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Evaluating the Diverted Attention Condition in a Trial-Based Functional Analysis

A Thesis
by
Kyle A. Frank

Submitted to the Faculty of the Department of Health Professions
at Rollins College in Partial Fulfillment
of the Requirements for the Degree of

MASTER OF ARTS IN APPLIED BEHAVIOR ANALYSIS AND CLINICAL SCIENCE

April 2020
Winter Park, FL

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Acknowledgements

Thank you to Kara Wunderlich for being my committee chair and for helping me through all the ups and downs of the roller coaster that is my thesis. I could not have completed this without your great knowledge of the field or your ability to roll with the “wonkiness” of the challenges we faced. Thank you to Sabrina Veilleux for being my rock throughout the entirety of the thesis process and for picking up the slack in my personal life when the going got tough. Thank you to Arturo Garcia for scoring my data and being an awesome colleague who provided a different view on every issue that I brought to him. Thank you to all of my family and friends who supported me and my busy schedule throughout my time in the ABACS program. Finally, this thesis would not be possible without the amazing parents of my participants who supported my research.

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Abstract

The diverted attention condition of a functional analysis is similar to the standard attention condition; however, instead of the therapist engaging in another task and ignoring the participant, the therapist provides attention to a confederate while diverting attention away from the participant. Contingent upon the occurrence of problem behavior, attention is diverted back to the participant. This study evaluated the diverted attention condition using a trial-based functional analysis format. Results of the standard functional analysis for both subjects were undifferentiated, whereas results of the trial-based functional analysis showed an attention function for one subject through the use of a diverted attention condition and undifferentiated for the other subject. The results suggest that the diverted attention condition can be conducted in a trial-based format without significant changes to the environment.

Keywords: attention, diverted attention, functional analysis, social-positive reinforcement, trial-based functional analysis

Introduction

The standard functional analysis developed by Iwata, Dorsey, Slifer, Bauman, and Richman (1982/1994) has been a staple in the field of applied behavior analysis (ABA). Through repeated exposure to specific antecedent and consequent events, experimenters can identify variables that maintain problem behavior. After maintaining variables have been identified, an individualized treatment plan can be developed to decrease problem behavior, which is one of the main goals of behavior analysts practicing in the field. One of the limitations of the standard functional analysis is its inability to identify maintaining variables that are more specific than those for which the typical conditions usually test. For example, a typical attention condition would not work for an individual who engages in problem behavior specifically to gain access to attention that is being provided to a confederate. Previous researchers have addressed this limitation through modifying certain variables within a standard functional analysis.

One of the ways researchers can modify the standard functional analysis is by modifying the conditions used to evoke problem behavior (e.g., social avoidance condition, diverted attention condition). A diverted attention condition is a modified version of an attention condition typically conducted in a standard functional analysis (Fahmie, Iwata, Harper, & Querim, 2013). In a typical attention condition the experimenter withholds attention until problem behavior occurs, whereas in a diverted attention condition the experimenter provides attention to another individual (i.e., a confederate adult or peer) for the duration of the session. Contingent upon the occurrence of problem behavior, the experimenter diverts attention away from the confederate and provides attention to the participant.

A diverted attention condition might provide results different from a standard attention condition. For example, if a teacher is paying attention to another student, the

teacher's attention might serve as an S^D that the teacher's attention is available. On the other hand, if the teacher is not paying attention to any students, the lack of attention might serve as an S-delta that the teacher's attention is unavailable. A study published by Mace, Page, Ivancic, & O'Brien (1986) was the first published study to include a diverted attention condition. Mace et al. (1986) tested the effectiveness of brief time-out with and without contingent delay by comparing a condition in which two adults constantly conversed with each other throughout the session to a condition in which one adult read a magazine alone. Although the diverted attention condition was not a focus of the study, the results suggested that the participant responded somewhat differently when the adults were conversing compared to when the adult read a magazine.

Over the last 30 years, a handful of other published studies have evaluated a diverted attention condition within the context of a standard functional analysis. For example, Fisher, Kuhn, & Thompson (1998) used a diverted attention condition to help differentiate responding in three different socially mediated positive reinforcement conditions. Conversely, Hagopian, Contrucci-Kuhn, Long, & Rush (2005) substituted the typical attention condition in the standard functional analysis for a diverted attention condition based on caregiver reports. Results suggested that the participant's problem behavior was maintained by attention. One common theme throughout the diverted attention literature is that the standard attention condition does not always accurately identify an attention function, whereas the diverted attention condition does.

Fahmie, Iwata, Harper, and Querim (2013) evaluated the efficacy of a diverted attention condition in a standard functional analysis for nine participants. Results showed that the standard attention condition and the diverted attention condition had similar reinforcing effects for a majority of the participants; however, two of the participants in the study responded only in the diverted attention condition. Additionally, it is important to note that

all nine participants demonstrated problem behavior in the diverted attention condition, whereas only eight out of nine participants demonstrated problem behavior in the standard attention condition.

Despite the support in the literature for the diverted attention condition, there are several limitations to its use. One limitation is the minimal number of research studies conducted using the diverted attention condition, which might be due to the specific nature in which the modified condition is needed. Another limitation of the diverted attention condition is the lack of generalizability of its use found in the current literature. Specifically, the diverted attention condition has only been conducted in the format of a standard functional analysis. Further, most of the literature on diverted attention has used a confederate adult or caregiver as opposed to a confederate peer. This may be due to the ease of including an adult in the highly controlled environment instead of a younger individual who has the potential to present more confounding variables into the environment. Additionally, the inclusion of a confederate peer in a standard functional analysis introduces the risk of the participant directing problem behavior at the confederate peer. Due to this risk, the diverted attention condition in a standard functional analysis is typically contrived and might lack the presence of stimuli typically found in the natural environment that evoke the problem behavior. For example, a diverted attention condition involving two adults conversing with one another might not evoke problem behavior for a student who engages in problem behavior to gain the attention of the teacher, who is focused on another student.

To address the broader limitation of a standard functional analysis requiring a highly controlled environment, Sigafos and Sagers (1995) carried out a series of trial-based functional analyses in a classroom setting to identify the variables maintaining problem behavior in two participants. The method involved embedding a series of probes into ongoing classroom activities throughout the day. Each probe consisted of a 1-min test interval in

which the EO and contingency for problem behavior were present and a 1-min control interval in which the reinforcer was available throughout the entire interval. Intervals were discontinued contingent on the occurrence of problem behavior.

Bloom, Iwata, Fritz, Roscoe, and Carreau (2011) replicated and modified the trial-based functional analysis carried out by Sigafoos and Sagers (1995). Bloom and colleagues modified the trial-based functional analysis in three main ways: (a) reversing the order of the test and control segments to eliminate potential carryover effects, (b) extending the segments into 2-min intervals, and (c) including ignore trials to test for a possible automatic function. Results from Bloom et al. (2011) suggested that the trial-based functional analysis is a viable assessment method for determining environmental variables that maintain problem behavior when conducting a standard functional analysis is not feasible. Bloom et al. (2011) also suggested that the 6-min (2-min control, 2-min test, 2-min control) trials conducted by Sigafoos and Sagers (1995) could be replaced with 4-min (2-min control, 2-min test) trials and still attain the same results.

The trial-based functional analysis has many benefits to analysts working in the field. One of the greatest benefits is the flexibility to conduct trials throughout the day without heavily modifying the environment. For example, a trial-based functional analysis can be conducted in a school classroom by using the relevant EOs taking place in the natural environment and conducting various trials at specific times (Rispoli, Davis, Goodwyn, & Camargo, 2013). Some optimal times to conduct trials in a classroom could be before a scheduled mealtime when the EO for tangible food items is the highest or after a long period of classwork when the EO for escaping from work is the highest.

In comparison to the standard functional analysis, the trial-based functional analysis has been an underutilized tool in the repertoire of behavior analysts, as noted by the lack of published literature. The diverted attention condition has been shown to aid in determining

specific functions of behavior when more differentiated data is warranted from results of a standard functional analysis. The ability to conduct a trial-based functional analysis when a standard functional analysis is not feasible allows researchers to test modified functional analysis conditions, such as a diverted attention condition, in a trial-based format. Thus, the purpose of this study is to evaluate the efficacy of the diverted attention condition conducted in a trial-based format.

Method

Participant and Settings

Two participants, Larry and Ian, were included in this study based on the following criteria: 1) the participant had a diagnosis of autism spectrum disorder, and 2) the participant engaged in problem behavior that had a hypothesized attention function based on indirect and descriptive measures carried out by a Board Certified Behavior Analyst. Participants were recruited from a behavior-analytic service provider in the Greater Orlando area. Larry was an 8-year-old male diagnosed with autism spectrum disorder who engaged in perseveration and Ian was a 5-year-old male diagnosed with autism spectrum disorder who engaged in inappropriate personal space.

All sessions were conducted in the clinic rooms of a local behavior analytic clinic that both participants regularly attended for ABA therapy services. The session rooms contained typical materials found at an ABA clinic (e.g., tables, chairs, work material, etc.).

Response Measurement and Interobserver Agreement

Perseveration for Larry was defined as repeating a question, an individual's name, or a statement two or more times within a 10-s interval (e.g., "That's a snake! That's a snake!"). All instances of perseveration were scored after the second instance within the 10-s interval.

Inappropriate personal space for Ian was defined as touching an individual without consent or coming into close proximity (i.e., 0.0762 meters) of another individual's face without consent. Inappropriate personal space was not counted for accidental touching during instructional tasks. For example, during the demand condition, inappropriate personal space was not scored if Ian accidentally touched the experimenter's hand or fingers while pointing to the correct card when the experimenter held up two cards and asked, "Which one do you use in the rain?"

The dependent variable measured was rate (responses per minute) of problem behavior during the standard functional analysis sessions and percentage of trials with problem behavior during the trial-based functional analysis sessions. All sessions were videotaped for data collection purposes. Standard functional analysis sessions were scored using the data-collection app Countee. A second observer independently collected data for 33% of Larry's sessions and 36% of Ian's sessions. Sessions were broken up into 10-s intervals, and interobserver agreement (IOA) was determined by taking the smaller number of occurrences of problem behavior recorded by one observer and dividing it by the larger number of occurrences of problem behavior scored by the second observer. If both observers recorded zero occurrences of problem behavior, the interval was recorded as 100% agreement. Agreement was averaged across intervals and multiplied by 100 to attain each session's percentage of agreement. Average IOA was 92% for Larry's sessions and 99% for Ian's sessions.

Trial-based functional analysis sessions were scored using trial-by-trial data collection using pen and paper. A second observer independently collected data for 50% of Larry's sessions and 40% of Ian's sessions. IOA was determined by taking the number of trials in agreement and dividing by the total number of trials then multiplying by 100 to attain the percentage of agreement. Average IOA was 95% for Larry's sessions and 100% for Ian's sessions.

Procedure

Preference Assessment. Based on the procedures described by DeLeon & Iwata (1996), a multiple stimulus without replacement (MSWO) preference assessment was conducted with five leisure items to determine a preference hierarchy for each participant. Toys included in the MSWO consisted of four toys the participant interacted with on a daily

basis, as determined by a caregiver interview, and one toy arbitrarily selected by the experimenter.

Standard Functional Analysis. A standard functional analysis was conducted based on the procedures described by Iwata et al. (1982/1994). All functional analysis sessions were 5 min in duration. The conditions were alternated in a fixed sequence of no interaction, attention, play, and demand (Hammond, Iwata, Rooker, Fritz, & Bloom, 2013). All conditions were conducted in the clinic rooms described above.

During attention condition, a moderately preferred toy was present in the session room. At the start of the session, the experimenter announced that his/her attention would not be available and instructed the participant to play with the toy (e.g., “Play with your toy, I have to do some work”). Contingent on the occurrence of problem behavior, the experimenter disengaged from working, turned to the participant, and delivered attention in the form of a verbal reprimand related to the problem behavior (e.g., “Stop climbing, you are going to hurt yourself!” or “Stop yelling, you are distracting me from my work!”). The demand condition consisted of delivering demands every 10 s using a three-step sequence comprised of a verbal instruction, model prompt, and a physical prompt. Praise was delivered contingent on compliance with a verbal instruction or modeled prompt. A 30-s break was delivered contingent on problem behavior; the task materials were removed during the 30-s break. During the play condition, the participant had free access to moderately preferred toys. No demands were placed and the experimenter provided verbal attention every 30 s (e.g., “Nice playing with the toy” or “I like your shirt”). Finally, in the no interaction condition, at least one experimenter was present in the room with the participant and no play or instructional materials were present. The experimenter did not interact with the participant and minimized physical contact and eye contact for the duration of the session.

A diverted attention condition was conducted only for Ian due to informal observations from Ian's therapy sessions suggesting a diverted attention condition might benefit the standard functional analysis. During the diverted attention condition, a moderately preferred leisure item was present in the session room. A confederate adult sat near the experimenter and the experimenter announced that his/her attention would not be available so the participant should play with the toy (e.g., "Play with your toy, [confederate's name] and I have to talk"). The experimenter and the confederate adult engaged in continuous conversation for the entire duration of the session. Contingent on the occurrence of problem behavior, the experimenter would stop conversating with the confederate, turn to the participant and deliver attention in the form of a verbal reprimand related to the problem behavior, then turn back to the confederate to continue the conversation.

Trial-Based Functional Analysis. A trial-based functional analysis was conducted based on the procedures described by Lambert, Bloom, and Irvin (2012), which was a modified version of Bloom et al. (2011). All trials were 4 min in duration and consisted of a 2-min control segment and a 2-min test segment. Occurrences of problem behavior were ignored during all control segments. Test segments ended early contingent on the occurrence of problem behavior. Four trial conditions were included: ignore, demand, attention, and diverted attention. Trials of each condition were conducted throughout the day and were embedded into the clinic's daily therapy schedule. Five trials of each condition were conducted for Larry, and 10 trials of each condition were conducted for Ian.

Ignore trials consisted of two back-to-back 2-min ignore segments in which no attention or demands were provided, and the participant did not have access to leisure materials. All occurrences of problem behavior were ignored.

During demand trials, the experimenter did not place any demands during the first 2-min (control segment) and the participant was free to get up from the work area. During the

last 2-min (test segment) the experimenter stated “Time to do some work” before placing demands, using a three-step prompting sequence (verbal, model, and physical). Contingent on the occurrence of problem behavior, the experimenter removed the instructional materials and turned away from the participant, ending the trial.

During attention trials, the experimenter provided attention continuously throughout the first 2 min (control segment). At the end of the 2-min control segment, a 2-min test segment began. The beginning of the test segment was signaled by the experimenter stating to the participant “I have some work to do” and physically turning away from the participant. Contingent on the occurrence of problem behavior, the experimenter turned back to the participant and provided attention similar to the attention provided in the natural environment (e.g., “Stop doing that, I have work to do,”) and ended the trial.

During diverted attention trials, the experimenter provided attention continuously throughout the first 2 min (control segment). The 2-min test segment started at the end of the control segment, which was signaled by the experimenter physically turning or moving away from the participant and providing continuous attention to a peer. Contingent on the occurrence of problem behavior, the experimenter turned back to the participant and provided attention similar to the attention provided in the natural environment and ended the trial.

Similar to Bloom et al. (2011), trial-based functional analysis trials were not scored if they met the criteria of a failed trial, and another trial was conducted to take its place. An example of a failed trial would be if another individual provided attention to the participant during the test segment of an attention trial. Another example of a failed trial would be if another therapist placed a demand on the participant during the control segment of the demand condition.

Results

Results of the two standard functional analyses are shown in Figure 1 for Larry and Ian. Larry's perseveration occurred most often during the play condition of the standard functional analysis; moderate responding also occurred during the attention condition. For Ian, inappropriate personal space occurred most frequently during the ignore condition of the standard functional analysis. A pairwise functional analysis was then conducted with Ian, in which sessions were alternated between one play condition and two diverted attention conditions. Zero problem behavior occurred during all pairwise functional analysis sessions.

Results of the two trial-based functional analyses are shown in Figure 2 for Larry and Ian. Larry's perseveration occurred equally high in the test and control segments of the diverted attention condition. Perseveration was also higher in the control segment compared to the test segment of the attention condition. The control segments of the demand condition also had a few occurrences of perseveration. Results suggest Larry's perseveration was largely undifferentiated. Only one ignore trial for Larry met the criteria of a failed session due to an interruption from another client at the clinic.

Ian's inappropriate personal space occurred exclusively in the diverted attention test segment. Thus, results of Ian's trial-based functional analysis sessions suggest an attention function, specifically when attention is provided to a peer. Only one attention trial for Ian met the criteria of a failed session due to the video recording device being stopped in the middle of the session.

Discussion

Results of this study confirm that the diverted attention condition can be conducted in a trial-based format without any significant changes to the natural environment. Additionally, the results show the standard attention condition can be replaced by a diverted attention condition or both a standard attention condition and a diverted attention condition can be conducted in a trial-based functional analysis, especially when a confederate adult or peer is

available. Both participants engaged in the targeted problem behavior primarily in the diverted attention condition, which is a stark contrast to the results of their standard functional analysis, thus strengthening the evidence that the diverted attention condition is a valuable asset to a behavior analysts' repertoire.

Anecdotally, Larry was reported to be more likely to engage in perseveration when a nearby individual was already talking compared to when a nearby individual was not already talking. For example, in the first attention condition, the experimenter provided Larry with the leisure item (i.e., crayons and paper) and instructed him to "Draw whatever you want, I have some work to do," to which Larry replied "Okay" and proceeded to draw for the entire session. At the conclusion of the session, when the experimenter began talking with Larry's therapist, Larry immediately began engaging in perseveration. Thus, Larry's equally high occurrences of perseveration in the trial-based diverted attention condition, as well as the high rate of perseveration in the play condition and low rate of perseveration in the attention condition of the standard functional analysis, could potentially be attributed to rule governance and stimulus control. If Larry's behavior was under the antecedent control of a rule governance, then it would help explain the matching percentage of trials with perseveration in the control segment and test segment of the trial-based diverted attention condition.

The contingencies set within an attention condition might influence how subjects respond. For example, during a standard functional analysis attention condition the contingency is made more salient by stating it to the participant at the beginning of the session (i.e., "Play with your leisure item, I have to do some work"). This might function as an S^D or S -delta for reinforcement in the form of attention being available depending on the participant's reinforcement history. However, during the trial-based functional analysis diverted attention condition used in this study, the S^D was not provided to the participant.

Therefore, it was unclear when the control segment ended and the test segment began. Future research should evaluate the effects of presenting the S^D at the beginning of the test segment (e.g., “Play with your leisure item, I have to talk to [confederate’s name]”) versus not presenting the S^D at all.

The choice to use a confederate peer or adult in the diverted attention condition might also influence how participants respond. For example, Ian responded differently in the diverted attention condition when a confederate adult was used in the standard functional analysis compared to a confederate peer in the trial-based functional analysis. This might have occurred due to the relevant MO’s taking place in the environment and Ian’s behavioral history. In addition, the choice to use a confederate adult or peer might be based on certain challenges or potential risks involved in conducting a standard functional analysis. For example, incorporating a confederate peer into a standard functional analysis diverted attention condition is a considerable challenge due to the highly controlled and contrived nature of functional analysis conditions. Conversely, incorporating a confederate peer into a trial-based functional analysis diverted attention condition is more naturalistic due to the conditions being tailored for use in the naturalistic setting.

Additionally, it might be more ethical to use a confederate peer in a trial-based functional analysis compared to a standard functional analysis. In all conditions that use a confederate, there is always the potential danger of the participant engaging in problem behavior that targets the confederate. However, this danger is mitigated in a trial-based functional analysis due to the sessions ending early contingent on the occurrence of problem behavior. Thus, only one instance of potential risk towards the confederate occurs per session compared to a standard functional analysis, in which the target behavior has the potential to occur multiple times.

Little research has been conducted on the implications of peer attention versus adult attention contingent on problem behavior. One such study was conducted by Taylor, Sisson, McKelvey, & Trefelner (1993), which evaluated multiple situations of adult attention on problem behavior. Results suggested that their participant engaged in higher rates of scratching during the condition in which two adults were conversing compared to an adult conversing with a peer. Additional research should be conducted to further evaluate the implications of peer attention versus adult attention contingent on problem behavior.

During his trial-based functional analysis, Larry engaged in a few instances of perseveration during the control segment of the demand condition. The control segment of the demand condition is very similar to the test segment of the attention condition; thus, it might have evoked some responding to gain the experimenter's attention. In order to eliminate this issue, one avenue for future research is to evaluate the control segment of the demand condition to differentiate it from the test segment of the attention condition. For example, the addition of more salient stimuli used only in the control segment of the demand condition might help differentiate it from the test segment of the attention condition.

Trial-based functional analysis literature is mixed on whether to end the control segment early contingent on the occurrence of problem behavior. In this study, the control segment was carried out for the full length of time and all occurrences of problem behavior were ignored. Additional research is needed on the implications of carrying out the control segment and maximizing the exposure to the environmental EOs compared to ending the control segment early contingent on the occurrence of problem behavior.

One limitation of this study was the small number of trials conducted for Larry's trial-based functional analysis; only five trials of each type were conducted compared to the average ten trials conducted in a majority of the published literature. After only five trials had been conducted in each condition, Larry's caregivers withdrew from all therapy sessions due

to the threat of the COVID-19 pandemic; therefore, additional trials could not be conducted. Another limitation was the inconsistency in the environmental variables of the diverted attention conditions conducted with Ian. The standard functional analysis sessions were all conducted with a confederate adult while the trial-based functional analysis sessions were all conducted with a confederate peer. Thus, these changes in environmental variables might have influenced responding in the two different functional analyses. An additional limitation is the potential carryover effects of conducting the trial-based functional analysis after conducting a standard functional analysis. Both participants might have had increased sensitivity to the environmental conditions over the course of the study, making the trial-based functional analysis more efficient as a result.

The participant's habituation to the items used in the functional analyses might also be a limiting factor in this study. The same item was used for each participant throughout the entire study, which could have influenced responding in the conditions for which items were available. For example, Ian's leisure item identified in the MSWO preference assessment was toy animals. At the beginning of the study, Ian functionally and appropriately played with the toy animals. Over the course of both functional analyses, however, the appropriate functional play gradually changed into less socially appropriate play (i.e., smashing the animals on the table, stacking the animals on top of one another, repeatedly making the animals fall off the table, etc.).

Based on the evidence provided from the diverted attention literature as well as the results of this study, an argument could be made that the diverted attention condition should replace the standard attention condition when problem behavior is occurring in a populated environment, such as a school or clinic. In the published literature on diverted attention (Fahmie et al., 2013; Fisher et al., 1998; St. Peter Pipkin, Vollmer, & Sloman, 2010), all participants with problem behavior maintained by attention responded in the diverted

attention condition, whereas not all participants responded in the standard attention condition. Although this evidence is valid, additional research is needed. Future research should be conducted on the validity and reliability of diverted attention condition results compared to those of the standard attention condition.

Future research should also consider evaluating other modified conditions typically found in a standard functional analysis in a trial-based format, such as the social avoidance condition or mand-compliance condition. For example, in a social avoidance condition in a standard functional analysis, there might only be a participant and an experimenter in the room. Conversely, there is a higher probability that more individuals will be in the room in the trial-based functional analysis, which might strengthen the MO for social avoidance. Thus, it is possible that a social avoidance condition has higher potential for producing problem behavior in a trial-based format compared to a standard functional analysis. A final limitation of this study is the lack of a treatment intervention based on the results of the trial-based functional analysis diverted attention condition. Therefore, future studies should address this issue by treating attention-maintained problem behavior identified through a trial-based functional analysis diverted attention condition.

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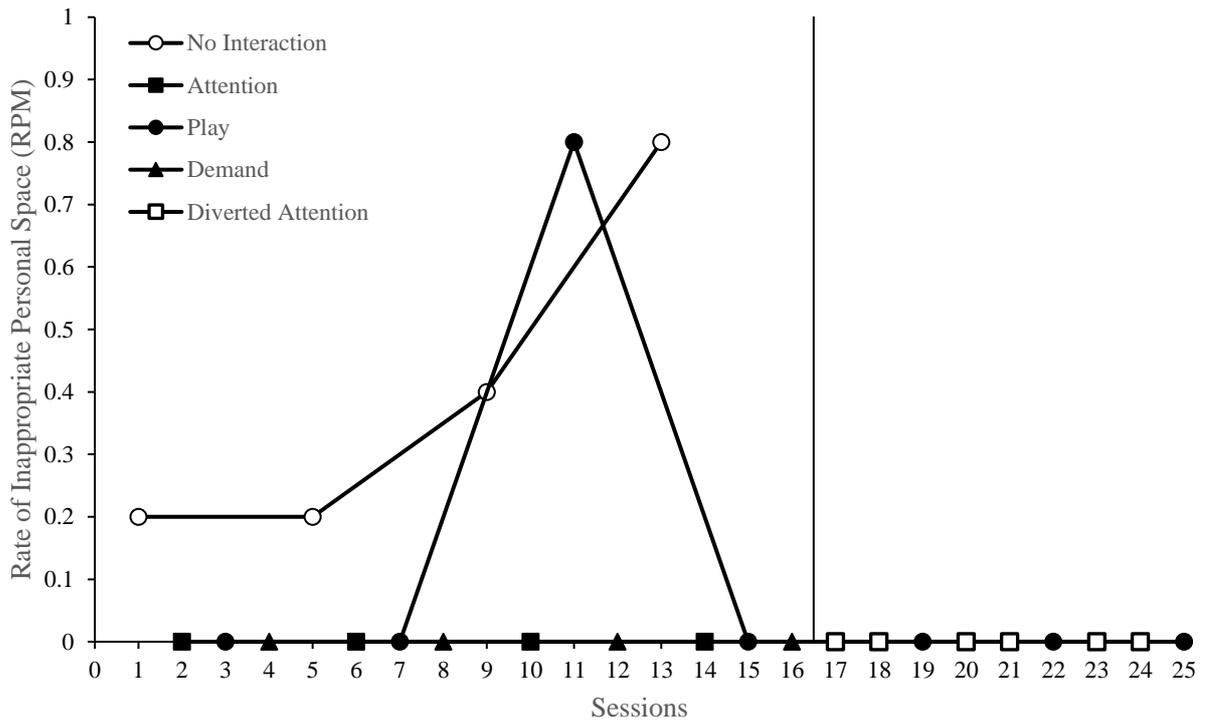
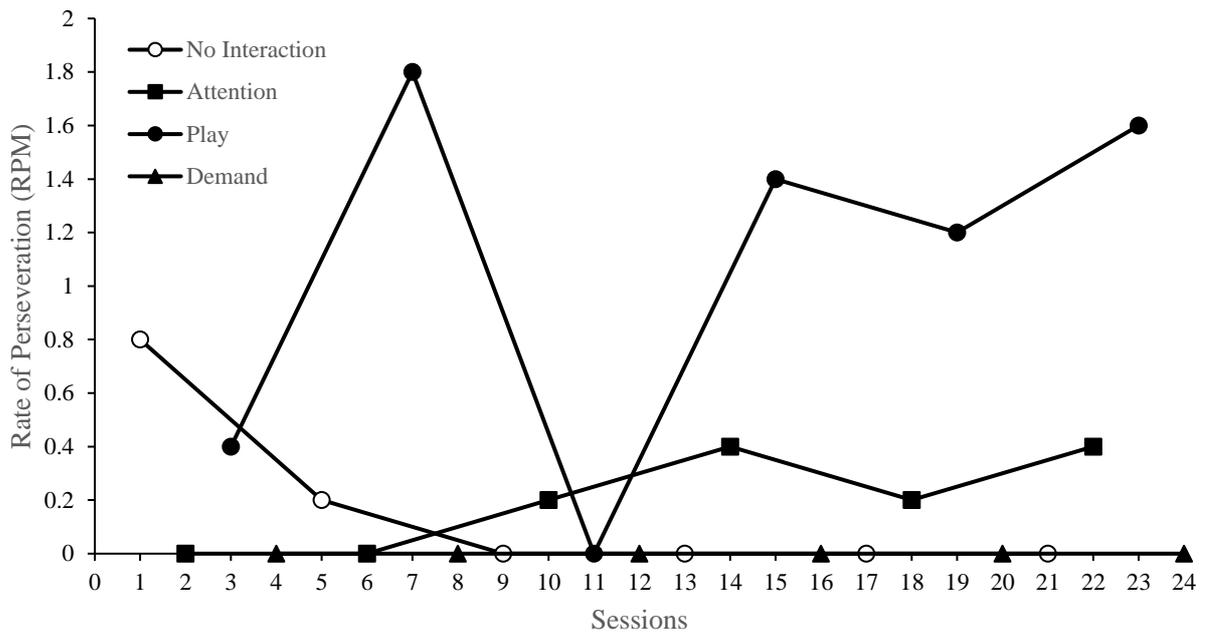


Figure 1. Functional analysis results for Larry (top panel) and Ian (bottom panel)

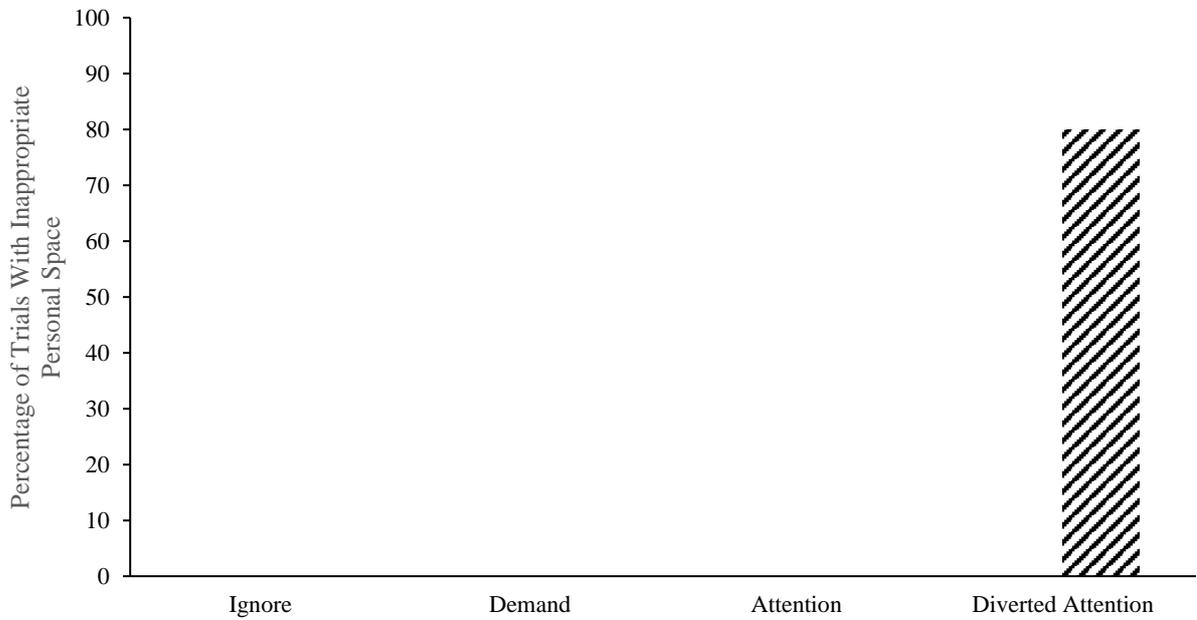
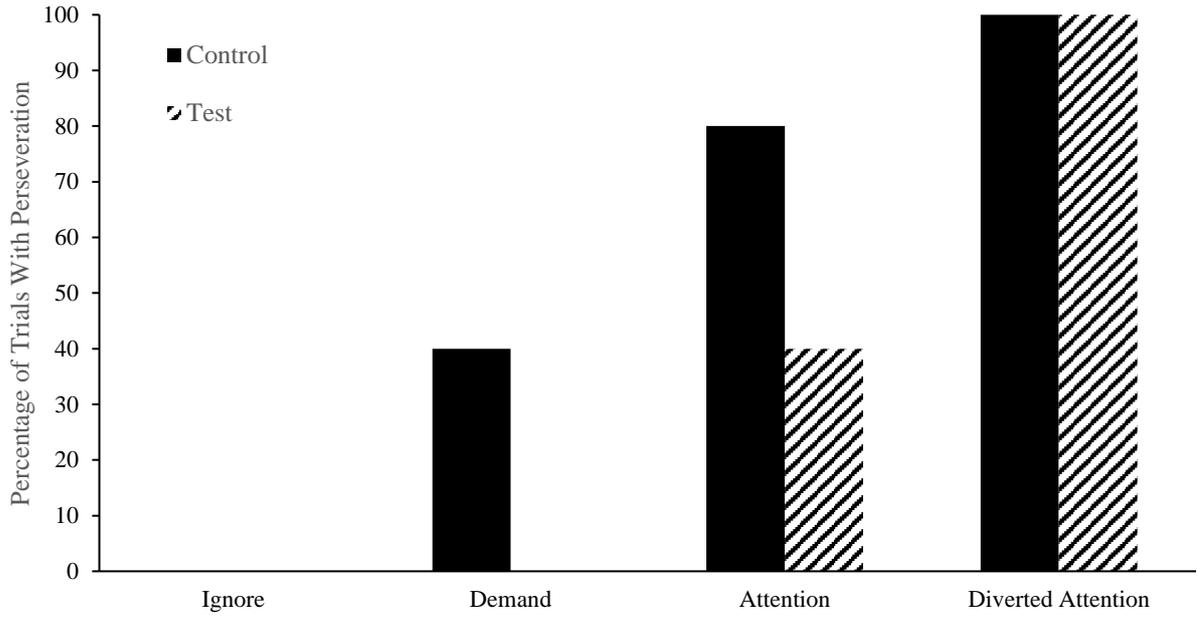


Figure 2. Trial-based functional analysis results for Larry (top panel) and Ian (bottom panel)