year-old White male, was diagnosed with autism spectrum disorder, attention-deficit/hyperactivity disorder, and other specified disruptive, impulse-control, and conduct disorder. Nash verbally communicated his wants and needs using complete sentences in English, his family's primary language. Nash lived at home with his biological parents and four siblings. He had a family history of schizophrenia, depression, and anxiety, and his siblings were diagnosed with attention-deficit/hyperactivity disorder and cerebral palsy. Nash was enrolled in a second-grade general education classroom in a public elementary school. Although formal academic test scores were not available upon admission, his caregivers reported that his grades were above average compared to his same-aged peers.

3 Presenting Complaints

A behavioral healthcare agency referred Nash to a university-based outpatient clinic specializing in assessing and treating severe challenging behavior. He attended behavioral therapy for 15 hours per week (3 hours per day, 5 days per week). The topographies of challenging behavior reported were aggression, property destruction, and self-injurious behavior.

During a pre-admission evaluation, Nash's caregivers reported that challenging behavior occurred multiple times every day over the last five years, most frequently at home with caregivers and siblings. Caregivers reported a more recent increase in the frequency and intensity of challenging behavior and the emergence of novel topographies such as suicidal ideation (e.g., threats and attempts to self-harm). His challenging behavior was a barrier to completing everyday activities with his family (e.g., going to the store) and limited participation in extracurricular activities.

Caregivers attempted to use strategies to manage challenging behavior, including modifications to antecedent (i.e., access to preferred items, environmental modifications) and consequent events (i.e., providing attention, reprimands, time out, removal of preferred items, minimizing attention, redirection, playing preferred music, and restraint/protective equipment). However, these strategies were reported to be ineffective.

4 History

Nash received outpatient behavioral health services from a psychologist at a local children's hospital bi-monthly since age two. Due to the persistence of challenging behavior, the psychologist recommended increased support. Shortly after, Nash was enrolled in applied behavior analytic services. Though multiple agencies evaluated him, he was disenrolled shortly after due to either (a) unsafe levels of challenging behavior, including damage to multiple therapy spaces, or (b) demonstrating skills at a level beyond the scope of services provided (i.e., he quickly mastered over 400 targets). Attempts to re-enroll Nash in similar programs were unsuccessful, resulting in a lapse of services for approximately 2 years.

Inconsistent and intermittent services were coupled with persistent challenges in the school setting. Nash received out-of-school suspension five times in the six months before his admission due to breaking items, flipping desks, and self-injurious behavior. On many occasions, due to failed attempts at de-escalation, Nash was removed from his classroom and relocated to a safe space until his caregivers arrived. During one behavioral episode, law enforcement was called to assist school staff in maintaining safety. On two occasions, Nash's behavioral episodes resulted in emergency room visits. One injury Nash sustained required stitches. These experiences align with common adverse childhood experiences (Hartley et al., 2023).

5 Assessment

Settings, Materials, and Implementers

All assessment sessions were conducted in a 3.7 m by 3.0 m therapy room in a university-based outpatient clinic. The room contained a one-way mirror, a two-way intercom, and padding covering the walls and floors. Assessment materials included Nash's preferred items (e.g., iPad, uno cards, Legos, sensory items), instructional materials (e.g., folder tasks, laundry, wiping), a table, and two chairs. Nash's caregivers conducted structured descriptive assessment sessions, and members of Nash's clinical team conducted functional analysis sessions.

Response Definitions and Measurement

Challenging behavior topographies were scored in two categories: nondangerous and dangerous behavior. Nondangerous behavior included any instance of inappropriate vocalizations, crying, whining, head rocking, leg shaking, or sighing. Dangerous behavior included self-injury (e.g., self-biting, punching, scratching, and hitting), aggression (e.g., grabbing, scratching, pinching, and hitting others), and property destruction (e.g., breaking, throwing, swiping, and kicking items

and surfaces). Additional measures recorded were appropriate requests and calmness. Appropriate requests included any reasonable request Nash made that therapists could honor (e.g., "leave the room" or "take a break"). Calmness was defined as Nash engaging with the therapist, reinforcers, environmental materials, or some combination while displaying a positive or neutral affect. We calculated the rate of challenging behavior by dividing the frequency of dangerous or nondangerous responses by the session duration in seconds and multiplying by 100. Each instance of challenging behavior or an appropriate request was recorded, specified by its timestamp and whether the responses occurred in a reinforcer absent interval (RAI) or reinforcer present interval (RPI).

Procedures

Pre-Assessments. During Nash's admission, we completed a functional behavior assessment, including pre-assessments (i.e., indirect and descriptive) and a functional analysis to identify the environmental conditions maintaining his challenging behavior. The pre-assessments were conducted to gain information from Nash's caregivers about his challenging behavior. First, we completed a record review of Nash's medical history and pre-admission evaluation. Next, we conducted a caregiver interview consisting of open-ended response questions and rating scales (i.e., Functional Analysis Screening Tool; Iwata et al., 2013; Destructive Behavior Severity Scale; Fisher et al., 2022). Caregivers reported that Nash most often engaged in challenging behavior at home when access to preferred items and activities were denied and when he was asked to wait. The Functional Analysis Screening Tool results indicated that Nash engaged in challenging behavior to gain access to preferred items and attention, escape instructions, access sensory stimulation, and attenuate pain (i.e., each of the four functions the tool evaluated).

Following the interview, we completed a structured descriptive assessment (Vollmer et al., 2001) with Nash's caregivers to identify the environmental antecedent and consequence events correlated with Nash's challenging behavior. The assessment included one evaluation each of attention, escape, tangible, and play (control) conditions. Each condition was a maximum of 5 mins (escape terminated early due to high rates of challenging behavior) and was conducted by Nash's caregiver in a padded clinical room. In all conditions, we instructed the caregiver to implement the programmed antecedent event (i.e., divert attention, provide daily living task instructions, or remove preferred tangible items from Nash's possession) and respond to challenging behavior as they typically would at home. Nash only engaged in challenging behavior in the escape condition, when his mother instructed him to fold clothes. The episode persisted even after his mother removed all instructional materials and no longer provided instructions. Collectively, the pre-assessment results did not provide clear evidence supporting a hypothesis of behavioral function. However, the clinical team noted that challenging behavior was evoked by Nash's mother's corrective feedback in the escape condition of the structured descriptive assessment. Pre-assessments were completed over the course of 9 hrs.

Functional Analysis. The pre-assessment results, combined with Nash's history of potentially adverse childhood experiences, led the clinical team to take a trauma-assumed approach to the functional analysis. Specifically, the pre-assessment results showed that Nash's challenging behavior was difficult to suppress once evoked, presenting a safety risk.

The functional analysis was intentionally designed to include trauma-assumed procedures informed by the literature. That is, the pre-assessment results informed the synthesized reinforcer absent intervals (RAI; Jessel et al., 2023) and reinforcer present intervals (RPI; Jessel et al.) in a single test session (based on procedures described by Canniello et al., 2023; Iovino et al., 2022), and conclusions were derived from within-session responding (Jessel et al.; Metras & Jessel, 2021).

Before each session, the therapist provided Nash access to all suspected reinforcers, including preferred items (e.g., iPad, uno playing cards, Legos, sensory items), and attention (e.g., discussing preferred topics, delivering praise), followed Nash's lead, and did not provide instructions for at least 5 min. We used a performance-based criterion (similar to procedures described by Canniello et al., 2023; Iovino et al., 2022; Jessel et al., 2023) to begin the session. When Nash demonstrated calmness for at least 1 min, the therapist initiated an RAI. To signal the beginning of the RAI, the therapist stated, "It's time for work," minimized their attention, removed preferred items, and instructed Nash to complete increasingly difficult academic instructions (e.g., math facts) and chores (e.g., wiping table, folding clothes). Each component of the RAI was progressively presented by the therapist (similar trauma-assumed procedures to minimize escalation have been described by Canniello et al., 2023; Jessel et al., 2023; Rajaraman, Hanley, et al., 2022).

Contingent upon Nash exhibiting any dangerous or nondangerous response or appropriate request (using an open-contingency class in functional analyses, a modification described by Warner et al., 2020), the therapist immediately initiated the RPI. All analysis sessions included three RAI presentations or were terminated after 20 min elapsed regardless of the number of RAI presented. These procedures deviated from those described by Jessel et al. (2023; i.e., three RAI presentations were targeted in each session rather than five). We intentionally departed from the Jessel et al. procedures to simultaneously reduce RAI exposure and the potential of evoking dangerous behavior while preserving functional control. For example, three demonstrations of the occurrence of challenging behavior during RAIs and quick suppression in RPIs would have provided sufficient evidence of functional control over challenging behavior. Additionally, if functional control had not been demonstrated following three RAI exposures, it would have allowed us to identify that analysis modifications were necessary quickly. In the RPI, the therapist terminated their instructions and provided access to all preferred items and their attention. After Nash demonstrated calmness for at least 1 min, the therapist initiated another RAI. If Nash did not demonstrate calmness, the RPI and data collection continued until the session was terminated at 20 min.

Three test session iterations were required to achieve within-session control. Hypothesis-driven modifications (i.e., providing affirming statements during instructions, not removing instructional materials during RPIs, or introducing a new therapist following challenging behavior) were made following each iteration. These modifications are summarized in Table 1. Figure 1 shows within-session analyses of each session. Elevated rates of dangerous behavior were observed in the first two sessions, persisting even when the assumed reinforcers were delivered, and the episodes continued for up to 50 min. In subsequent sessions, we omitted corrective feedback due to the persistence of challenging behavior. When reinforcers were provided at the first sign of nondangerous behavior (i.e., sigh), challenging behavior was immediately suppressed. Although within-session control was achieved in Session 3, this iteration included a resource-intensive context switch (i.e., a new therapist entered the room) contingent on challenging behavior. Therefore, the clinical team conducted an additional session identical to Session 3 with the context switch omitted. The same results were achieved in Session 4. The functional analysis was completed over the course of 6 hrs. Overall, Nash's assessments (i.e., pre-assessments and functional analysis) were completed in 15 hrs.

6 Case Conceptualization

Functional analysis results suggested that Nash's challenging behavior was maintained by escape from instructions to access preferred items and attention. Important to note, however, is that corrective feedback was not directly evaluated in all functional analysis sessions; challenging behavior was reliably evoked each time it was delivered in Sessions 1 and 2 and the structured descriptive assessment. Moreover, each time Nash engaged in challenging behavior following

Table 1. Functional Analysis Synthesized Contingency Modifications.

Iteration	Pre-session Procedures	Reinforcer Absent Interval	Reinforcer Present Interval
1	—	The therapist stated, "It's time for work," minimized their attention, and instructed Nash to put his preferred items away. The therapist then instructed Nash to complete increasingly difficult academic instructions (e.g., math facts) and chores (e.g., wiping the table and folding clothes).	The therapist immediately terminated their instructions, removed the instructional materials, and provided Nash access to preferred items (e.g., tablet computer) and their attention.
2	All materials in the session room were limited. The therapist reminded Nash that he could ask for "help" if he needed it at any time during the session.	Identical to Reinforcer Absent Interval 1	The therapist immediately terminated their instructions, and related materials were not removed. The therapist provided reassuring statements (e.g., "It's okay; you can play with your iPad) and access to preferred items (e.g., iPad) and their attention.
3	All materials in the session room were limited. The therapist provided Nash with an overview of what he would experience in each session and reminded him that he could ask for "help" if he needed it at any time during the session.	The therapist stated, "It's time for work," minimized their attention, and allowed Nash to keep his preferred items accessible. The therapist then instructed Nash to complete increasingly difficult instructions. Academic (e.g., math facts) and chores (e.g., wiping the table and folding clothes) instruction delivery was interspersed, and the therapist did not deliver corrective feedback.	The therapist immediately terminated their instructions, related materials were not removed, the therapist left the room, and another one entered. The new therapist provided reassuring statements (e.g., "Oh, I'm sorry, you can have your iPad) and access to preferred items (e.g., iPad) and their attention.
4	Identical to Pre-Session 3	Identical to Reinforcer Absent Interval 3	Identical to Reinforcer Present Interval 2

corrective feedback, the episode persisted even after all programmed reinforcers were provided. Despite the inability to demonstrate functional control over challenging behavior when corrective feedback was provided in the analysis, the clinical team deemed that the safety risk posed by Nash's dangerous behavior outweighed the benefit of further assessment. Nonetheless, it remained clear that corrective feedback was an evocative event requiring intervention. Therefore, we developed a treatment that focused on teaching Nash to tolerate corrective feedback while co-operating with instructions when, at times, his reinforcers were unavailable.

During the functional analysis, the clinical team observed Nash independently identify his errors and attempt to remediate them before the therapist provided corrective feedback. Thus, we hypothesized that Nash preferred to complete instructions accurately and remediate errors

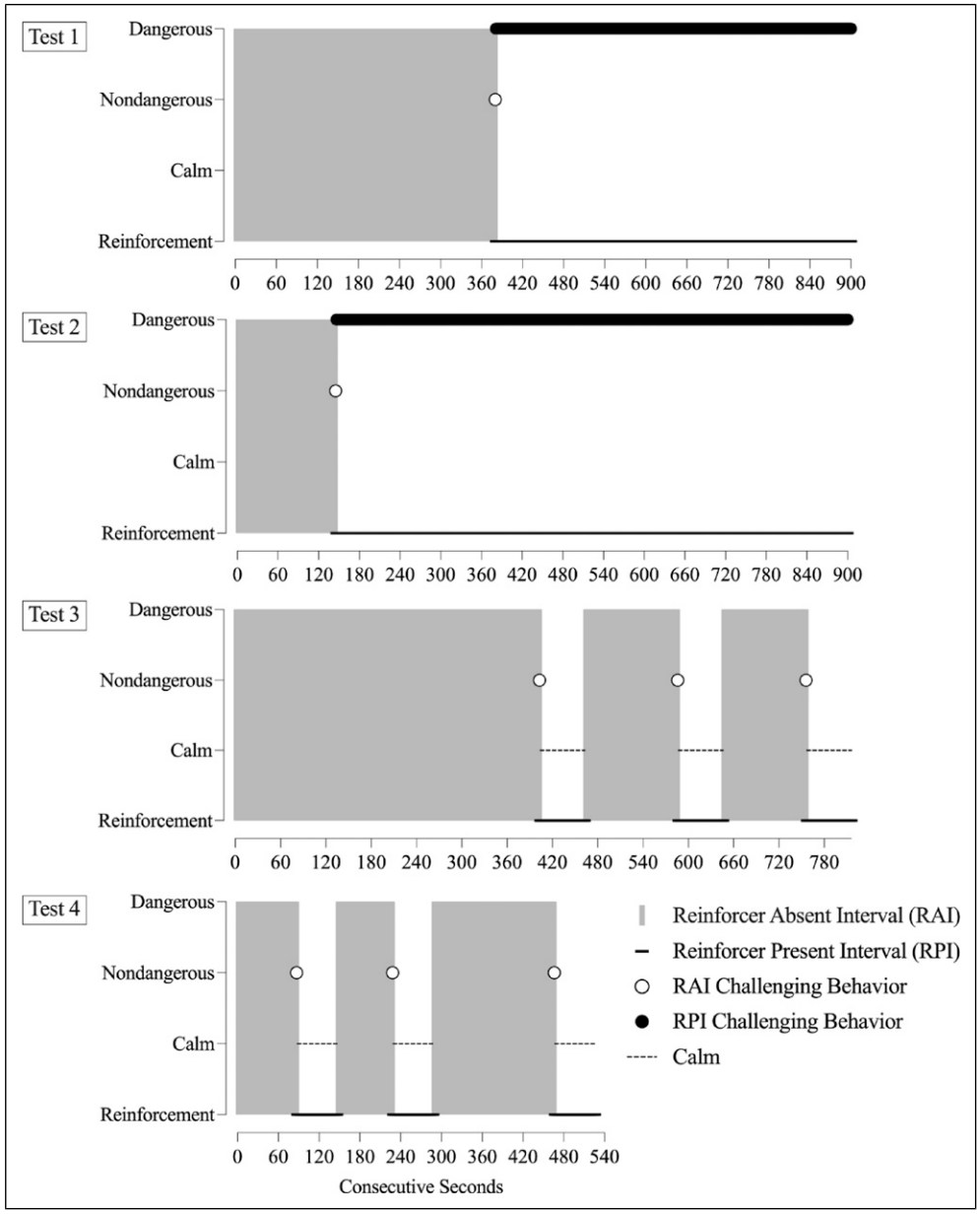


Figure 1. Within Session Analysis of the Performance-Based Synthesized Contingency Analysis. *Note*. If Nash exhibited challenging behavior during the functional analysis and did not demonstrate calmness for 1 min, the RPI and data collection continued. All analysis sessions were terminated after 20 mins elapsed regardless of the number of RAI presented.

independently. In Session 2, the therapist reminded Nash that he could ask for help or a break. Although these responses were in his vocal-verbal repertoire, he never emitted either request in session. Therefore, we deviated from a typical functional communication training approach (i.e., teaching a response to access programmed reinforcers) to treat Nash's challenging behavior.

Because we were unable to identify or control the evocative properties of what Nash experienced as an error nor the reinforcers associated with avoidance or escape, we felt that teaching Nash to tolerate corrective feedback was critical.

7 Course of Treatment and Assessment of Progress

Settings, Materials, and Implementers

Treatment sessions took place in the same therapy room as the functional analysis. During the treatment extension, sessions were conducted in spaces simulating environments Nash typically experienced (i.e., classroom, playroom, and a mock apartment) outside the clinic and in Nash's home. The treatment materials were the same as in the assessment, with the addition of a token board and a choice board depicting available reinforcers (e.g., iPad, uno playing cards, gym). Members of the clinical team implemented all treatment sessions. Nash's caregivers were trained to implement treatment sessions during the treatment extension.

Response Definitions and Measurement

Response definitions and measurement for dangerous and nondangerous behavior and appropriate requests were identical to the functional analysis. In addition, we recorded the frequency of corrective feedback delivery, defined as any instance of the therapist telling Nash that a task he completed could have been improved and needed correction. For example, after Nash completed a task, the therapist may have stated, "That was close, it is this one," "Fold it like this," or "Actually, do it this way." We used the same procedures to calculate the rate of challenging behavior as in the functional analysis. As a summary measure, rates of challenging behavior were summed across sessions in each phase and divided by the total number of sessions in the phase. We calculated the mean frequency of corrective feedback by dividing the sum of feedback across all sessions in each phase by the total sessions in the respective phase.

Interobserver Agreement. A second data collector independently collected data on all primary dependent variables (i.e., nondangerous behavior, dangerous behavior, and corrective feedback delivery). Interobserver agreement (IOA) was assessed using the partial interval agreement method. Sessions were divided into 10 s intervals. Intervals with exact agreement were scored 1, and intervals with partial agreement were scored by dividing the smaller value by the larger value. The sum of all intervals was divided by the total number of intervals and multiplied by 100 to yield a percentage. Interobserver agreement was assessed for 50% of sessions in the functional analysis, 47.10% in the contingency reversal, 41.46% in the differential reinforcement and graduated exposure phase, and 20% in the treatment extension phase. Mean agreement was 99.04% (range: 88.46%–100%) for all dependent variables in the functional analysis, 100% in the contingency reversal, 99.31% (range: 56.67%–100%)[2] in the differential reinforcement and graduated exposure phase, and 96.83% (range: 93.33%–100%) in the treatment extension phase.

Procedures

Baseline and Contingency Reversal. Baseline sessions were identical to Session 1 of the functional analysis. Although we achieved strong within session control over Nash's challenging behavior in Sessions 3 and 4, we specifically opted to replicate Session 1 because corrective feedback was not included in the final two test sessions. Thus, sessions including corrective feedback provided an adequate baseline for our treatment to teach Nash to tolerate corrective feedback. We used an

Table 2. Assessment and Treatment Components Aligned With Trauma-Assumed Commitments.

Commitments	Procedures	Examples[a]
	Functional Analysis	
Acknowledge trauma and its impact	1. Pre-assessment and ongoing caregiver input	1. Gover et al. (2024)
	2. Reducing exposure to evocative events (RAIs)	2. Canniello et al. (2023) Jessel et al. (2023)
	3. Progressive EO introduction	3. Ghaemmaghami et al. (2018) Ward et al. (2021)
Ensure safety and trust	1. Open contingency class	1. Schmidt et al. (2020) Warner et al. (2020)
	2. Session termination criteria	2. Frank-Crawford et al. (2023) Iwata et al. (1982/1994)
Promote choice and shared governance	1. RAI and RPI contingent on participant behavior	1. Canniello et al. (2023) Jessel et al. (2023)
	2. No physical guidance used	2. Metras et al. (2023) Rajaraman et al. (2024)
Emphasize skill building	–	–
	Treatment	
Acknowledge trauma and its impact	1. Open contingency class	1. Slaton et al. (2024)
	2. No physical guidance used	2. Rajaraman et al. (2021) Staubitz et al. (2022)
Ensure safety and trust	1. Session termination criteria	1. Slaton et al. (2024)
	2. Participants relinquished preferred items independently	2. Metras et al. (2023)
	3. Adjust expectations when dangerous behavior occurs	3. Metras et al. (2023) Slaton et al. (2024)
Promote choice and shared governance	1. RAI and RPI contingent on participant behavior	1. Metras et al. (2023)
	2. Choice of activities or tasks to complete	2. Chotto et al. (2024) Staubitz et al. (2022)
Emphasize skill building	1. Skills targeted across activities	1. Slaton et al. (2024)
	2. Treatment extension	2. Metras et al. (2023) Rajaraman et al. (2022) Slaton et al. (2024)

Note. RAI = Reinforcer absent interval. EO = Programmed establishing operation. RPI = Reinforcer present interval.
[a]The examples provided above are illustrative and not an exhaustive list.

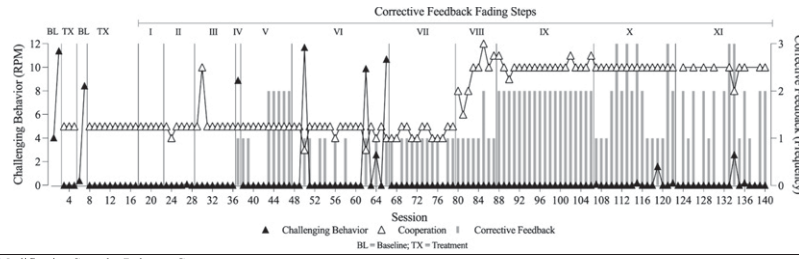
ABAB reversal design to demonstrate experimental control (Gast et al., 2018). Nash experienced a brief contingency reversal after our treatment sufficiently suppressed challenging behavior.

Treatment. Nash's treatment package consisted of differential reinforcement of alternative behavior, a token economy, and graduated exposure to increasingly evocative properties of corrective feedback. Table 2 depicts assessment and treatment components aligned with trauma-assumed commitments. Each session was 10 min and began with the therapist stating, "It's time for work," and allowing Nash to independently stop what he was doing and relinquish the

preferred items or activities with which he was engaging (e.g., Rajaraman et al., 2021; Slaton et al., 2024; Staubitz et al., 2022). If Nash did not independently relinquish his preferred items within 30 s, the therapist reminded him that it was time for work and that he could earn tokens for a break to play with his preferred items. The therapist then minimized their attention and provided Nash a choice between two tasks (e.g., math, geography, wiping the table). Following Nash's selection, the therapist delivered instructions related to the relevant task (e.g., "match isthmus" and "fold the sweatshirt"). Nash independently selected a task in all treatment sessions. If Nash had not selected, the therapist would have used two-step prompting (e.g., verbal, model) procedures until he did.

The token reinforcement system consisted of FR-1 production/FR-5 exchange after establishing tokens as conditioned reinforcers. Regardless of accuracy, the therapist delivered a token and verbal praise for each instruction Nash completed. If Nash did not initiate the task within 5 s following an instruction, the therapist used two-step prompting to facilitate cooperation. If nondangerous behavior occurred, the therapist minimized their attention until Nash exhibited calmness, as described in the functional analysis. If responses escalated to dangerous topographies, all large and breakable items were removed from the room to maintain safety, and the session was terminated. After Nash earned five tokens on his token board (i.e., completing five instructions without challenging behavior), he exchanged his terminal token with the therapist. The therapist delivered verbal praise and presented Nash with a choice board depicting available reinforcers (e.g., iPad, uno playing cards, gym). Nash selected a reinforcer and was permitted access for the remainder of the session.

Differential Reinforcement and Graduated Exposure Procedures. Sessions were identical to the treatment phase but included graduated exposure to evocative properties of corrective feedback.



Treatment Modification Steps by Relevant Category	
Applicability included incorporating relevant tasks that Nash was typically asked to complete at his school and home	
I.	The therapist chose the task Nash completed
II.	The tasks Nash completed included chores
III.	Nash was given a "reverse card to exchange to change the instruction provided
V.	Nash was no longer asked to complete chores, and one instance of gamified corrective feedback was delivered (e.g., holding up three UNO cards backward and asking Nash to touch the one he thought was the yellow 4)
VI.	Nash was asked to complete novel tasks (e.g., academic tasks, crafts), and one instance of corrective feedback was delivered based on naturally occurring opportunities
VIII.	The token exchange schedule was increased from FR-5 to FR-8, then FR-10
X.	Sessions were conducted using baseline conditions and the treatment package in place
XI.	Sessions were conducted in 10 min rotating intervals of academic work, chores, group play, and independent play
XII.	Various generalization steps were programmed, including novel therapists, varying the number of therapists present, novel settings, and pairing the highest-preferred reinforcers with the least-preferred session intervals
Sensitivity included altering the suspected aversive features of corrective feedback, including the phrasing, clarity, and directness	
IV.	Nash was provided the penultimate token after completing a chore, corrective feedback and an edible reinforcer were simultaneously, and the terminal token was provided for any attempt that Nash made to cooperate with the feedback
X.	See above
Frequency included varying the number of corrective feedback statements delivered in one session	
IV and VI.	See above
IX.	Two corrective feedback statements were delivered
XII.	See above
Immediacy included varying the degree of temporal locus between task completion and corrective feedback delivery	
VI.	Two or three instructions were delivered between task completion and corrective feedback

Figure 2. Differential reinforcement and graduated exposure.

These properties were grouped into the following categories: immediacy, frequency, sensitivity, and applicability. Immediacy was defined as varying the degree of temporal locus between task completion and the delivery of corrective feedback. Frequency was defined as varying the number of corrective feedback statements delivered in one session. Sensitivity was defined as altering the suspected aversive features of feedback, including phrasing, clarity, and directness. Applicability was defined as incorporating relevant tasks that Nash was asked to complete at his school and home. The clinical team used direct observation and ongoing visual analysis to determine when to introduce features of corrective feedback. The bottom panel of Figure 2 shows the modifications the clinical team made to the treatment package and the delivery of corrective feedback over the course of Nash's admission. The clinical team began extending treatment after Nash learned to tolerate corrective feedback while engaging in minimal challenging behavior.

Treatment Extension. Extension steps were programmed in fading step 12, as described in Figure 2. Sessions were conducted with novel staff, in novel settings (e.g., a mock apartment, Nash's home, a clinic classroom, and a clinic playroom), and with corrective feedback statements based on naturalistic opportunities. Additionally, the features of reinforcement were manipulated (e.g., available choices and quality of attention). Nash's caregivers were trained to implement treatment procedures as treatment effects were maintained.

Figure 2 displays the results of Nash's treatment. Nash was taught to tolerate corrective feedback and continue cooperating with instructions without engaging in challenging behavior. In treatment modification steps 1–3, no corrective feedback was delivered, and minimal challenging behavior was observed. In step 4, challenging behavior increased (M = 8.90 RPM), so the clinical team regressed a step to increase safety before increasing the evocative properties of corrective feedback. In step 5, feedback was delivered in a game-like manner, and the therapists delivered more instances of corrective feedback with a continued decrease in challenging behavior. In step 6, challenging behavior was variable when novel demands and corrective feedback statements were introduced. Due to this variability, the treatment team altered the immediacy of corrective feedback to decrease its presumed aversiveness during fading step 7. Challenging behavior did not occur, and corrective feedback was delivered on average 0.85 times per session in this phase (range: 0–1 instance). During steps 1– 7, Nash's mean cooperation with instructions was 4.88 (range: 3–10). In steps 8 and 9, challenging behavior remained low while the frequency of corrective feedback was increased (range: 1–2 instances; M = 1.74). During step 10, challenging behavior remained at low levels (range: 0–1.60 RPM; M = 0.13 RPM) with variable instances of corrective feedback being delivered (range: 1–3 instances; M = 1.81 instances). During step 11, a structured schedule was introduced, and challenging behavior remained at low levels across all contexts (range: 0–2.60 RPM; M = 0.16 RPM) with variable instances of corrective feedback provided (range: 0–3 instances; M = 1.44 instances). During steps 8–11 the response requirement was systematically increased to FR-10 and Nash's mean cooperation with instructions remained high at 9.91 (range: 6–12).

The treatment was extended to various settings that simulated contexts Nash regularly encountered outside the clinic, and caregivers implemented treatment procedures. Figure 3 displays a summary across all treatment phases included in the evaluation. In baseline, Nash engaged in high levels of challenging behavior (M = 6.07 RPM) and received low levels of corrective feedback (M = 0.25 instances). Additionally, he tolerated 0% of the corrective feedback delivered. In treatment, Nash engaged in moderate levels of challenging behavior (M = 3.00 RPM) and received increased levels of corrective feedback (M = 0.99 instances). He tolerated 92% of the corrective feedback delivered in this phase. In the treatment extension, Nash engaged in low levels of challenging behavior (M = 0.27 RPM) and received moderate levels of corrective feedback (M = 0.65 instances). He tolerated 91% of the corrective feedback delivered in this phase. Thus,

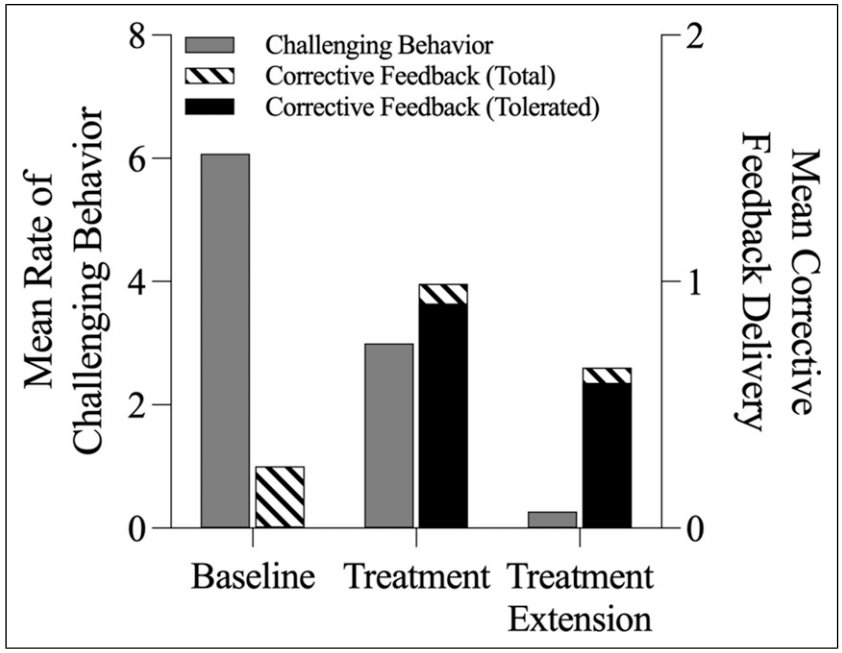


Figure 3. Comparison of challenging behavior and corrective feedback across phases.

our treatment package increased Nash's tolerance of corrective feedback while he engaged in minimal challenging behavior, and these effects were maintained across settings and implementers.

8 Complicating Factors

A notable complicating factor we encountered during the assessment was difficulty suppressing Nash's challenging behavior despite providing him access to all hypothesized reinforcers (i.e., the therapist terminated all instructions and provided access to preferred items and attention) in the functional analysis. Episodes of dangerous behavior evoked in early iterations of the functional analysis lasted up to 50 min and required 2 to 3 staff to maintain safety. When a dangerous episode occurred, the clinical team attempted multiple de-escalation strategies. For example, the therapist offered assistance and additional reinforcers (e.g., snacks, gym). Notably, during one episode in which these strategies failed, the therapist even attempted to use humor as a redirection strategy and pretended to trip over items in the room. It was not until corrective feedback was no longer delivered and challenging behavior resulted in a context change (i.e., a new therapist switched out the current therapist conducting the functional analysis) that functional control over Nash's challenging behavior was demonstrated.

Although Nash demonstrated success in the clinic, the clinical team faced several challenges during the treatment extension. The physical setting included various stimuli in the environment that the clinical team did not initially account for, including pets, siblings, furniture, and electronics. Thus, there were more opportunities for Nash to encounter corrective feedback incidentally. In one instance, when corrective feedback was delivered incidentally, and a large episode of challenging behavior was evoked, the environment posed various safety risks (e.g., water on the floor, sharp objects in proximity). Therefore, the clinical team implemented several strategies to

address these challenges. For example, after each challenging behavior episode, the clinical team debriefed by discussing effective or ineffective strategies and ways to mitigate barriers. Additionally, the clinical team prioritized building rapport with Nash and his family in the home setting before reintroducing treatment sessions. When treatment sessions were reintroduced, cooperation expectations were gradually faded into sessions.

9 Access and Barriers to Care

Nash's admission was insurance-funded, and one barrier the clinical team faced was limited assessment hours. Only 15 assessment hours were funded. Therefore, the clinical team had to strategically plan and balance obtaining the necessary information from the assessments while using a trauma-assumed approach. As such, an efficient and performance-based analysis was an ideal assessment format to obtain the necessary information to develop an effective treatment.

10 Follow-Up

Following Nash's admission, the clinical supervisor provided outpatient consultation by conducting weekly email check-ins (a communication format nominated by Nash's caregivers) for 9 weeks. Before discharge, the clinical team offered Nash's caregivers various options to assist with the transition, including training school staff and completing home visits or booster sessions. Nash's caregivers declined additional support. In weekly email communication, the clinical supervisor monitored Nash's behavior and caregiver adherence to treatment recommendations and provided suggestions when obstacles were reported. After the 9-week follow-up, the supervisor transitioned out of their role, and another clinical team member served as the primary contact for Nash's caregivers. Follow-up services are ongoing and will continue for two years post-discharge to ensure continued support and progress.

11 Treatment Implications of the Case

Our clinical team sought to employ a trauma-assumed approach to Nash's assessment and treatment, given the potential adverse childhood events reported in his evaluation. Using a flexible approach, as informed by the literature, Nash's challenging behavior was substantially reduced across phases as corrective feedback was increased across treatment sessions in the clinic and the home. The treatment implications of this case are threefold: (a) functional analysis modifications can be adapted using clinical decision-making while adhering to commitments of trauma-assumed care, (b) the same can be done during treatment, and (c) a flexible and conceptually systematic clinical approach is essential to achieving both.

The clinical team intentionally selected a performance-based functional analysis format. As Jessel et al. (2023) described in relation to the performance-based IISCA, allowing clients to have control over the presentation of evocative events in a functional analysis is aligned with trauma-assumed practices. The performance-based format was also helpful for addressing obstacles related to difficulty suppressing Nash's challenging behavior once evoked. Reducing exposure to evocative events and providing Nash control over their presentation likely contributed to the immediate suppression of challenging behavior in the analysis when all hypothesized reinforcers were delivered following each occurrence. However, the iterative process of designing RAIs and RPIs (see Table 1) suggests that additional modifications were necessary to demonstrate control over challenging behavior in the functional analysis. Notably, in the final analysis iteration, after control over challenging behavior was achieved, the clinical team evaluated if control would be maintained when a resource-intensive context change was omitted (i.e., introducing a new therapist contingent on challenging behavior). Control was

maintained despite the omission. These results support previous research demonstrating that functional control over challenging behavior was not impacted when analyses were conducted in contexts with varying features (e.g., Rajaraman, Hanley, et al., 2022). These outcomes would likely not have been possible without the clinical team's responsiveness to Nash's behavior and flexibility in adjusting procedures throughout the process.

The clinical team employed the same approach in developing and executing Nash's treatment. From the onset, teaching Nash to tolerate corrective feedback in various situations he regularly encountered while maintaining safety was paramount. Therefore, trauma-assumed graduated exposure techniques demonstrated by previous studies to be effective in increasing tolerance and minimizing escalation (e.g., Gover et al., 2023, 2024) were used to teach Nash to tolerate corrective feedback. Much like the functional analysis, treatment was an iterative process (see Figure 2). The positive assessment and treatment outcomes may be best attributed to the clinical team's conceptually systematic approach. For example, the clinical team programmed for the transfer of treatment effects to Nash's caregivers early in the treatment extension phase. Moreover, the clinical team was immediately responsive to any indication that the generality of treatment outcomes was compromised. Specifically, when Nash exhibited a dangerous episode of challenging behavior in the home setting during the treatment extension, instead of persisting through this re-emergence of challenging behavior, the clinical team took a step back by building rapport with Nash and his caregivers in the home setting. Treatment expectations were carefully and gradually reintroduced, and Nash's treatment was successfully extended to his caregivers.

12 Recommendations to Clinicians and Students

We recommend that clinicians and students remain open to the various approaches to assessing and treating challenging behavior. Although protocols for implementing best practices exist, we hope the present case example emphasizes the importance of flexibility in clinical decision-making. A trauma-assumed and individualized approach to the assessment and treatment of Nash's challenging behavior was made possible through the synthesis of published examples of relevant modifications.

Although the outcomes of this case study were overwhelmingly positive, they were not without limitations. Many trauma-assumed elements were incorporated throughout the assessment and treatment process but were not all-encompassing. Trauma-assumed practices exist on a continuum—clinicians may consider how trauma-assumed practices not included in this case study may improve outcomes for clients with similar referral concerns to Nash (e.g., assent-based approaches; Rajaraman et al., 2021). Further, although the acceptability of the goals, procedures, and outcomes of Nash's admission was assessed on an ongoing basis by involving caregivers in the process from the onset and extending the effects of treatment, formal social validity data were not collected. We recommend that clinicians collect data using these more formal measures during the assessment and treatment process to better evaluate the acceptability of their approach when possible. Also, Nash's assessment and treatment occurred in a university outpatient clinic and was completed by a clinical team consisting of multiple Board Certified Behavior analysts at the master's and doctoral levels. The amount of resources and expertise available throughout the process may have contributed to why we were able to modify our procedures so quickly and achieve a favorable outcome. Clinicians assessing and treating challenging behavior in less-resourced settings should be mindful that the level of flexibility demonstrated in this study may be difficult. When presented with a complex case that exceeds the capacity of the setting or scope of clinical competence, we recommend that clinicians refer these clients to providers with these resources or seek expert supervision.

Our case study provides an example of the utility of integrating procedural components from various empirical sources into an individualized, trauma-assumed assessment and treatment

process. A one-size-fits-all approach, strict adherence to standard protocols, or both would likely not have led to the same client outcomes. We urge clinicians to remain flexible throughout the assessment and treatment process and reflect on the reemergence of challenging behavior as an indicator that *they* must change their expectations rather than requiring the *client* to acclimate to a standard set of treatment procedures.

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Author Contributions

The authors equally contributed to the conceptualization and writing of the manuscript.

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Notes

1. Trauma-assumed terminology is used throughout the manuscript as this case pertains to an individual for whom the presence of trauma was not confirmed. A trauma-informed framework employs universal precautions as a proactive approach to mitigate the risk of retraumatization during service provision (Harris & Fallot, 2001; Rajaraman, Austin, et al., 2022). Although the procedures described in this case study aligned with a trauma-informed framework, the trauma-assumed descriptor is used throughout to communicate clearly the clinical team's assumption of trauma in this case and to reflect that the procedures selected were distinct from those typically employed during the assessment of treatment of challenging behavior in the setting.
2. The minimum agreement reported (i.e., 56.7%) is reflective of a single session in which there was variability of data recorders. However, excluding this single session, the mean agreement was 99.98% (range: 91.67%−100%).

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