On the Role of Task Preference and Work Removal for Identifying Escape Functions

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On the Role of Task Preference and Work Removal for Identifying Escape Functions

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Master of Science in
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Abstract
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Brian P. Long

Students within the public school system may exhibit severe challenging behavior to escape from academic demands. Procedures to identify the reinforcers that maintain challenging behavior, such as functional analysis, may improve the probability of treatment success. Functional analysis involves manipulating contingencies to determine if positive (e.g., attention following challenging behavior) or negative (e.g., escape from aversive events such as task demands) reinforcers may maintain challenging behavior (Iwata et al., 1982). The absence of evocative tasks could produce inaccurate results when testing for effects of negative reinforcement during a functional analysis. Structured assessments to identify evocative tasks to include in a functional analysis may increase the possibility of conclusive results. In this study, we used a structured assessment called the paired-stimulus demand analysis (PSDA; Zangrillo et al., 2020) to identify tasks for a functional analysis for escape. Also, we tested for differences in response rate based on removal of materials during escape periods in the functional analyses. The PSDA involved presenting teacher-nominated tasks in pairs and recording which task the student selected. The functional analysis involved three conditions: the least-selected task with removal during escape, the least-selected task without removal during escape, and the most-selected task without removal during escape. Although the PSDA identified a clear preference for tasks for all participants, an escape function was identified for only 1 of 4 participants. For all participants, removal and non-removal of materials contingent on challenging behavior produced no differential effects.
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Table 2. This table presents the interobserver agreement (IOA) for data collection on the primary and secondary dependent variables during each student’s functional analysis. IOA presented in this table is for the target response, side effects, correct/on-task responding, and incorrect responding. Students are listed in alphabetical order in the far-left column and IOA for each response presented in the columns to the right starting with the target response for each student. The parenthetical numbers indicate the range of IOA and the non-parenthetical number indicates the mean for each response.

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Figure 1. This graph presents data from each student’s PSDA. Data for each student are presented in bar graphs for each student showing how often each item was selected across all sessions out of the total number of times it was presented. This was converted to a percentage and graphed in this figure. Total percentages of selections: number of total selections (summed for all sessions)/number of total presentations (summed for all sessions) x 100.

Figure 2. This figure shows graphs for both the rates of the primary dependent variable and side effects for each student’s functional analysis. The y-axes are scaled for the same range responses per minute for the primary dependent variable and side effects graph for each student. Because of this the y-axes for each student vary in size across participants. The left column presents functional-analysis data for the target response of each student. The right column presents data from these same sessions for side effects. Left graph: The asterisks (“*”) on the graph for Benji and for Randy denote procedural fidelity training and changes, and for Benji during these sessions the operational definition for the target response was updated. The asterisks (“**”) symbol on the graphs (i.e., Benji and Fabian) denotes sessions that ended due to removal of assent or the student leaving the experimental area. Finally, the “x” denotes removal of assent and the end of the study (Benji).
**Introduction**

Functional analysis has been described as one of the most effective methods to identify reinforcers maintaining a target challenging behavior (i.e., behavioral functions; Mace, 1994). Functional analyses typically involve comparing response rates between conditions designed to occasion and reinforce the target challenging behavior (test conditions) and at least one condition designed to attenuate the target challenging behavior (i.e., control condition; e.g., Carr, 1977; Hanley et al., 2014; Iwata et al., 1982; Piazza et al., 1997). In three reviews of the literature, Beavers et al. (2013), Hanley et al. (2003), and Melanson and Fahmie (2023) noted that functional analysis has been effective with many forms of challenging behavior (e.g., self-injury, bizarre speech, aggression, disruption, noncompliance, tantrums). Further, functional analyses have proven effective for identifying behavioral functions for participants with diagnoses such as autism spectrum disorder (ASD), developmental delays, oppositional defiant disorder (ODD), and attention-deficit hyperactivity disorder (ADHD; Beavers et al., 2013; Ervin et al., 1998; Kodak et al., 2004; Melanson & Fahmie, 2023). The focus of the functional-analysis procedure on what environmental manipulations control behavior indicates it should be adaptable to different situations that require idiosyncratic considerations to test for behavioral function.

Generally, four components should be considered when developing and conducting any functional analysis. First, the behavior analyst must include the specific antecedent events likely to occasion the target challenging behavior (e.g., non-preferred academic task; removal of attention or items) in the test conditions. Second, the specific consequent events that often follow the target challenging behavior (e.g., removal of the task, provision of attention or items) must be included. Third, procedures should isolate effects of antecedents and consequences by controlling for extraneous variables that occur in the natural environment that may impede identification of a behavioral function (e.g., number of people present, duration of each session, etc.). Fourth, the functional analysis should include a control condition that is likely to reduce the likelihood of challenging behavior, typically by freely providing the potential reinforcers from the other conditions. These four components provide a framework to systematically test which reinforcers maintain the target challenging behavior.
For example, a functional analysis to evaluate reinforcement in the form of escape from academic tasks would include a test condition with an aversive task likely to evoke the target challenging behavior and a control condition in which the target challenging behavior is unlikely to occur (e.g., a different task, or absence of tasks). The test condition would involve repeated presentation of the aversive task. Prompts to complete the task would occur at set intervals (e.g., every 10s) to ensure the antecedent event remains in place. Occurrences of the target challenging behavior would result in cessation of prompts for a finite period (e.g., an escape interval of 30s where the aversive task is removed), and then prompts would resume. A control condition would involve either the absence of a task, or a task unlikely to occasion challenging behavior. If a task unlikely to occasion challenging behavior was included, this condition would replicate the test condition and only vary the task type. To demonstrate a behavioral function of escape (i.e., reinforcement by removal of the aversive task), the test and control conditions would be alternated to compare rates of challenging behavior across the two conditions. An escape function would be identified if challenging behavior occurred at higher rates in the test condition compared to the control condition.

Considering how to test for escape may be especially important because escape has been the most frequently identified behavioral function during functional analysis, and tests for escape as a reinforcer have been included in approximately 90% of functional analyses (Beavers et al., 2013; Hanley et al., 2003; Melanson & Fahmie, 2023; Saini et al., 2019). Further, escape-maintained challenging behavior may impede acquisition of important skills by reducing learning opportunities. For instance, teachers may attempt to reduce the probability of challenging behavior by avoiding the student or presentation of the task likely to evoke challenging behavior (Carr et al., 1991; Yarborough et al., 1997). Thus, inclusion of the aversive event likely to occasion challenging behavior is an integral component of a functional analysis that tests for an escape function. Failure to select an evocative aversive event may produce inaccurate results.

An undifferentiated functional analysis (i.e., no identified function; similar response rates across many conditions) may accurately suggest that a target challenging behavior is maintained by automatic
reinforcement (i.e., behavior produces its own reinforcers, such as hitting yourself maintained by the release of endorphins). However, some undifferentiated functional-analysis outcomes probably reflect false negatives. False negatives may result from omitting appropriate antecedents or consequences. For instance, if a participant frequently exhibits challenging behavior during math tasks, presenting a reading passage during the escape condition may fail to occasion challenging behavior. Thus, the functional analysis may suggest challenging behavior is not maintained by escape, though, challenging behavior continues to occur in the natural environment (i.e., math class) to escape from the aversive math task.

Many functional analyses for escape include tasks identified through caregiver or teacher report alone (Avery & Akers, 2021). However, caregiver reports do not always align with direct measurement of client behavior (Avery & Akers, 2021; Wiggins & Roscoe, 2020). In contrast, functional analyses that test for challenging behavior maintained by positive reinforcement often include stimuli based on assessments with direct measurement of client behavior (e.g., Bachmeyer et al., 2019; Bloom et al., 2011; Gerow et al., 2021; Saini et al., 2015; Volkert et al., 2005). These assessments result in ranked stimuli based on direct measurement of client preference rather than solely on caregiver report (DeLeon & Iwata, 1996; Fisher et al., 1992; Pace et al., 1985; Thurstone, 1927).

One common form of assessment to identify preferred stimuli is the paired-stimulus preference assessment (PSPA; Fisher et al., 1992). PSPA sessions consist of presenting items thought to be potential reinforcers to the participant in pairs. The participant selects one of the items and then interacts with the item for a short period (e.g., 30s). The item is removed after the period ends, and the next pair of items is presented. The researcher collects data on the item selected for each pair. Items selected most often are identified as highest preferred, and those selected least often are identified as lowest preferred. Outcomes of the PSPA have predicted which stimuli function as positive reinforcers (Graff et al., 2006; Lee et al., 2010; Roscoe et al., 1999; Virues Ortega et al., 2012).

Thurstone’s Law of Comparative Judgment provided a mathematical comparison of two or more stimuli along some feature (e.g., quality, size, shape, intensity, etc.). Thurstone proposed that all stimuli for comparison fall along a continuum and that multiple samples are necessary for comparison. This law underpins later work on preference.
Using logic similar to preference assessments, demand assessments are used to determine which demands participants might avoid. Demand assessments have taken four forms: 1) interview and record review (Wiggins & Roscoe, 2021; Zarcone et al., 1999); 2) comparing rates of challenging behavior for each task (Roscoe et al., 2009); 3) comparing latency to challenging behavior for each task (Call et al., 2009; Call et al., 2016; Schmidt et al., 2014); and 4) comparing task preference (Lloveras et al., 2020; Zangrillo et al., 2020). Interview-based demand assessments involve caregiver nomination of demands, tasks, and events that likely occasion challenging behavior and function as reinforcers when removed (Avery & Akers, 2021; Wiggins & Roscoe, 2021). The interviews may follow structured formats with questions in a set order or open-ended formats with the interview following caregiver responses to each question (Wiggins & Roscoe, 2021; Zangrillo et al., 2020; Zarcone et al., 1999). As indicated above, the interview format may be informative, but it does not provide direct measurement of participant behavior.

Rate-based demand assessments and latency-based demand assessments both involve direct measurement of participant challenging behavior. Both assessment formats start with a caregiver interview to identify tasks for inclusion. Following the interview, the participant is prompted to complete one task during each session with fixed session durations (Call et al., 2009; Call et al., 2016; Roscoe et al., 2009; Schmidt et al., 2013; Wiggins & Roscoe, 2021). During rate-based demand assessments, challenging behavior results in brief removal of the task (Roscoe et al., 2009; Wiggins & Roscoe, 2021). The primary dependent variable is the relative rate of challenging behavior across tasks. During latency-based demand assessments, each session is ended after the first instance of challenging behavior (Call et al., 2009; Call et al., 2016; Schmidt et al., 2013). The primary dependent variable is the latency from the initial presentation of the task to the first instance of challenging behavior. Both rate-based and latency-based assessments have accurately predicted which tasks result in identification of an escape function (Avery & Akers, 2021; Call et al., 2009; Call et al., 2016; Roscoe et al., 2009). However, both also require challenging behavior to occur. Rate-based demand assessments involve occasioning challenging behavior repeatedly (Roscoe et al., 2009). Latency-based demand assessment sessions cease after the first
response, but they still require the repeated occurrence of challenging behavior across sessions (Call et al., 2009; Call et al., 2016).

Zangrillo et al. (2020) developed a demand assessment based on the PSPA (Fisher et al., 1992) called the paired-stimulus demand analysis (PSDA). The PSDA includes several PSPA procedures: tasks are nominated by caregiver report; tasks are presented in pairs and data are collected on participants’ task selection; a single session involves pairing each task with every other task; at least two sessions are conducted. The PSDA involves an initial exposure session in which each task is presented in isolation for a single trial to ensure the participant has experienced the task prior to paired presentations. Next, tasks are presented in pairs and the selected task in the PSDA is presented for a single trial during which the researcher prompts task completion. Task completion results neutral praise and presentation of the next pair of tasks. Challenging behavior results in removal of demands and materials for a brief period before the next pair of tasks is presented. The least-selected task (LS task) is predicted to occasion challenging behavior. The most-selected task (MS) is predicted to occasion little or no challenging behavior. In subsequent functional analyses by Zangrillo et al., the condition with the LS task resulted in identification of an escape function for all 4 participants. Inversely, the condition with the MS task resulted in identification of an escape function for only 1 of the 4 participants.

In a replication of the PSDA to inform clinical treatments not focused on challenging behavior, Lloveras et al. (2020) created the concurrent-operant demand assessment (CODA). The CODA involved exposure sessions (i.e., presenting tasks in isolation) and subsequent paired presentations of tasks while collecting data on task selection to generate preference hierarchies. Unlike the PSDA, the CODA involves a 2-min break period between each task presentation following completion of the selected task. Additionally, because the CODA was created to inform possible clinical treatments rather than functional analysis of challenging behavior, Lloveras et al. did not report data on challenging behavior.

Although the PSDA may be a valuable tool for identifying antecedents for functional analyses, consideration of consequences is equally important. A procedure that sometimes varies within the consequent event of the functional-analysis escape condition is removal, or non-removal, of materials
following instances of the target challenging behavior (e.g., Call et al., 2009; Greer et al., 2013; Iwata et al., 1982; Roscoe et al., 2009; Zangrillo et al., 2020). A researcher’s decision to remove or not remove materials as a consequent event seems based on tradition or previous training rather than data. We could find only one study that examined possible effects of removal of task materials within the escape condition (Peyton et al., 2005). However, work removal was studied in correlation with several other variables and the study included only one participant. Impacts of removal and non-removal of materials require further empirical evaluation.

The purposes of the current study were to A) systematically replicate the paired-stimulus demand analysis (PSDA) with participants who attend an alternative-education public school for children who exhibited severe challenging behavior, and B) to test if removal of work materials following the target response differentially affects outcomes of escape conditions in functional analyses.

**Method**

**Participants and Setting**

Participants were four boys who attended an alternative elementary school for individuals who exhibited high-intensity challenging behavior in the school setting. Teachers nominated participants for whom they suspected escape functioned as a reinforcer. The teacher then contacted the student’s parent to provide initial information about the research study. If the parent expressed interest, the researcher sent the consent form home with the student. The researcher and teacher then contacted the parent to answer any questions to ensure parents were fully informed prior to starting the study. Parents provided written consent and participants provided written assent prior to starting any experimental procedures. Students could remove assent for the day at any point by stating they wanted to return to their classroom. Removal of assent for three consecutive days prompted a discussion with the student about continued inclusion. Benji was the only student who discontinued participation in the study, however, enough data had been collected to determine a behavioral function (see Results). All sessions were video recorded.

Experimental procedures were conducted in a section of the student’s classroom away from other participants, or a separate classroom or area within the school. The experimental area included a desk or
small table, two chairs, a table or desk, one to two cameras, and a second observer (for approximately 33% of sessions for both the PSDA and functional analysis) stationed at the edge or at least three feet from the researcher and student. Three PSDA sessions were conducted for Benji, Fabian, and Verdeen; two sessions were conducted for Randy. The PSDA typically took a single day and lasted no longer than two days for each participant. All target and non-targeted forms of challenging behavior are described in Table 1. One to three functional-analysis sessions were conducted each day, an average of 4 days per week (range 2-5 days) across all participants. Functional analyses spanned 20 to 65 calendar days. Total time for completion of the PSDA and functional analysis spanned 30 to 75 calendar days.

Benji was a 9-year-old, White boy diagnosed with ADHD and ODD. A functional behavior assessment (FBA) completed three years before the current evaluation (in 2019) resulted in the identification of an escape function for protesting. Fabian was a 7-year-old White boy diagnosed with ADHD and ODD. A trial-based functional analysis completed in Fabian’s regular classroom approximately 6 months before he entered this study and resulted in the identification of an escape function for aggression and disruption. Randy was an 11-year-old, African-American and White boy diagnosed with ADHD, ODD, post-traumatic stress disorder (PTSD), asthma, and chronic otitis media. An FBA was completed 6 years before his participation in this study for non-compliance and indicated non-compliance was maintained by escape. Verdeen was a 10-year-old White boy with no diagnoses. An FBA was completed for Verdeen two months prior to his participation in this study and suggested that challenging behavior was not maintained by escape, but no clear behavioral function was identified. However, his teacher reported that challenging behavior seemed to be evoked by tasks and maintained by escape.

**Interviews**

An open-ended interview (see Appendix A for interview questions) was conducted with the teacher of each student. This open-ended interview was used to determine the following: a) if at least one form of challenging behavior was likely to be maintained by escape, b) if certain academic tasks differentially occasioned challenging behavior, c) operational definitions of a target response and other
forms of challenging behavior, and d) typical prompting procedures and modalities of work presentation. Follow up questions were also asked as needed in response to answers to clarify information and to ensure inclusion criteria were met, challenging behavior was identified and defined, and tasks features were identified. Additionally, when available, functional behavior assessments or functional analyses previously conducted for each student, school reports, and behavior intervention plans were reviewed for relevant information (i.e., an identified escape function, or teacher information that indicated challenging behavior occurred to escape from work) to inform if challenging behavior may be likely to be at least partly maintained by escape.

Both teachers who were interviewed had nearly a decade of experience implementing behavior-analytic procedures and receiving consultation services for behavioral intervention from a doctoral-level behavior analyst. Further, one of the teachers held a credential as a Board-Certified Behavior Analyst for nearly ten years.

**Paired-Stimulus Demand Analysis (PSDA)**

**Materials**

Five to seven tasks were included in the PSDA for each student based on the results of the teacher interview (see Tables 2-5 for tasks for each student). For Benji and Fabian, tasks during the PSDA were presented on laminated, white flashcards that were 16cm by 15.11cm with 110-point Arial font. Randy’s and Verdeen’s teacher suggested that tasks should be presented on worksheets. Therefore, tasks for Randy and Verdeen were presented on 20.32cm by 27.94cm white paper with 12-point Times New Roman font. Each flashcard or worksheet for the PSDA contained one problem.

**Measurement, Interobserver Agreement, and Data Analysis for the PSDA**

Prior to the PSDA, observers practiced collecting data from videos or live roleplays of PSDA sessions. Practice data were compared to data collected by an independent, previously trained observer. New observers achieved interobserver agreement (IOA) scores of at least 90% with the trained observer, using the calculation described below, across two consecutive sessions of the PSDA for each dependent variable before beginning data collection for the study.
The primary dependent variable was task selection. Data were also collected on correct and incorrect answers and challenging behavior (see Table 1). Data for task selection, correct and incorrect responding, and challenging behavior were collected by the researcher and independent observers. Data were collected using paper and pencil. Task selection was recorded by circling which task was selected on each presentation. Correct and incorrect responses were scored for the answer following the vocal prompt (i.e., if the student could answer the question without additional help) on each trial. Data for challenging behavior were collected by counting the frequency of each challenging behavior nominated by the teacher.

Independent observers collected data on all measures during 50% to 100% of PSDA sessions across participants. Interobserver agreement (IOA) was calculated by comparing data collected by the researcher and independent observers. For task selections and correct/incorrect responses, trial-by-trial IOA was calculated by dividing the number of trials in which the researcher and observer (or two observers, if multiple were present) scored the same selection by the total number of trials (agreements + disagreements) and converting the quotient to a percentage. IOA values for challenging behavior were based on average agreement across trials. For each form of challenging behavior for each trial, the smaller count was divided by the larger count. A value of 1 was assigned to any trial on which the observers agreed on the absence of that type of challenging behavior. These quotients were averaged across the session to yield an IOA value for that class of behavior during that session.

IOA data were collected during 100% of sessions for Benji, Fabian, and Randy. For Benji and Fabian, IOA was 100% for all measures. For Randy, IOA was 100% for task selection, 94% for correct/incorrect, and 94% for challenging behavior. IOA data were collected during 50% of sessions for Verdeen; IOA was 100% for task selection, 95% for correct/incorrect, and 100% for challenging behavior.

Once all data were collected, the researcher used the primary observer’s data to create a preference hierarchy for each student by counting the number of times each task was selected across all replications of the assessment. The total number of selections of a particular task was then divided by the
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The total number of presentations of that task (i.e., selections and non-selections), and then multiplied by 100 to convert to a percentage. Tasks were then ranked from lowest percentage to the highest percentage. The least-selected task (LS) was the one with the lowest total-selection percentage. The most-selected task (MS) was the one with the highest total-selection percentage.

**Procedural Fidelity**

Before implementing the PSDA with participants, the researcher roleplayed the PSDA with a supervisor to establish high-fidelity implementation. The supervisor collected fidelity data using checklists during roleplays, which continued until the researcher implemented procedures with 100% accuracy for two consecutive roleplays.

During the PSDA, independent observers used checklists to collect procedural fidelity data during 50% of sessions for Benji, 33% of sessions for Fabian, 33% of sessions for Randy, and 75% of sessions for Verdeen. Procedural-fidelity scores were calculated for each component by dividing the sum of instances of correct implementation by the sum of total opportunities to implement that step for that session and then multiplying by 100. Global fidelity scores were calculated for each session by taking the total number of correct instances of implementation across all categories and dividing those by the total number of opportunities across all categories and then multiplying by 100. Procedural fidelity that fell below 80% for any session would have resulted in conducting another session, but this did not occur. Global procedural fidelity scores were 100% for Benji and Fabian, 97% for Randy, and 94% for Verdeen.

**Paired-Stimulus Demand Analysis (PSDA) Procedures**

**Exposure Sessions**

The exposure session involved the student attempting each task prior to the PSDA. Prior to the exposure session, the researcher explained the tasks and what the student would need to do when presented with each task. The researcher also answered any questions the student had about any of the tasks.

During each exposure session, the researcher presented each task in isolation for a single trial. Task order was determined using an online randomizer program. Exposure sessions started with the
researcher saying, “I am going to show you some tasks, do the best you can,” and then presenting the first task. The researcher presented tasks using a two-step prompt sequence. First, the researcher presented a flashcard or worksheet while giving a vocal prompt (e.g., “What’s 2+2?”). If the correct response did not occur within 10s, the researcher provided a vocal or written model of the answer (e.g., “Say, ‘4.’”, or “Write the answer,” while holding up a sheet of paper with the answer). Written words were used only for Randy. Following a correct response, the researcher delivered neutral praise and then presented the next task within 15s. If the correct response did not occur within 10s of the model, the researcher removed the task and attention for 5s before presenting the next pair of tasks. Contingent on challenging behavior the researcher said, “Okay, you don’t have to,” removed the flashcard/worksheet, turned away from the student, and did not deliver any prompts for 30s before presenting the next pair of tasks. The exposure session ended when each task had been presented once.

**PSDA**

The PSDA involved presenting tasks in pairs, such that each task was paired with every other task at least once. Each session started with the researcher stating, “I am going to show you some tasks. Pick which one you want to do.” The researcher then placed the first pair of tasks in front of the student 5cm to 8cm apart and prompted the student to choose a task. The student selected a task by touching it, gesturing toward it, stating he wanted to do it, or providing an answer (e.g., “2 + 2 is 4.”). The researcher removed the non-selected task after a task was selected and prompted the student to complete the task as in the exposure session. If the student selected by giving the answer, the problem was presented again for the student to answer. Following the selection of a task, a trial was run in identical manner as in the exposure session: vocal prompt to complete the task, model prompt if no answer occurred within 10s or was incorrect, neutral praise for a correct answer, and escape provided contingent on any instance of challenging behavior (see above for specific procedures).

If the student did not select a task within 5s, the researcher did not comment, removed the pair of tasks and attention for 5s. After 5s, the researcher re-presented the same pair. If the student did not select
a task during the second presentation, the researcher would have prompted the student to complete a pre-determined task from the pair, but this never occurred.

A session concluded when each task had been paired with every other task. At least two sessions were conducted for each student. A third session was conducted if the position of the most-selected task (MS) and/or least-selected task (LS) shifted on the hierarchy between the first and second sessions.

**Modifications.** PSDA tasks were modified for Benji and Verdeen after the start of the assessment. These modifications were based on components of materials or task presentation that caused confusion for the participants. For Benji, sight words and parts of speech both initially involved presenting a single word on a flashcard, making it difficult for Benji to discriminate between the task materials. To improve discriminability, prompts were written at the bottom of each parts-of-speech flashcard and sight-word flashcard to signal to Benji which task was being presented. For Verdeen, writing sentences initially involved generating novel sentences with sight words in 10s. However, writing a complete sentence with a vocabulary word was not possible in 10s. This task was modified to have Verdeen write spoken, pre-selected sentences (e.g., “Today is Monday.”). Verdeen was instructed to write phonetic approximations within 10s of the prompt.

**Multiple-Stimulus Without Replacement Preference Assessment (MSWO)**

A multiple stimulus without replacement (MSWO) preference assessment was conducted for Benji only. The purpose of the MSWO was to identify three highly preferred activities to include in a play condition of the functional analysis. Benji’s teacher suggested six items or activities that may be reinforcers for Benji. The six items were placed equidistant apart from each other and Benji. At the start of each MSWO session, the researcher stated, “I am going to show you some items, pick which one you want to play with.” The researcher then said, “Pick one,” to prompt Benji to select an item. Following a selection, the other items were removed and Benji was provided 3.3 min\(^2\) to interact with the activity.

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\(^2\) An initial session of the MSWO was conducted with Benji with 30-s intervals. Benji complained following the first session that the time was too short. The MSWO was re-started with 3.3 min access intervals to allow Benji time to engage with each selection. Data for the sessions involving 3.3 min access intervals were used to create the MSWO preference hierarchy. The 3.3 minutes were determined because the Play condition would be 10 min. Three
Because some of the items involved interaction with a second person (e.g., board games like Fox Catch), the researcher provided attention at least once every 15s across all items. The activity was removed after 3.3 min, and the remaining items in the array were presented. This continued until Benji selected all items or requested end the assessment. Three sessions of the MSWO were conducted. Items were ranked after each assessment based on the order in which Benji selected them, such that a rank of 1 indicated the item selected first. The ranks were averaged across assessments, and those items with the lowest mean ranks (iPad, Gravity Maze, and Googly Eyes Board Game) were included in the play condition.

**Functional Analyses**

**Materials**

At least 50 different problems for each of the LS and MS tasks were created. Each of these problems was printed on colored paper (purple, yellow, or white), with the colors later corresponding to the condition in effect. A single problem appeared on each flashcard; 10 problems appeared on each worksheet. Randy and Verdeen had at least three pencils available during all sessions.

**Dependent Variables**

The primary dependent variable was rate of the target challenging behavior per minute as defined in Table 1. The secondary dependent variables were rates of non-targeted challenging behavior (i.e., side effects; Table 1). Side effects were selected and included for data collection based on teacher identification of multiple forms of challenging behavior during the initial interview. Although data were collected for all likely side effects shown in Table 1, data displays were created only for forms of behavior that occurred during the functional analysis.

**Data Collection**

Before collecting functional-analysis data, observers were trained to use the Behavior Logger Observational Coding System™ (BLOCS), a computer program designed for observational data...
collection. BLOCS allows for the recording of student responses and other environmental events using keyboard keys. Observers were trained using instructions, models, and opportunities to practice with feedback. Training continued until observers obtained 90% IOA values for each target response, using the calculation described below, for three consecutively scored videos.

An independent observer scored all sessions using BLOCS keys by recording each occurrence of the primary dependent variable, secondary dependent variables, and researcher responses (i.e., occurrence of prompts, delivery of escape, removal of materials, and delivery of praise). Sessions were scored either in person or through a video recording of the session. Data on the primary and secondary dependent variables were graphed with a time-series graph (i.e., line graph across sessions). Data on the researcher responses were used to calculate procedural fidelity for each session (described below).

**Interobserver Agreement (IOA).** BLOCS was used to calculate IOA values using a partial-agreement calculation. To calculate partial-agreement IOA, each data stream was divided into 10-s intervals. Counts (or durations in seconds) for each response were compared across observers for each interval by dividing the smaller count of that response by the larger count of that response and converting it to a percentage. For example, if Observer 1 recorded 5 target responses during a 10-s interval and Observer 2 recorded 6 target responses for the same interval, the IOA values would be 5/6 for 0.83 or 83%. Intervals in which both observers agreed on the absence of the response were considered 100% agreement for that interval. For each response, the values were averaged across all intervals of the session.

A second, independent observer collected interobserver agreement (IOA) data during 33% of sessions. IOA data were collected during 36% of sessions for Benji, 35% for Fabian, 36% for Randy, and 33% for Verdeen, respectively. Mean IOA scores for target behavior averaged at least 97% for all participants. Refer to Table 2 for all IOA scores.

**Procedural Fidelity**

Before conducting functional analyses, the researcher roleplayed each condition with a doctoral-level supervisor. The supervisor collected fidelity data using checklists. Roleplays of the procedures
continued until the researcher implemented the procedures with 100% accuracy for two consecutive roleplays of each condition. Throughout the study, the researcher sought feedback from a doctoral-level supervisor when procedural fidelity fell below 100%. Typically, this process included contacting the supervisor on the day of the session, describing the reduced fidelity, and discussing how improve fidelity, including determining if re-training was necessary before conducting continuing the experiment. IOA for procedural fidelity data were based on BLOCS data as described above. IOA coefficients related to researcher responses (i.e., independent variables) are presented in Table 3 for each student.

Procedural fidelity was evaluated from BLOCS data based on the extent to which researcher responses aligned with programmed procedures. The BLOCS computerized data system provided an Excel spreadsheet for each session with the order in which all recorded events occurred (student behavior and researcher responses) and the time at which each event occurred. Procedural fidelity was calculated for the consistency of the inter-prompt interval (vocal to model prompt; student response to prompt), praise of a correct response, the escape interval, and duration of the escape interval. Implementation was considered correct if it occurred within 2s of programmed event (e.g., prompt interval was between 8 to 12s). Procedural fidelity scores for each student are presented in Table 4. Fidelity on removal of materials was calculated based on whether it occurred within 3s of the target response, and if it only occurred in the LS-No-Remove condition. An Excel spreadsheet was created with formulas to calculate how closely each researcher response for each session aligned with the programmed range described above.

**Procedures**

Functional analyses typically involved three conditions: two conditions in which the researcher presented the least-selected task (LS; LS-Removal Condition and LS-No-Removal Condition), and a condition in which the researcher presented the most-selected task (MS) with no removal of materials. Each experimental condition was associated with a discriminative stimulus in the form of a distinct color of flashcards or worksheets. All experimental sessions were initially 5 min and extended to 10 min if responding occurred at low rates initially.
Each experimental session started with the researcher identifying the color of the flashcard or worksheet, and providing a countdown of “3, 2, 1, Start.” Across experimental sessions, the researcher presented materials and prompted the student to complete the task every 10s using the same two-step (vocal, model) prompt sequence as during the exposure and PSDA. The model prompt was repeated until the student completed the problem correctly. Correct responding resulted in neutral praise (e.g., “Nice job,”) and immediate presentation of the next problem with a vocal prompt.

Contingent on the target response, the researcher said, “Okay, you don’t have to,” and removed prompts and attention for 30s by turning away from the student. The researcher ignored all student responses during the escape interval. After 30s elapsed, the researcher resumed prompting. Minor forms of non-targeted challenging behavior and appropriate requests resulted in no programmed consequences. Behavior severe enough to require medical treatment or for implementation of crisis protocols (e.g., physical restraint) would have resulted in termination of the session, but this never occurred. Sessions were terminated if the student left the experimental area, which occurred for Fabian during Sessions 6-11, 13, 22, and 23. Finally, the student could remove assent at any time and end a session by requesting to return to his classroom. This occurred for Benji during Sessions 12, 14, 16, and 21. Following Session 32, Benji removed assent to continue in this study; no subsequent sessions were conducted. Benji stated he did not want to take part any further but provided no reason. Randy declined to participate between Sessions 26 and 27 but assented on the following day. These events are noted in Figure 2 in the left column graphs for the target response.

**Least-Selected-with-Work-Removal Condition (LS Removal).** In addition to the procedures described above, the researcher removed the work materials from the student’s sight during the 30-s escape interval.

**Least-Selected-without-Work-Removal Condition (LS No Removal).** In addition to the procedures described above, the researcher continued to keep the work materials in front of the student during the 30-s escape interval.
Most-Selected-without-Work-Removal Condition (MS No Removal). The researcher followed the procedures described for the LS-Removal condition but presented the most-selected (MS) task.

Play Condition. For one participant (Benji), a play condition was included due to increases in target responding across both LS conditions and the MS-Removal condition. The Play condition involved free access to the three activities identified as most preferred during the MSWO, no demands, and provision of attention at least once every 30s.

Procedural Modifications. Procedures were also modified for Randy’s functional analysis starting at Session 21. Initially, procedures for the model prompt involved presenting the answer visually on a clipboard along with the prompt to “Write the answer.” The researcher held up the clipboard, pointed to the written model, and vocally prompted Randy to write that answer. These multiple steps impeded quick delivery of the model prompt and made the 10s prompt interval variable across session. The model prompt was a verbal model of the answer (e.g., for the LS task: “Write It is winter”; for the MS task: “Write eleven over twelve”).

Experimental Design

A within-subject, multielement design was used to demonstrate experimental control during the functional analyses. Sessions were conducted in series, with each series consisting of one session of each condition. The order of conditions within the series was randomized without replacement using online randomization software (random.org). Functional analyses were terminated based on visual inspection of graphed data. Visual inspection focused on identifying differentiation (nonoverlap) between at least two experimental conditions.

Results

Paired-Stimulus Demand Analysis (PSDA)

Data for each student’s PSDA are presented in Figure 1. Preference hierarchies were obtained for each student. The LS task was selected on no more than 10% of opportunities. Additionally, no ties for the LS task occurred for any student. The MS task was selected for at least 75% of opportunities. Preference shifted based on each individual task and did not coalesce around academic domains (e.g.,
language arts, mathematics). For instance, for Benji the LS task was double-digit addition and the MS-task was sight words. However, the next least-preferred task was identifying parts of speech, and the second most-preferred task was single-digit addition. Similarly, for Fabian, both the LS and MS tasks were language arts.

Accuracy of correct responding did not predict task preference (see Tables 5 through 8 for percentage of correct responding during PSDAs). The task that participants performed best on during the PSDA (i.e., most correct answers) did not end up being the task selected most often (i.e., MS task; highest preferred). These data suggest that performance may not be a great predictor of which stimuli may be more preferred. Inversely, the LS task for 3 out of 4 participants was the task they performed the worst on (i.e., lowest percentage of correct answers). However, as stated above, the LS tasks for all participants were selected on 10% or fewer of presentations, which meant that participants had many fewer opportunities to complete problems for the LS task relative to the MS task and other tasks. Fewer opportunities to complete the task may reflect poor performance, or could have resulted from percentages being higher, because of incorrect answers on fewer opportunities.

Recall that one possible advantage of the PSDA is that it may not evoke challenging behavior. Benji, Fabian, and Verdeen did not engage in challenging behavior during the PSDA. Randy engaged in 11 instances of protesting (which were subsumed into the definition of Talk Outs for the functional analysis) during the PSDA. Severe challenging behavior did not occur during the PSDA.

Finally, Zangrillo et al. (2020) reported that the PSDA may be an efficient assessment that can be completed in a short period of time relative to other demand assessments. Both the exposure and PSDA portions of the overall PSDA procedure required 26.5 min, 6.6 min, 58.5 min, and 21.8 min for Benji, Fabian, Randy, and Verdeen, respectively. Randy’s PSDA took the longest because of the inclusion of reading comprehension tasks that involved reading a short passage to Randy prior to presentation and because his PSDA was the only one during which challenging behavior occurred (i.e., 30-s escape intervals occurred).

**Functional Analysis**
Results for the target challenging behavior during the functional analyses are presented in Figure 2. Functional analysis results were variable for all participants and undifferentiated for three participants. The failure to identify an escape function in test conditions using the LS task condition diverges from the results of Zangrillo et al. (2020), in which all escape functions were identified when the LS task was included. The removal or non-removal of materials following the target response had no effect across all participants.

Data for side effects (i.e., non-targeted challenging behavior) for each student’s functional analysis are presented in the right column of Figure 2. Non-targeted challenging behavior did not occur during Randy’s functional analysis. For the three functional analyses during which side effects were observed, only one form of behavior was observed for each student.

Data for Benji’s functional analysis are presented in the upper left of Figure 2. Procedural fidelity errors occurred during Sessions 7 and 9: escape was not delivered for the target response (shown by asterisk in the graph). Rates of the target response were low during the first nine sessions, however, Benji frequently groaned, sighed, and rolled his eyes during the latter part of sessions, the session duration was extended to 10 min at Session 10. Response rates increased in all conditions during Sessions 13 to 15. A Play condition was added at Session 16. For the remainder of the assessment, responding occurred at variable rates during both LS conditions (LS Removal and LS No Removal), but never occurred in the MS No Removal or Play conditions. The relative increase in mean response rates in the LS conditions relative to the MS condition suggests a possible escape function, but this conclusion must be tempered due to the variability in responding. Benji’s functional analysis was ended after Session 32, because Benji removed assent to continue in the study. Benji’s functional analysis ended at that point due to continued removal of assent. Benji did not provide a reason other than he no longer wanted to continue.

The variability in responding may have been due to procedural fidelity errors early in Benji’s functional analysis. As noted above, escape was not delivered for the target response during Sessions 7 and 9, increasing unintended exposure to extinction for escape-maintained behavior. Additionally, model prompts sometimes occurred at long delays (e.g., 13s during Sessions 1-5). Self-injury was the only
observed side effect for Benji. Self-injury occurred across three consecutive sessions (across all conditions).

Data for Fabian’s functional analysis are presented in the second row of Figure 2. Variability in the target response occurred across both LS Conditions and the MS-No-Removal Condition throughout Fabian’s functional analysis, despite implementation with at least 95% fidelity on all components. Based on continued variability and undifferentiation, a second teacher interview was conducted to determine if events in the natural environment were occurring that may have affected responding that was not accounted for in the functional analysis. The teacher stated that experimental procedures aligned with classroom procedures. These data may indicate a behavioral function other than escape. Inappropriate vocalizations were the only observed side effect for Fabian. Variability in these data paralleled the variability in rates of the target response in Figure 2 for Fabian. Because of the continued variability in the data, we discontinued Fabian’s participation in the study. A clinical functional analysis was not conducted for Fabian, because the school year ended. A recommendation was made for the school team to discuss if a functional analysis was warranted when Fabian would return in the fall.

Data for Randy’s functional analysis are presented in the third row of Figure 2. Procedural-fidelity errors related to prompt delivery (i.e., inter-prompt interval) occurred during the first 6 sessions. After Session 6, procedural fidelity for prompt delivery increased and averaged 93% for the remainder of the study. Neither the improvements to fidelity nor the modification to the prompts (described in the Method Section) appeared to affect response rates. During a follow-up interview, Randy’s teacher suggested that peer attention may also maintain talking out in class. Therefore, we discontinued Randy’s participation in the study. Results of a subsequent clinical functional analysis suggested that peer attention served as a reinforcer.

Data for Verdeen’s functional analysis are presented in the bottom row of Figure 2. Verdeen was dismissed from the study after 12 sessions during which a target response did not occur. Disruption was the only observed side effect during Verdeen’s functional analysis. Disruption occurred during two LS-No-Removal Condition Sessions (Session 19 and Session 21). Disruption may have been occasioned by
continued presentation of the LS task. These data cannot be used to identify an escape function, though, because escape was not provided for disruption when it occurred.

**Discussion**

The purpose of the current study was to extend the PSDA to participants who attended an alternative-placement public school for children who exhibited severe challenging behavior and to examine if removal of materials differentially affected response rates during functional analyses for escape. Like Zangrillo et al. (2020) and Lloveras et al. (2020), we identified an LS task and MS task for each student. In contrast, the results of our PSDAs included broader ranges between the LS task and MS task for all participants (0% to 76%; 8% to 83%; 10% to 90%; 8.3% to 83.3%) relative to those obtained by Zangrillo et al., and there were no tie breakers for the LS task in our results. Also, for 3 of 4 participants in Zangrillo et al., the LS task was selected on a higher percentage (20% to 30%) of paired presentations than for participants in the current study.

Unlike Zangrillo et al. (2020) and Lloveras et al. (2020), each participant’s tasks in the current study required the same response form (e.g., all vocal answers or all written answers), and could be completed within 10s. These controls removed task features that required considerable variation in form of response. All tasks in the current study required simple vocal or written responses; tasks in the studies by Zangrillo et al. and Lloveras et al. included tasks such as exercise, matching-to-sample, writing name, cleaning up, and shoe tying. Intuitively, equating response forms across tasks would seem likely to reduce differences in preference (Mace et al., 1997), but this effect was not observed.

It is possible that matching the form of the response may have made differences in the difficulty of the tasks more salient to participants. For instance, flashcards with double-digit addition and single-digit addition may highlight that one flashcard has more numbers to add than the other (e.g., Benji) and provide discriminative stimuli for which task to avoid and which to select. Equating the form of the response across tasks was possible in the current study because our participants were working on academic skills typical for their grade. When participants are working on daily living skills (like the participants included in the studies by Lloveras et al., 2020, and Zangrillo et al., 2020), the form of the
response may necessarily vary. For example, tasks like picking up clothes, coloring, and completing puzzles (all tasks included by Lloveras et al.) must involve different response forms. The role of the response form on preference could be explored in future research. For example, it is possible that the preferences of participants like those in the current study would vary with the same task type that varied in the response form. For example, a student might prefer to type a sentence than to write one with a pencil on paper.

Participants’ preferences for tasks did not cluster together by subject area. For instance, both the LS task and MS task were language arts for Benji and Fabian. This suggests that predicting task preference generally may not be possible based solely on subject matter (Parsons et al., 1998; Worsdell et al., 2002). Lloveras et al. (2020) suggested that preference-based demand assessments (i.e., the CODA and the PSDA) could inform clinical programs focused on skill acquisition. One practical application of the PSDA may be in identifying LS and MS tasks that occur within subject areas or across the day. This information could allow organization of tasks that embeds reinforcement for completion of LS tasks by moving to an MS task, without additional positive reinforcers (Lloveras et al., 2020; Premack, 1959; Romano et al., 2021). Further, alternation of task sequence increases compliance more than does repeated presentation of the same task (Richman et al., 2001; Winterling et al., 1987); identifying an individual’s preference for tasks could permit systematic alternation. Preferences for tasks may not be evident based on observation alone (e.g., Worsdell et al., 2002); direct comparisons may be necessary.

Lloveras et al. (2020) and Zanfirillo et al. (2020) suggested that preference-based demand assessment may be particularly beneficial because challenging behavior is not necessary to generate a preference hierarchy with potentially non-preferred tasks. In the current study, challenging behavior occurred for only one participant (Randy). The form of challenging behavior was fairly minor (protesting) and the rates were low overall. Challenging behavior, though, may be an important measure under some circumstances. For instance, despite greater differentiation in our task-preference hierarchy, an escape function was only identified in subsequent functional analyses for 1 out of 4 participants. Future research may compare the predictive quality of the PSDA, and possibly the CODA, to other demand assessments
to further determine the limits of each or if outcomes align across the different forms of demand assessment that use measures of challenging behavior to create hierarchies.

Although the outcomes of the PSDAs in this study may inform further research and clinical applications beyond functional analyses, it is important to note that functional analyses in this study were undifferentiated for 3 of 4 participants. For these participants, the LS task did not consistently occasion the target response at a higher rate than the MS task. This finding differs from Zangrillo et al. (2020), who reported differential evocation of challenging behavior by the LS task for all participants. However, functional-analysis outcomes obtained by Zangrillo et al. also included overlapping data paths (i.e., response variability) and procedures that required modifications. For instance, for two participants, Zangrillo et al. extended sessions from 5 min to 10 min for two participants, and modified the procedures for one participant. Thus, functional analyses did not result in clear or immediate differentiation across the LS and MS escape conditions in either study. These are potentially surprising findings given the wealth of clear outcomes from functional analyses in the broader literature (Beavers et al., 2013; Hanley et al., 2003) and, in the case of the current study, pre-experimental screening procedures to identify participants whose behavior was likely to be maintained by escape. It is possible that the inclusion of both LS and MS tasks within the same broader functional-analysis context changed how the participants react (e.g., by modifying the aversiveness of prompting regardless of the specific task in place). The inclusion of two escape conditions, therefore, may cause possible carryover effects from exposure to multiple escape conditions rather than only one. Future studies could compare outcomes when single or multiple escape conditions are included in the functional analysis.

It is also possible that outcomes of functional analyses were undifferentiated in the current study because challenging behavior was maintained by a reinforcer other than escape. For instance, a subsequent functional analysis for Randy suggested that peer attention maintained talking out. We did not conduct functional analyses to test other reinforcers for Benji, Fabian, or Verdeen, so the extent to which other reinforcers would have been identified is unclear. Future studies could include broader tests for both positive and negative reinforcement in the initial functional analyses to disentangle failure of the PSDA.
from potential reactivity or other confounds that would affect the functional analysis more broadly (Beavers et al., 2013).

Limitations of this study also require discussion. Procedural fidelity errors occurred during initial functional-analysis sessions for Benji and Randy. Although an escape function was identified for Benji once procedural fidelity improved, the functional analysis may have been completed more quickly with better initial procedural fidelity. For Randy, prompting procedures occurred at intervals that were too long or were inconsistent. The extended prompt intervals may have functioned as inadvertent escape. Additionally, the early errors in procedural fidelity led to extended exposure to the functional analysis. Another limitation was that Benji and Randy removed assent during the functional analysis, resulting in Benji withdrawing from the study. The inclusion of only escape-related conditions in the functional analysis may have increased the aversiveness of the assessment context relative to assessments that include a variety of conditions. Fabian also may have been withdrawing assent by leaving his area, which resulted in early termination of the session. It may be important to determine what conditions are necessary to keep participants engaged in functional-analysis procedures.

Because challenging behavior was not consistently evoked during the functional analysis, effects of work removal during escape intervals could not be evaluated. Escape from the LS task appeared to function as a reinforcer for Benji, but response rates were undifferentiated across removal and non-removal conditions. Fabian contacted both variations of escape, but neither differentially affected responding. Randy and Verdeen may not have sufficiently contacted the contingencies. Future research should continue to examine the possible differential effects of removal of materials for participants with known escape functions.

Relatedly, future research for screening participants for inclusion based on an escape function may consider use of a descriptive assessment along with a caregiver-interview. Descriptive assessments often may overestimate the probability of an attention function (Contreras et al., 2023). Thus, a descriptive assessment suggesting an escape function may be especially informative, because it would seemingly overcome this possibly common outcome of a descriptive assessment.
Results of the current study suggest that the PSDA may not be effective for identifying tasks that result in differential response rates in subsequent functional analyses, constituting a failure to replicate previous research. Further identification of the boundary conditions of the PSDA is warranted. One such use may be to assist educators in identifying tasks that could be used as reinforcers, or in sequencing academic activities to avoid abrupt transitions from highly preferred to non-preferred tasks (e.g., rich-to-lean transitions; Retzlaff et al., 2017). Additional research could also identify strategies to produce clear and rapid functional-analysis outcomes for participants with ODD and ADHD (Anderson & St. Peter, 2012).
References


Variations in Functional Analysis: Escape

Profound Disabilities, *Journal of Applied Behavior Analysis*, 25 (2), 491-498. DOI: 
https://doi.org/10.1901/jaba.1992.25-491

https://doi.org/10.1002/jaba.801


Table 1

*Operational Definitions for Target Responses and Side Effects (i.e., non-targeted challenging behavior)*

<table>
<thead>
<tr>
<th>Label</th>
<th>Definition</th>
<th>Benji</th>
<th>Fabien</th>
<th>Randy</th>
<th>Verdeen</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protest</td>
<td>Curse words, refusal statements, inability statements, complaints, or insults.</td>
<td></td>
<td>T</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Disruption</td>
<td>Hitting, swiping, crumpling, throwing, or ripping materials</td>
<td></td>
<td>T</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Talk Out</td>
<td>Student makes a sound at conversational volume.</td>
<td></td>
<td></td>
<td></td>
<td>T</td>
</tr>
<tr>
<td>Inappropriate Vocalizations</td>
<td>Exceeding conversational volume, and/or threats to another person, or insulting another person.</td>
<td>S</td>
<td>S</td>
<td></td>
<td>T</td>
</tr>
<tr>
<td>Aggression</td>
<td>Forcefully moves hands, feet, or head/mouth toward another person.</td>
<td></td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td>Disruption</td>
<td>Ripping, crumpling, throwing items not at a person, or lifting furniture totally off ground.</td>
<td></td>
<td></td>
<td></td>
<td>S</td>
</tr>
<tr>
<td>Leave Area</td>
<td>Entire body is outside of taped-off instructional area.</td>
<td></td>
<td></td>
<td></td>
<td>S</td>
</tr>
<tr>
<td>Move Furniture</td>
<td>Physical contact with furniture so that all four legs are off the ground.</td>
<td></td>
<td></td>
<td></td>
<td>S</td>
</tr>
<tr>
<td>Self-Injury</td>
<td>Makes forceful contact with self (e.g., hits head, bites self, and pulls own hair with force).</td>
<td></td>
<td>S</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Spitting</td>
<td>Ejection of liquid past the plane of the lips.</td>
<td></td>
<td>S</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Threats</td>
<td>Descriptions of physical harm to self or others, or property destruction of others’ property.</td>
<td></td>
<td>S</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 2

Interobserver Agreement (IOA) for each student functional analysis

<table>
<thead>
<tr>
<th>Student</th>
<th>Target Response</th>
<th>Side Effect</th>
<th>Correct/On-Task</th>
<th>Incorrect</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benji</td>
<td>99 (98-100)</td>
<td>97 (97-100)</td>
<td>95 (85-100)</td>
<td>94 (83-100)</td>
</tr>
<tr>
<td>Fabian</td>
<td>97 (89-100)</td>
<td>99 (87-100)</td>
<td>92 (85-98)</td>
<td>91 (82-95)</td>
</tr>
<tr>
<td>Randy</td>
<td>98 (87-100)</td>
<td>N/A</td>
<td>82 (70-95)</td>
<td>N/A</td>
</tr>
<tr>
<td>Verdeen</td>
<td>100 (91-100)</td>
<td>99 (79-100)</td>
<td>N/A</td>
<td>N/A</td>
</tr>
</tbody>
</table>
Table 3

Interobserver Agreement (IOA) for Functional Analysis Independent Variables

<table>
<thead>
<tr>
<th>Student</th>
<th>Vocal Prompt</th>
<th>Model Prompt</th>
<th>Praise</th>
<th>Escape</th>
<th>Removal of Materials</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benji</td>
<td>96 (90-100)</td>
<td>95 (89-100)</td>
<td>97 (90-100)</td>
<td>99.5 (98-100)</td>
<td>99.8 (98-100)</td>
</tr>
<tr>
<td>Fabian</td>
<td>94 (89-100)</td>
<td>92 (86-98)</td>
<td>94 (87-98)</td>
<td>98 (93-100)</td>
<td>98 (94-100)</td>
</tr>
<tr>
<td>Randy</td>
<td>98 (94-100)</td>
<td>95 (87-100)</td>
<td>97 (87-100)</td>
<td>99 (93-100)</td>
<td>99.8 (97-100)</td>
</tr>
<tr>
<td>Verden</td>
<td>98 (87-100)</td>
<td>90 (83-100)</td>
<td>93 (86-100)</td>
<td>99.8 (98-100)</td>
<td>100</td>
</tr>
</tbody>
</table>
Table 4

*Functional Analysis Procedural Fidelity*

<table>
<thead>
<tr>
<th>Student</th>
<th>Global Procedural Fidelity</th>
<th>Prompt Latency</th>
<th>Escape Delivery</th>
<th>Escape Duration</th>
<th>Escape Type</th>
<th>Praise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benji</td>
<td>97 (81-100)</td>
<td>96 (62-100)</td>
<td>91 (0-100)</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Fabian</td>
<td>99.9 (98-100)</td>
<td>99 (99-100)</td>
<td>98 (50-100)</td>
<td>98 (67-100)</td>
<td>95 (0-100)</td>
<td>100</td>
</tr>
<tr>
<td>Randy</td>
<td>93 (66-100)</td>
<td>91 (32-100)</td>
<td>100</td>
<td>98 (50-100)</td>
<td>100</td>
<td>99 (80-100)</td>
</tr>
<tr>
<td>Verdeen</td>
<td>95 (88-100)</td>
<td>91 (77-100)</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>99 (93-100)</td>
</tr>
</tbody>
</table>
Table 5

*Benji’s PSDA Non-targeted behavior*

<table>
<thead>
<tr>
<th>Task</th>
<th>Correct</th>
<th>Total Trials</th>
<th>Percent Correct</th>
<th>Protest (Count)</th>
<th>SIB (Count)</th>
<th>Threats (Count)</th>
<th>Spit (Count)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sight Words (MS)</td>
<td>18</td>
<td>21</td>
<td>85.7%</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Add: Double-Digit (LS)</td>
<td>0</td>
<td>2</td>
<td>0%</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Subtract: Single-Digit</td>
<td>17</td>
<td>18</td>
<td>94.4%</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Add: Single-Digit</td>
<td>15</td>
<td>16</td>
<td>93.8%</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Multiplication</td>
<td>9</td>
<td>12</td>
<td>75%</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Parts-of-Speech</td>
<td>5</td>
<td>13</td>
<td>38.5%</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Subtract: Double-Digit</td>
<td>2</td>
<td>7</td>
<td>28.5%</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Table 6

*Fabian’s PSDA Non-targeted behavior*

<table>
<thead>
<tr>
<th>Task</th>
<th>Correct</th>
<th>Total Trials</th>
<th>Percent Correct</th>
<th>Disrupt (Count)</th>
<th>Move Furn (Count)</th>
<th>Inp. Voc. (Count)</th>
<th>Aggress (Count)</th>
</tr>
</thead>
<tbody>
<tr>
<td>ID: Letters (MS)</td>
<td>10</td>
<td>11</td>
<td>90.9%</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sight Words (LS)</td>
<td>0</td>
<td>2</td>
<td>0%</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>ID: Numbers</td>
<td>9</td>
<td>9</td>
<td>100%</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Add</td>
<td>6</td>
<td>8</td>
<td>75%</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Subtract</td>
<td>1</td>
<td>5</td>
<td>20%</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
### Table 7

**Randy’s PSDA Non-targeted Behavior**

<table>
<thead>
<tr>
<th>Task</th>
<th>Correct</th>
<th>Total Trials</th>
<th>Percent Correct</th>
<th>Protest (Count)</th>
<th>Scribble (Dur.)</th>
<th>Prop. Dest. (Count)</th>
<th>Aggress (Count)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subtract: Fractions <em>(MS)</em></td>
<td>6</td>
<td>10</td>
<td>60%</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Making Inferences <em>(LS)</em></td>
<td>1</td>
<td>2</td>
<td>50%</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Match Word to Meaning</td>
<td>2</td>
<td>6</td>
<td>33%</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Spelling</td>
<td>3</td>
<td>9</td>
<td>33%</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Read and Answer</td>
<td>0</td>
<td>3</td>
<td>0%</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Long Division</td>
<td>0</td>
<td>5</td>
<td>0%</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
### Table 8

**Verdeen’s PSDA Non-Targeted Behavior**

<table>
<thead>
<tr>
<th>Task</th>
<th>Correct</th>
<th>Total Trials</th>
<th>Percent Correct</th>
<th>Inap. Voc. (Count)</th>
<th>Out of Area (Dur.)</th>
<th>Disrupt (Count)</th>
<th>Aggress (Count)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Subtract (MS)</td>
<td>7</td>
<td>11</td>
<td>64%</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Write Sentences (LS)</td>
<td>0</td>
<td>2</td>
<td>0%</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Add</td>
<td>9</td>
<td>10</td>
<td>90%</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Spelling</td>
<td>4</td>
<td>6</td>
<td>67%</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Parts of Speech</td>
<td>2</td>
<td>7</td>
<td>29%</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Table 9

Benji’s Multiple-Stimulus Without Replacement Results (3 sessions, 3 min 20s access intervals)

<table>
<thead>
<tr>
<th>Activity</th>
<th>Rank</th>
<th>Selected</th>
<th># Of Sess.</th>
<th>Protest (Count)</th>
<th>SIB (Count)</th>
<th>Threats (Count)</th>
<th>Spit (Count)</th>
</tr>
</thead>
<tbody>
<tr>
<td>iPad</td>
<td>1</td>
<td>5, 1, 1</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Gravity Maze</td>
<td>2</td>
<td>1, 2, NS/6</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Chase the Fox</td>
<td>3</td>
<td>3, 4, NS/6</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Googly Eyes</td>
<td>4</td>
<td>2, 3, NS/6</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Shark Bite</td>
<td>5</td>
<td>4, 4, NS/6</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Sandbox</td>
<td>6</td>
<td>6, 6, 2</td>
<td>3</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
</tbody>
</table>
Figure 1

Paired-Stimulus Demand Analysis (PSDA) Graphs
Figure 2.

*Functional Analysis Results for each Student (Target Response left column; Side Effects right column)*

- **Benji**
- **Fabian**
- **Randy**
- **Verdeen**

Responses Per Minute vs. Session Number

- **MS No Removal**
- **LS No Removal**
- **LS Removal**
- **Play**
Appendix A

Teacher Interview – Escape Variations FA

Instructions
Complete the following form with each teacher who interacts with the student during academic instruction. Type your responses under each question.

Interviewer: ____________________  Interviewee (Teacher): ____________________
Date: ____________________  Interview Start Time: ___________ End Time: ________

Tell the teacher: The purpose of this study is to look at ways to identify what work participants will complete or avoid, and how showing or removing that work affects behavior in a functional analysis (a form of functional behavior assessment). Although participants often engage in many forms of challenging behavior, please think about challenging behavior that is most likely to happen during classroom routines involving work as you answer the following questions.

1. What form or forms of challenging behavior occur during work routines in the classroom?
   a. Does the behavior turn on and off quickly (like hitting), or does it occur in episodes that last a long time (like crying)?
   b. If the teacher initially lists multiple responses of concern:
      i. Which is the most concerning? What does it look like?
      ii. Which is the least concerning? What does it look like?
      iii. What behavior occurs most often?
   c. If the teacher reports that challenging behavior does not occur during work routines, thank the teacher for their time and let them know that the student is not eligible to participate in the study.

2. Complete the following table for the behavior of most concern. To complete the table, ask:
   a. What is your daily routine in the classroom? (add to “ACTIVITY” column)
   b. What time does each routine start and end? (add to “TIME” column)

<table>
<thead>
<tr>
<th>ACTIVITY</th>
<th>TIME</th>
<th>LIKELIHOOD OF BX OCCURRING (1-5)</th>
<th>DISRUPTIVENESS OF BX (1-5)</th>
<th>BX IS DANGEROUS? (1-5)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
c. Think about [behavior of concern]. For each routine, rate the likelihood of [behavior of concern] occurring, disruptiveness, and chance of physical harm on a scale of 1-5, where 1 is unlikely, not disruptive, and not likely to cause harm, and 5 is very likely, highly disruptive, and may easily cause physical harm. Note each category is distinct: for example, a behavior could have a likelihood of 5, a disruptiveness of 5, but a danger of 1 (e.g., screaming).

3. Identify the routine above in which the behavior is most likely. Ask:
   a. What kinds of activities occur during [routine]?
   b. Are there any kinds of activities that seem particularly problematic?

4. Identify the routine above in which the behavior is least likely. Ask:
   a. What kinds of activities occur during [routine]?
   b. Are there activities that the student will request or about which the student seems excited?

5. Do you avoid presenting certain kinds of work during the day because of the likelihood of [behavior of concern]?

6. What do you do when [behavior of concern] occurs?

7. Do you currently collect data on the target behavior? If so, can you share the data that you have collected?

8. Has a functional behavior assessment (FBA) been completed for this student? [If yes, request a copy of the FBA document.]

9. Does this student have a current behavior-intervention plan (BIP)? [If yes, request a copy of BIP information.]

10. Does the student seem to have language skills on par with his or her peers?

11. Is there a safe and non-disruptive area in the school that I can conduct assessments with the student?

12. What times of day or days of the week would it be possible for me to remove the student from the classroom to conduct the assessments? I expect that the entire process will require at least an hour and a half, and up to 4 hours. I will probably need to work with the student across multiple days, and hope to do assessments for 1 to 2 hours per day.