

January 01, 2012

Assessing the role of stimulus cues in promoting discriminated responding in abbreviated functional analysis

Monica L. Frisbee
Northeastern University

Recommended Citation

Frisbee, Monica L., "Assessing the role of stimulus cues in promoting discriminated responding in abbreviated functional analysis" (2012). *Applied Behavioral Analysis Master's Theses*. Paper 95. <http://hdl.handle.net/2047/d20002651>

This work is available open access, hosted by Northeastern University.

Assessing the Role of Stimulus Cues in Promoting Discriminated Responding in

Abbreviated Functional Analysis

A Thesis Presented

by

Monica L. Frisbee

The Department of Counseling and Applied Educational Psychology

In partial fulfillment of the requirement for the degree of

Master of Science

in the field of

Applied Behavior Analysis

Northeastern University

Boston, MA

April 2012

**Assessing the Role of Stimulus Cues in Promoting Discriminated Responding in
Abbreviated Functional Analysis**

by

Monica Frisbee

Submitted in partial fulfillment of the requirements for the degree of Master of Science in
Applied Behavior Analysis in the Bouve College of Health Science Graduate School of
Northeastern University, April 2012

Table of Contents

A. Abstract 4

B. Introduction..... 5

C. Method 10

D. Results 16

E. Discussion 18

F. References 20

G. Figures22

Abstract

There is limited empirical research evaluating the extent to which stimulus cues may promote discriminated responding in an abbreviated functional analysis (FA). Past studies including Kahng and Iwata (1999) along with Connors and Iwata, (2000) have evaluated the efficacy of conducting brief functional analysis in an outpatient settings, and participants with severe problem behavior where safety becomes a concern. Of the studies completed thus far in the *Journal of Applied Behavior Analysis*, studies concluded that brief assessments (single exposure or shorter duration session length) could be useful with some participants. In the current study, we included some the limitations mentioned from previous studies, and included multiple exposures contingencies for experimental control, the inclusion of salient stimuli (colored T-shirts and poster board corresponding with each condition) antecedent video clips of each condition, and shorter session duration length only lasting 3 ticipants were referred to the study to assess their problem behavior in the form of aggression. Despite many studies that suggested the inclusion of salient stimuli might increase the differentiation between FA conditions, we were able to identify a clear function of problem behavior for 3 of the 4 participants who participated in this study, in a short period of time.

Assessing the Role of Stimulus Cues in Promoting Discriminated Responding in
Abbreviated Functional Analysis

The functional analysis (FA) procedure developed by Iwata et al. (1982/1994) is a widely used tool that has been found effective for determining the environmental variables that may maintain problem behavior, including aggression (Hagopian, Wilson & Wilder, 2001), self-injury (Smith, Iwata, Vollmer & Zarcone, 1993), stereotypy (Derby et al., 1994) and elopement (Piazza, Hanley, Bowman, Ruyter, Lindauer, Saiontz, 1997). Because functional analysis involves the systematic manipulation of environmental events, behavioral function can be identified and appropriate function-based treatment can be developed. Prior to the advent of this method, positive punishment procedures were often used for decreasing problem behavior (e.g., Birnbrauer, 1968; Corte et al., 1971; Dorsey, Iwata, Ong, & McSween, 1980; Sajwaj, Libet, & Agras 1974; Tanner & Zeiler, 1975).

One concern that has been raised regarding the Iwata et al. FA is that it can be time intensive and impractical for use in settings with limited staff resources (e.g., outpatient settings). To address this concern, a number of authors have evaluated the utility of a brief FA (e.g., Kahng et al., 1999; Derby et al. 1992; Northup et al. 1991). Northup and Wacker (xxxx) evaluated a brief FA in an outpatient setting for participants with severe aggression. The brief FA consisted of a single 5- or 10-min session of each test condition followed by a three-condition contingency reversal phase. In this phase, the authors alternated the FA test condition associated with the highest levels of problem behavior with a contingency reversal condition (only appropriate behavior resulted in the putative reinforcer), and the sequence of conditions was test, contingency reversal, and

test. For three participants, this brief FA resulted in a clear outcome (i.e., differentially higher levels in a test condition relative to the control condition). However, a limitation of this study is that the authors used an alone condition as the control; therefore, there was no opportunity for the target behavior (aggression) during this condition, limiting experimental control. Because an adequate control condition was not included in the FA, the internal validity of their assessment and the external validity of their outcomes were compromised.

Derby et al. (1992) evaluated the utility of the brief FA with a large number of participants ($n = 79$). Sessions were 10 min in length, but each evaluation consisted of a single exposure for each condition. Results indicated that problem behavior occurred for only 63% of the 79 participants. For the participants who exhibited problem behavior, 75% suggested a maintaining variable. Therefore, the brief FA yielded a clinically useful outcome for only about half of the participants. Therefore, brief analyses may not always yield results that can inform treatment. One explanation for why Derby et al. did not observe clear outcomes during their brief FA is that a single 10-min exposure to the each of the conditions was too brief to allow for discrimination between the different conditions.

Kahng and Iwata (1999) also evaluated the utility of a brief FA by comparing it to an extended FA and by looking at within session patterns of responding during the brief FA sessions. The extended FA was similar to that described by Iwata et al., (1982/1994) and included alone, attention, demand, play, and tangible conditions. Sessions were 10-15 min in length, and a multielement design was used. The brief FA data sets were derived from the extended FA by replotting only the first session of each condition from the

extended FA. Each data point from the brief FA was replotted using a minute-by-minute analysis or within-session analysis. Seven to eight behavior analysts examined the results of each of the data sets (i.e., the extended FA, the brief FA, and the within-session analysis of the brief FA). Each of the extended, brief, and within session FAs were reviewed, and the evaluators formed decisions of the maintaining variable for problem behavior for each data set. These decisions were based on the examination of the data in regards to level, within and across assessment conditions. Results indicated that the brief and within-session FAs yielded similar outcomes to the extended FA approximately two-thirds of the time, suggesting slightly higher correspondence than that reported by Derby et al. A limitation of this study was that the brief FAs were derived from pre-existing functional analysis data sets with 15-min sessions. Therefore, the findings obtained by not generalize to brief assessments that are not derived from extended functional analyses. In addition, their brief functional analyses did not include a contingency reversal analysis, and previous studies have demonstrated the utility of including a contingency reversal phase (e.g., Derby et al. 1992).

Another method for reducing the time investment of a functional analysis is to conduct shorter duration sessions. Wallace and Iwata (1999) evaluated the extent to which briefer FA session durations (i.e., 5- and 10-min) yielded similar outcomes to longer (i.e., 15-min) FA session durations. Forty-six previously conducted 15-min session functional analyses were used. From these functional analysis data sets, the authors generated additional data sets by taking the last 5- and 10-min of each 15-min session. Examiners then determined the extent to which the 10- and 5- min datasets matched those obtained for the 15-min data sets. Examiners identified the extent to which functions for the 10- and 5-min data sets matched those obtained for the 15-min data set. Of the 46 participants

that were evaluated in this study, when experimenters compared the 15 min data sets to the 10 min data sets 46 yielded perfect agreement, and only three disagreements for the comparison of 15 and 5 min durations. According to Wallace and Iwata (1999) results indicated that brief repeated exposure to assessment conditions may be sufficient to reveal functional relations on a large portion of cases. Limitations included individuals discrimination abilities between conditions, especially when conditions are conducted under similar physical arrangements (e.g., same therapist, same location) requiring extensive contact with contingencies. Extinction during control or non-test conditions may require extensive contact with the contingencies.

A noteworthy feature of the Iwata et al. FA method is that multiple potential maintaining variables were tested by rapidly alternating test and control conditions in a multielement design. Although differential responding often has been reported (Smith, Iwata, Vollmer & Zarcone, 1994), undifferentiated outcomes may occur. One potential explanation for undifferentiated outcomes is carryover effects across conditions due to multiple treatment interference associated with the experimental design.

One way to reduce the likelihood of multiple treatment interference associated with multielement designs is to introduce salient stimulus cues during conditions. For example, Redd (1969) suggested that the inclusion of discriminative stimuli might facilitate differential responding, therefore decreasing the amount of sessions needed to identify variables maintaining problem behavior. He concluded that children be more likely to exhibit problem behavior in the presence of therapists that had previously delivered reinforcement for responding. Adult one was presented to the participants as a using a mixed schedule, giving M&Ms contingently on behavior half of the time, and non-contingently the other half of the time. Adult two known as the contingent adult,

dispensed reinforces contingent upon the occurrence of cooperative play. Adult three known as the presence of the non-contingent adults dispensed candy and praise with no regards to the participant's behavior. The discriminative cues that were given (M&Ms and praise) were the adults dispensing or withholding reinforcement contingent on the participants behavior (cooperative play) . Results of the Redd study indicate that children react to adults consistent with the manner how past reinforcement occurred. In that, the presence of the contingent adult manipulated the behavior of control play of the two participants. The adults functioned as a form of discriminative stimuli paired with reinforced to manipulate behavior, due to the participants meeting the contingency of candy and praise for controlled play.

Conners et al. (2000) assessed whether the inclusion of salient cues facilitated differentiated outcomes during multielement functional analyses. Eight individuals who exhibited self-injury or aggression participated. Two separate functional analyses were conducted, one with salient stimulus cues present and one with these cues absent. Salient stimulus cues associated with each of the conditions included a particular therapist and a specific room color. During the stimulus cues absent functional analysis, therapists and rooms were picked at random across participants. Results showed that the inclusion of salient stimulus cues enhanced functional analysis outcomes for four of eight participants. When discriminative stimuli were withdrawn for these four participants, it took twice as many sessions before clear outcomes were obtained. These findings suggest that the inclusion of salient stimulus cues may facilitate discrimination between functional analysis conditions.

Given that brief functional analyses do not always correspond with extended functional analyses, there is a need for evaluating briefer functional analyses that may lead to clear outcomes. One modification that may prove helpful is the use of an abbreviated functional analysis that includes shorter session durations (e.g., 5 min) and at least three replications of each assessment condition. In addition, the inclusion of salient stimulus cues during brief functional analyses may aid in their efficiency and increase the likelihood that of obtaining clear outcomes. Therefore, the purpose of this study was to evaluate an abbreviated functional analysis that included shorter session durations and multiple replications per condition. In addition, a second purpose was to evaluate the utility of including salient stimulus cues during an abbreviated functional analysis.

Method

Participants and Setting

Four individuals, diagnosed with an Autism Spectrum Disorder (ASD), participated in this study. All participants resided in a residential facility and exhibited severe problem behavior that prevented educational programming. Andrew was a 12-year-old male, who primarily communicated by using a speech-generating device or a picture communication book. Andrew exhibited aggression in the form of hits, kicks, punches, bites, and hair pulls. He needed assistance in most self-care tasks for thoroughness such as showering and tooth brushing. Karla was a 14-year-old female; who vocally communicated by emitting short sentences and by using a picture communication book. She was independent in self-help skills and was occasionally verbally prompted for thoroughness. She was evaluated for aggression in the form of hits, punches, kicks, hair-pulls and bites. Dale was an 8-year-old male, who primarily

communicated using a picture communication book. He had required assistance (prompting) with self-care tasks. He engaged in aggression in the form of hits, slaps, kicks, and head butts. Matt was an 11-year-old male who had a limited vocal repertoire and used PECS to communicate, he was evaluated for the assessment of self-injurious behavior in the form of hand biting.

Sessions were conducted in the student's classroom with a table and two chairs, and necessary session materials.

Response Measurement and Reliability

The dependent variable for Andrew, Dustin, and Karla, was aggression, and the dependent variable for Matt was self-injurious behavior (SIB) in the form of self-bites. Observers recorded aggression and SIB using paper and pen or a computer software program. Sessions were three min and were divided into 10-s intervals. Frequency measures were summarized as responses per min.

An independent observer recorded 33% of sessions for obtaining interobserver agreement (IOA) data. To calculate IOA scores, the smaller number of responses was divided by the larger number of responses in each interval; these fractions were summed, divided by the number of intervals in the session, and multiplied by 100%.

IOA was 86% (range, 70% to 95%) for Andrew's aggression, 95% (range, 72% to 100%) for Karla's aggression, 88% (range, 74% to 100%) for Dustin's aggression, and was 76% for (range, 60%-100%) for Matt's SIB.

Functional Analysis

A functional analysis (similar to that described by Iwata et al., 1982/1994) was conducted to identify the maintaining variables of participants' problem behavior. Conditions included alone, attention, play, demand, and tangible (if maintenance by

tangible reinforcement was suspected). All sessions were 3-min in duration. Demands for the FA demand condition were identified by conducting a survey with three staff that had known the participant for a year or more. They were instructed to list a variety of tasks including: skills, academic tasks, domestic tasks, physical demands, and any other demands which did not fall under any of the other categories. In addition, they were instructed to write down tasks or demands that the participant dislikes avoids, or has led to problem behavior in the past, and rank them 1-5. Five scored as being the most aversive demands and one being the least. Based on these results given the highest scoring and most common demands written down amongst caregivers were chosen to include in the demand condition for each of the participants.

No interaction. During the no interaction condition, the therapist remained in the room. No interaction or leisure items were provided, and no programmed consequences were delivered for problem behavior

Attention. During the attention condition, the therapist delivered the instruction, “I have work to do” and ignored the participant. Contingent on the occurrence of the target response, the therapist delivered 2-5 seconds (s) of attention in the form of non-putative comments (e.g., the therapist stated, “don’t do that,” “stop you’ll hurt yourself”) and brief physical contact (e.g., the therapist will place a hand on participant’s shoulder) The therapist ignored all non-target participant behavior.

Play (control). The therapist presented preferred toys (based on preference assessments and caregiver report) and delivered brief attention (brief vocal statement and physical contact) to the participant every 30 s. The therapist did not present demands or prompt the participant to engage with the toys. The therapist delivered no consequences

for the target behavior. Toys that were most highly preferred based on previous preference assessments and caregiver reports were included.

Demand. During the demand condition, the therapist delivered the instruction, “It’s time to do work” and presented 5 tasks demands on a continuous schedule. The therapist will present demands using 3-step least-to-most prompting (i.e., verbal, gestural, physical), using a 3-5 s inter-prompt interval. Contingent on the occurrence of the target behavior, the demand, attention, and eye contact was removed for 30 s. After 30 s has elapsed, an alternative demand was presented. The therapist ignored all non-target behavior.

Tangible. Prior to each session, the therapist presented preferred tangible items to the participant for 30 s. At the start of the session, the therapist took away the preferred item and sat nearby the participant while holding the preferred item so that it was visible to the participant. The therapist delivered brief attention on a fixed-time 30-s schedule. Contingent on the occurrence of the target behavior, the therapist returned the preferred item to the participant for 30 s.

Evaluation of stimulus cues

Two phases were conducted to examine the influence of stimulus cues on functional analysis outcomes, a *Stimulus Cues Present* Phase and a *Stimulus Cues Absent* Phase. These phases were alternated using a reversal design, and the *Stimulus Cues Present* Phase always preceded the **Stimulus Cues Absent** Phase to allow for a more conservative evaluation of the effects of stimulus cues.

Stimulus Cues Present. Prior to the start of each FA session, the therapist showed the participant a 3-min video clip. The video clip depicted a student and a

therapist in a room and the therapist implementing the antecedent manipulation for the upcoming FA condition. The therapist also wore a colored T-shirt, and hung a colored poster board on the wall that corresponded with the upcoming condition. Specifically, the therapist wore a red T-shirt and displayed a red poster board during the demand condition, a yellow T-shirt and yellow poster board during the alone condition/ no interaction condition, a green T-shirt and green poster board for the play condition, a blue T-shirt and blue poster board for the attention condition, and a purple T-shirt and purple poster board for those participants in which a tangible condition was included.

Stimulus Cues Absent Phase. During this phase, all stimulus cues noted above were removed. To keep the sessions consistent, a 3-min video clip was shown to the participant prior to the start of the session. However, the clip displayed a blank screen.

Each phase was completed in either a 51-min or 60-min (if tangible is included) observation period. During each 60-min observation period, there was either 36 min or 45 min (if tangible is included) of FA-session time and 15 min of video-viewing time. Each series consisted of three replications of functional analyses in each phase of each condition, and alternated in a set order across two days. Stimulus cues were present during one day (A phase) of sessions, and absent during the other day of sessions (B phase). The tangible condition was added after the demand condition for those participants for whom it is included.

Extended FA

For one participant (Dale), little to no responding was observed during the first two exposures to the A and B phases. Therefore, a modified FA was conducted based on information obtained via caregiver report. First, we modified the demand condition to include continuous presentation of tasks included on Dale's picture activity schedule (i.e., a puzzle, creating a snow man out of play doh, a matching task, and emitting a series of fine motor skills, such as putting a clothes pin on a piece of paper. Second, a familiar caregiver served as therapist. Third, only two FA conditions, the demand and no interaction conditions, were alternated. Finally, we extended the session duration for 3 min to 10 min. Stimuli present and absent were alternated for each phase, and each condition was conducted three times per phase.

Treatment Analysis

For Andrew only, an abbreviated treatment assessment was conducted based on his functional analysis results. During this analysis, baseline and intervention conditions were alternated using a reversal design, and all sessions were 3 min. Each phase was conducted in a single observation and included three sessions, and each phase was conducted three times. Observers recorded problem behavior and a mand response (i.e., the press of a button that produced the sentence, "Can I have attention please?").

Attention Baseline

This condition was identical to the attention condition of the functional analysis. That is, the therapist acted busy and did not deliver attention to the participant. Contingent on problem behavior, the therapist delivered brief attention in the form of reprimands (e.g, "Stop. That hurts," or "Ouch. Don't do that").

Differential reinforcement plus extinction intervention

During this condition, the therapist acted busy and did not interact with the participant as in the attention baseline condition. Contingent on problem behavior, the therapist did not deliver attention. Contingent on an appropriate mand, the therapist delivered brief attention.

Results

Figure 1 (top panel) depicts the results of Andrew's functional analysis. During the first *stimuli present* phase, there were elevated rates of aggression during the attention condition, with low and variable rates of aggression in all other conditions. During the first *stimuli absent* phase, high rates of aggression occurred during the no interaction and attention conditions, with near-zero rates of behavior in all other conditions. During the second *stimuli present* phase, differentially higher levels of aggression occurred in the attention condition relative to the other conditions. During the *second stimuli absent* phase, high levels of behavior were observed during both the no interaction and attention conditions. During the last two phases, there were elevated rates of aggression during the attention condition, with low and variable rates of aggression compared to the no interaction condition. The bottom panel of *Figure 1* depicts Andrew's treatment analysis. For the first attention baseline condition, elevated rates of aggression were observed. When the DRA plus extinction intervention was initiated, aggression decreased to low levels and manding occurred at high levels. During the return to the attention baseline condition, aggression again increased. When the DRA plus extinction intervention was implemented a second time, aggression decreased.

Figure 2 (top panel) depicts results from Karla's FA. A similar pattern was observed across all *stimuli present* and *stimuli absent* phases. That is, there were elevated rates of behavior during the tangible condition, and zero rates of behavior across all other conditions.

Figure 2 (bottom panel) depicts the results from Dale's FA. During the first *stimuli present* phase, elevated levels of aggression occurred during only a single demand and tangible condition. During the first *stimuli absent* phase, problem behavior was not observed. During the second *stimuli present* and *absent* phases, problem behavior was not observed. During the modified functional analysis, a familiar caregiver served as the therapist and a pair-wise FA was initiated. Aggression occurred in the beginning of the modified functional analysis but then again decreased to zero levels. Next, session duration was extended to 10 min. Following this modification, aggression occurred in the only the demand condition, indicating that his problem behavior was maintained by escape from tasks.

Figure 3 depicts the results for Matt, during the first *stimuli present* phase elevated levels of self-injury occurred during only a single demand condition. During the second first *stimuli absent* phase problem behavior occurred during the tangible condition. In the second *stimuli present* phase elevated levels of self-injury occurred only in a single attention condition. During the third *stimuli present* and *absent* phases, problem behavior was not observed until the sixth phase in which *stimuli* were *absent*, elevated rates of problem behavior occurred for a single data point during the attention, play and tangible conditions.

Discussion

Results of the current study provide some support for the utility of brief functional assessments. For 3 of the 4 participants, a maintaining variable was identified, and for one participant, an effective treatment plan was implemented. The abbreviated functional analysis used in this study differed from previous brief FAs in that shorter session durations (i.e., 3 min) were used, permitting more time for multiple replications of each condition. By conducting each condition multiple times, this abbreviated functional analysis allowed for the demonstration of experimental control, strengthening confidence in the maintaining variable identified.

There are many advantages to conducting an abbreviated functional analysis. First, their efficiency allows clinicians to empirically identify the function of problem behavior in an outpatient setting. Second, they allow clinicians to conduct functional analyses with problem behavior that is in need of an immediate intervention. This type of analysis could also be used in evaluating various function-based treatment after the functional analysis is completed. Third, they may be able to be used during an initial intake period for day treatment programs, allowing clinicians to initiate treatment more quickly.

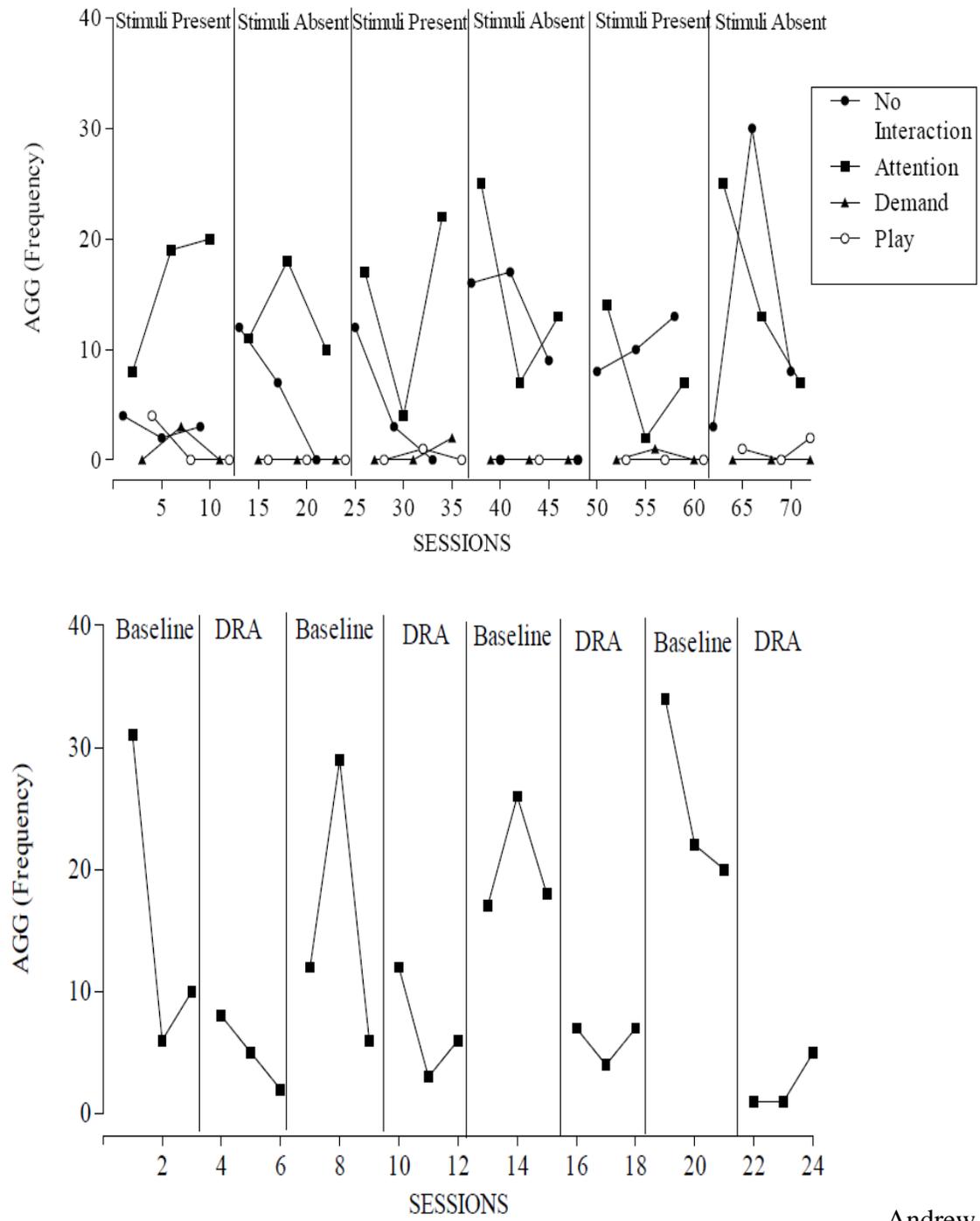
There are some limitations of this study that deserve comment. First, it was unclear whether the stimulus cues used functioned as discriminative stimuli. Because a clear function of behavior was identified for three of the participants regardless of whether or not stimulus cues were present, it is unclear whether the stimuli functioned as discriminative stimuli. In addition, it was unclear whether participants attended to the

stimuli presented. Future research might consider including a differential observing response to ensure that participants attend to the stimuli.

References

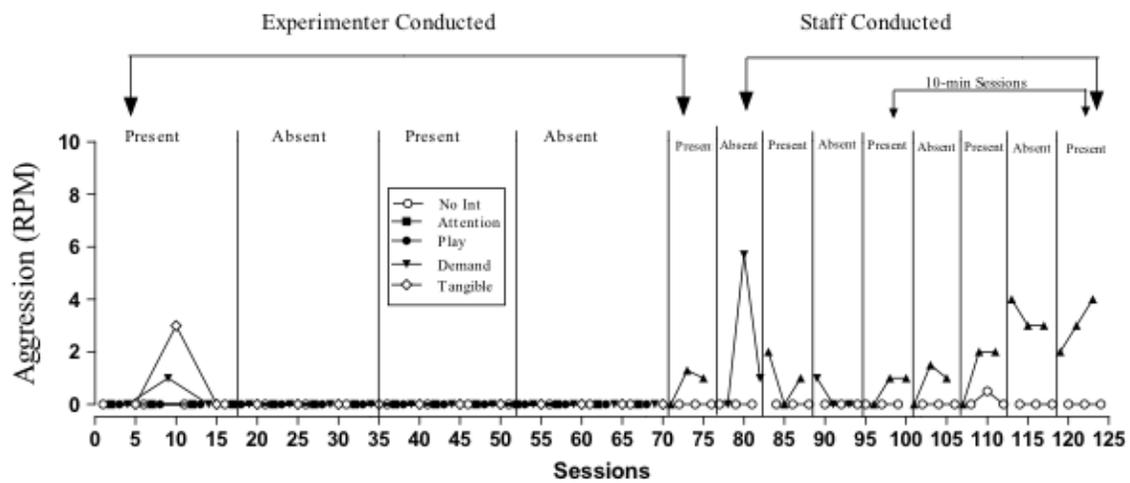
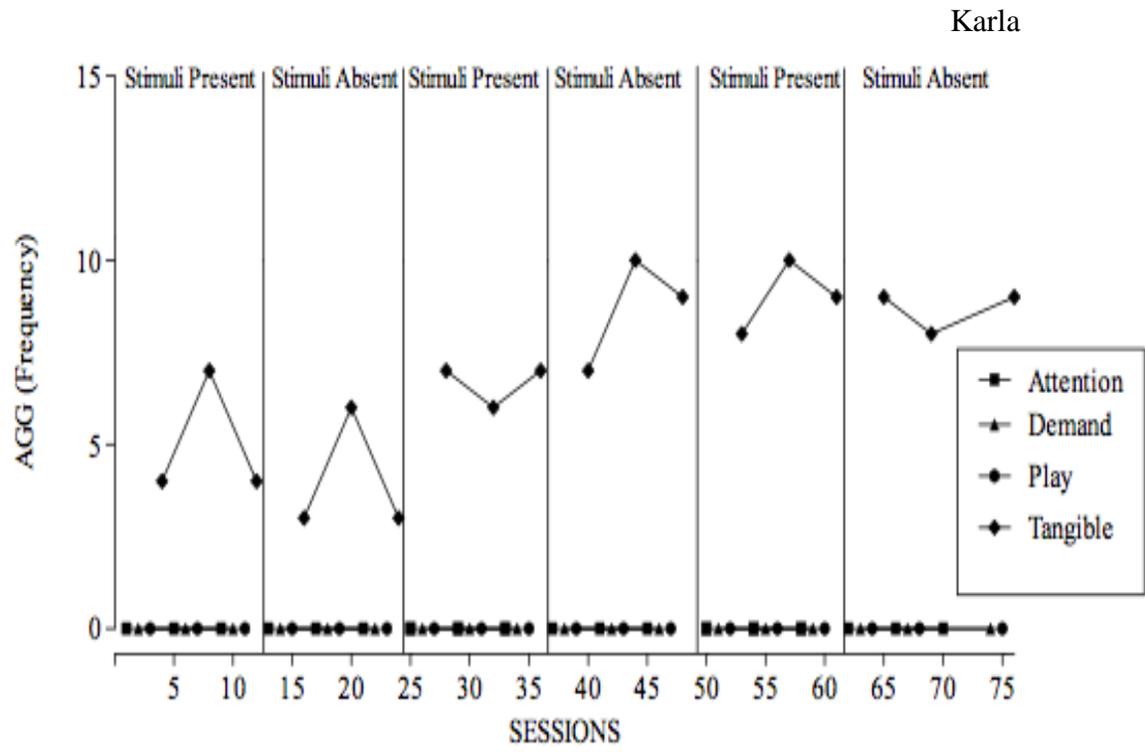
- Birnbrauer, J. (1968). Generalization of punishment effects-A case study. *Journal of Applied Behavior Analysis, 1*, 201-211.
- Carr, E. G., & Durand, V. M. (1985). Reducing behavior problems through functional communication training. *Journal of Applied Behavior Analysis, 18*, 111-126.
- Conners, J., Iwata, B. A., Kahng, S., Hanley, G. P., Worsdell, A. S., & Thompson, R. H. (2000). Differential Responding in the presence and absence of discriminative stimuli during multielement functional analyses. *Journal of Applied Behavior Analysis, 33*, 299-308.
- Corte, H.E., J., Wolf, M. M., & Locke B. J. (1971). A comparison of procedures for eliminating self-injurious behavior of retarded adolescents. *Journal of Applied Behavior Analysis, 4*, 201-213.
- Derby K, M., Wacker D, P., Peck, S., Sasso, G., DeRaad, A., Berg, W., et al. (1994) Functional analysis of separate topographies. *Journal of Applied Behavior Analysis, 27*, 267-278.
- Derby K, M., Wacker P, D., Sasso, G., Steege, M., Northup, J., Cigrand, K., & Asmus, J. (1992). Brief functional assessment techniques to evaluate aberrant behavior in an outpatient setting: a summary of 79 cases. *Journal of Applied Behavior Analysis, 25*, 713-721.
- Dorsey, M F., Iwata, B. A., Ong, P., & McSween, T. E. (1980). Treatment of self-injurious behavior using a water mist: Initial response suppression and generalization. *Journal of Applied Behavior Analysis, 13*, 353-353.

- Hagopian, L. P., Wilson D. M., Wilder, D. A. (2001). Assessment and treatment of problem behavior maintained by escape from attention and access to tangible items. *Journal of Applied Behavior Analysis, 34*, 229-232.
- Hanley, G. P. Iwata, B. A., & McCord, B. E. (2003). Functional analysis of problem behavior: a review. *Journal of Applied Behavior Analysis, 36*, 147-185.
- Iwata, B. A., Dorsey, M. F., Slifer, K. J., Bauman, K. E., & Richman G. S. (1994). Toward a functional analysis of self-injury. *Journal of Applied Behavior Analysis, 27*, 197-209.
- Kahng, S., & Iwata, B. A. (1999). Correspondence between outcomes of brief and extended functional analyses. *Journal of Applied Behavior Analysis, 32*, 149-159.
- Northup, J., Wacker, D., Sasso, G., Steege, M., Cigrand, K., Cook, J., & DeRaad, A. (1991). A brief functional analysis of aggressive and alternative behavior in an outclinic setting. *Journal of Applied Behavior Analysis, 3*, 509-522.
- Redd, W. H. (1969). Effects of mixed reinforcement contingencies on adults' control of children's behavior. *Journal of Applied Behavior Analysis, 2*, 249-254.
- Sajwaj, T., Libet, J., & Agras, S. (1974). Lemon-juice therapy: The control of life threatening rumination in a six-month-old infant. *Journal of Applied Behavior Analysis, 7*, 557-563.
- Tanner, B. A., & Zeiler, M. (1975). Punishment of Self-injurious behavior using aromatic ammonia as the aversive stimulus. *Journal of Applied Behavior Analysis, 8*, 53-57.
- Wallace, D. M., & Iwata, A.B. (1999). Effects of session duration on functional analysis outcomes. *Journal of Applied Behavior Analysis, 32*, 175-183.



Andrew

Figure 1. (Top Panel) Represents Andrew's FA results. Session number is on the x-axis, and frequency of aggression is on the y-axis, the bottom panel shows the results of the treatment analysis conducted for Andrew's aggression.



Dale

Figure 2. Depicts of FA for Karla (top panel), x-axis represent sessions, and the y-axis represents frequency of aggression. Dustin's FA is on the (bottom panel) session number is on the x-axis, and rates per minute of aggression is on the y-axis.

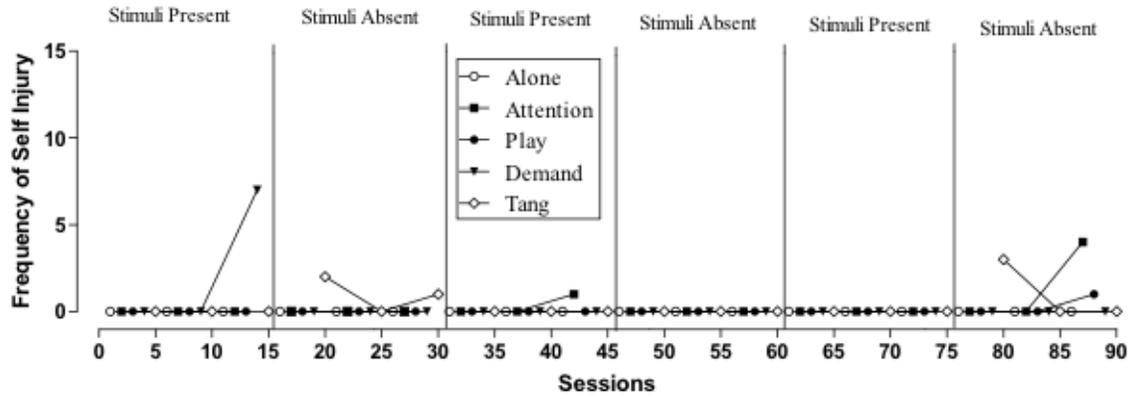


Figure 3. Depicts the FA for Matt, x-axis represent sessions, and the y-axis represents frequency of self- injury.