DEVELOPING A FUNCTION-BASED TREATMENT FOR PROBLEM BEHAVIOR
USING A STRUCTURED DESCRIPTIVE ASSESSMENT
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This study evaluated the utility of structured descriptive assessment (SDA) to generate a hypothesis regarding the operant function of problem behavior when the analogue functional analysis (FA) failed to evoke problem behavior for an adult with developmental disabilities. The effectiveness of interventions based on that hypothesis was evaluated in the natural environment. The SDA succeeded in producing a relatively controlled baseline of problem behavior where the FA and direct observation could not. However, the extent to which treatment procedures affected problem behavior could not be determined due to confounding variables outside the control of the experimenter. The results provide cautionary evidence highlighting both the potential utility of SDA and challenges that may be encountered when conducting SDA and evaluating treatments in natural environments.
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When I began my bachelor’s degree at the UNT department of behavior analysis, I thought behavior analysis was a method for teaching autistic children that involved discrete trials and M&Ms. I also had a shaky academic past and I could not keep track of my own wallet, let alone appointments and deadlines. Each of the faculty members took their turn in taking my interest in behavior and slowly and patiently shaping a confident, competent behavior analyst. With their passion for behavior analysis and teaching, they lit my own fire. I now see all behavior through a framework composed of the principles of behavior analysis and address problems I am solving with the principles of science. I am proud that I had the opportunity to learn from each of them. My deepest gratitude belongs to Rick, who endured the brunt of my lack of organization skills as he supervised me at Denton State School but continued to give me opportunities and continued to hold high expectations. Rick took my classroom verbal behavior and my experience as a behavior therapist with autistic children and taught me how to conduct good, careful research and how to take the long view in regards to behavior rather than getting bogged down in single-session details. For every service recipient that I work with in the future, I will endeavor to treat their behavior in a way that is worthy of the training and education I have received from Rick and the rest of the faculty. I am grateful to Bryan Lovelace for meeting me morning after morning to run sessions, for running sessions in my absence despite his busy schedule and for helping bat around ideas through the many unexpected turns of this study. Finally, I am grateful to my beloved wife, Anne-Marie for her unwavering support. She never complained when I could not spend time with her, gave me encouragement when I was low, and shared the highs with me.
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CHAPTER 1
INTRODUCTION

Prior to Carr’s conceptual analysis of potential motivational conditions for self-injury (1977), research on the treatment of behavior disorders focused on implementing operant procedures arbitrarily; that is, without taking into account the potential contingencies controlling problem behavior. For example, interventions such as timeout and token economy were evaluated while the variables maintaining the problem behavior were unknown (Mace, Lalli, & Lalli, 1991). The results of this approach, called behavior modification, were varied. Whereas some researchers reported positive outcomes, other results were less encouraging (Iwata, Dorey, Slifer, Bauman & Richman, 1994). Carr (1977) suggested that variables maintaining self-injurious behavior (SIB) could be categorized as extrinsic reinforcement (e.g., attention delivery or removal of task demands) and intrinsic reinforcement (e.g., self-stimulation or pain attenuation). This account implies that assessing environmental events that influence problem behavior, or functional assessment, can result in the development of more effective treatment (Carr, 1977; Iwata, Dorsey, Slifer, Bauman, & Richman, 1994). More specifically, if functional assessments can identify events that set the occasion for behavior (i.e., in terms of antecedent influence) and events that follow the behavior and maintain it (i.e., in terms of consequential influence), then treatments can be developed that alter these events in therapeutic ways. A large and growing body of evidence shows that treatments based on the identification of the contingencies controlling problem behavior (i.e. the behavior’s function) are more likely to be effective than arbitrary treatments (Carr & Durand, 1985; Day, Rea, Schussler, Larsen, & Johnson, 1988; Iwata, Pace, Cowdery, & Miltenberger, 1994; Vollmer, Iwata, Zarcone, Smith, & Mazaleski, 1993; Zarcone, Iwata, Smith, Mazaleski, & Lerman, 1994). Two common types of
functional assessment found in the literature currently are descriptive assessment and analogue functional analysis.

The functional assessment most commonly found in the literature is the analogue functional analysis (also known as experimental analysis or functional analysis). These procedures are typically conducted in a laboratory setting by trained researchers (Iwata, Dorsey, Slifer, Bauman and Richman, 1994) although studies have also shown that they can successfully be implemented by trained teachers or other caregivers (English & Anderson, 2004; Sasso, Reimers, Cooper, Wacker, Berg, Steege, Kelly & Allaire, 1992). Antecedent and consequent variables are manipulated systematically to assess situations similar to those suspected to occur in the natural environment. Systematically manipulating antecedents and consequences prevents extraneous variables from confounding the results, and demonstrates a cause-effect relationship between controlling variables and the problem behavior (Anderson, Freeman and Scotti, 1999; Iwata, Vollmer, & Zarcone, 1990 and Mace & Lalli, 1991). Although the experimental conditions are designed to be analogous to the natural environment, this level of control may limit the range of antecedent and consequent stimuli presented (both in terms of form and schedule) leading to potential problems with external validity (Anderson, Freeman, & Scotti, 1999; Lerman, & Iwata 1993; Mace, 1994). More specifically, if functionally relevant variables are not present during the functional analysis, false-negative outcomes are likely to occur. For example, if a problem behavior is maintained by escape from performing a certain task in the natural environment but demands for that specific task are not presented in an analogue assessment, problem behavior will not be observed during the analysis and escape from demands will not be identified as the maintaining contingency. Such false-negative errors decrease the likelihood that treatments will be effective in the natural setting (Mace, Lalli, & Lalli, 1991) or
may even lead to the false conclusion that the behavior is not a significant problem (Call, 2003). Also, problem behaviors exposed to putative reinforcement contingencies in an analogue analysis may come under control of a reinforcing contingency that is not present in the natural environment. It is possible therefore, that the functional relation identified in the functional analysis is not present in the natural environment, leading to false-positive errors (Anderson et al., 1999; Mace, Lalli & Lalli, 1991; Sasso et al. 1992). Furthermore, researchers have pointed out that functional analysis procedures can be complex and time consuming (Lerman & Iwata, 1993) and are rarely conducted outside of laboratory settings (Desrochers, Hile & Williams-Moseley, 1997). Finally, removing the participant from their natural environment may be disadvantageous because it disrupts their routine (Anderson & Long 2001) and may occasion resistance or other behaviors that interfere with the ability to conduct the assessment.

Another method of functional assessment in the literature is descriptive assessment. Descriptive assessments involve direct observation of the problem behavior in the natural environment (i.e., where the problem behavior typically occurs). Although there are several types of descriptive assessments (see Iwata, Zarcone, Vollmer and Smith, 1994 for a review), procedures developed by Bijou, Peterson, & Ault, (1968) allow for sequential recording of antecedent-behavior-consequence events and provide for quantification of the data across time in terms of conditional probabilities (Bijou et al., 1968; Iwata, Dorsey, Slifer, Bauman and Richman,1994). These data can yield information regarding idiosyncratic variables present in the natural environment such as the topography of functionally relevant antecedents. For example, Borrero, Vollmer and Borrero (2004) found that pleasant instructions did not evoke problem behavior whereas abrasive instructions did. Descriptive assessments may also identify functionally relevant consequent events in the natural environment. For example, Carr,
Yarbough and Langdon (1997) found that a descriptive analysis revealed that the removal of only certain tangible items evoked problem behavior. Descriptive assessment can also provide information about schedules of reinforcement in the natural environment, which can be useful when developing treatment (Anderson & Long 2002). Furthermore, descriptive assessment does not require the removal of the participant from their natural environment, thus preventing the disruption of their routine (Anderson & Long, 2002). Also, conducting a functional assessment in the participant’s natural environment can be beneficial in cases where the topography of the behavior is too problematic to lend itself to an analogue functional analysis (Borreo, Vollmer, & Borroero, 2004). Several studies have suggested that combining descriptive assessments with an experimental analysis can improve the effectiveness of treatment (Anderson, Freeman & Scotti, 1999; Carr et al. 1997; Mace & Lalli, 1991).

Although descriptive assessment appears to provide information regarding a broader range of idiosyncratic variables that may be functionally related to problem behavior, precision is sacrificed because the antecedent and consequent variables are not manipulated under strict conditions of experimental control. Therefore, although correlations between suspected variables may be revealed, functional relations cannot be demonstrated (Iwata et al., 1990). Also, if functionally relevant variables occur infrequently, they may be difficult to identify. For example, caregivers may avoid, where possible, antecedent events that have set the occasion for problem behavior in the past. In addition, functionally relevant variables may be masked by other, more frequent consequences (Anderson & Long 2002, Iwata & Lerman, 1993). For example, if a behavior is maintained by escape from demands on an intermittent schedule, and caregivers deliver reprimands on a continuous schedule, attention may be mistakenly identified as the maintaining variable. Perhaps for this reason, descriptive assessments are most likely to
identify attention as the maintaining consequence whether or not it is the actual maintaining consequence for the behavior (Thompson & Iwata, 2001). Lerman and Iwata (1993) suggested that the information gathered from descriptive assessment could be obtained through pre-assessment interviews, saving valuable time and resources. Evaluations of the relative strengths and weaknesses of functional analyses and descriptive assessments have yielded mixed results (Belfiore, Browder, & Lin, 1993; Carr, Yarbrough & Langdon, 1997; Fisher, Adelinis, Thompson, Worsdell & Zarcone, 1998; Lerman & Iwata, 1993; Mace & Lalli, 1991; Sasso, Reimers, Cooper, Wacker, Berg, Steege, Kelly & Allaire, 1992). Some studies found that descriptive and analogue approaches produced corresponding outcomes (Belfiore et al., 1993; Fisher et al., 1998; Sasso et al., 1992). For example, Sasso and colleagues conducted a conventional analogue functional analysis using procedures similar to Iwata, Dorsey, Slifer, Bauman and Richman, (1994) with two children with autism and compared them to a descriptive assessment and an analogue analysis, both of which were conducted in the classroom by a teacher. The behaviors targeted were aggression and disruptive vocalizations. It should be noted that the descriptive assessment procedures were unconventional in that the data were collected at particular times in the participants’ schedule when antecedent conditions were present that were comparable to those tested in the functional analysis. The results showed that outcomes from both assessments matched and a treatment based on those results successfully reduced problem behavior. Belfiore and colleagues obtained similar results with a 58-year-old male with severe mental retardation in a community-based day program. The participant was referred for SIB. Results from the descriptive analysis identified idiosyncratic variables that appeared to be related to the self-injury. These variables were further analyzed during an experimental analysis, which replicated the outcome from the descriptive analysis. This study demonstrated that the
descriptive assessment yielded information regarding idiosyncratic variables, which contributed to a successful treatment. Fisher and colleagues conducted a descriptive assessment for two participants in an in-patient unit. One participant was a 13-year-old boy with mild to moderate mental retardation, and attention deficit hyperactivity disorder who engaged in aggressive behavior. The other participant was a 14-year-old girl with pervasive developmental disorder, severe mental retardation and bipolar Type II disorder. In both cases insufficient problem behavior occurred during their analogue functional analyses to determine the function of their problem behavior. When specific instructions observed to occur in the natural environment were incorporated into a second analogue analysis, clear differentiation in the data was observed, matching the outcome of the descriptive analysis. A treatment derived from the outcome of the functional assessments successfully reduced problem behavior.

Other studies found that results from descriptive analyses did not correspond with results from analogue functional analyses (e.g., Lerman & Iwata, 1993; Mace & Lalli, 1991). Mace and Lalli conducted a descriptive assessment with a 47-year-old man with moderate mental retardation who exhibited bizarre speech. The descriptive assessment was followed by an analogue functional analysis which incorporated information from the descriptive assessment. Two hypotheses regarding function were generated from the descriptive assessment but only one of those was confirmed by the functional analysis. Mace and Lalli suggest that the functional analysis was enhanced by incorporating information from the descriptive assessment. Lerman and Iwata compared results from descriptive analyses with results from a functional analysis for six adults with profound mental retardation who exhibited SIB and found that outcomes matched for only one participant. Additionally, Carr, Yarbrough and Landon (1997) conducted an analogue functional analysis with three males diagnosed with autism, ranging from 12 to 20
years-old and exhibiting aggression, self-injury and property destruction. Information regarding idiosyncratic variables from initial interviews was incorporated in an analogue functional analysis, the outcomes of which were compared to those from an analogue functional analysis that incorporated information from a descriptive assessment. Results showed that information provided by the descriptive assessment altered the outcome of the analogue functional analysis as compared to the analogue functional analysis based on initial interviews.

In an effort to overcome some of the limitations inherent in purely descriptive and analogue approaches, a structured descriptive assessment (SDA) was developed by Freeman, Anderson and Scotti (2000). Similar to analogue functional analyses, classes of antecedent events are systematically programmed (e.g., demands, diverted attention, and tangible removal). However, as in descriptive assessments, observations occur in the natural environment and procedures are conducted by persons typically present in those environments (e.g., teachers, caregivers). Specific topographies of antecedent events are not programmed and the consequent events are allowed to vary freely as in the natural environment. In addition to the advantages of the descriptive analysis, SDA provides greater control over the antecedents, which means that extraneous antecedent variables are less likely to confound results and problem behavior is more likely to occur during the observation periods (Anderson and Long, 2002).

Freeman, Anderson and Scotti (2000) conducted an unstructured descriptive assessment followed by a structured descriptive assessment and an analogue analysis with two participants. One of the participants was an 8-year-old girl with moderate to severe mental retardation who displayed aggressive and disruptive behaviors. The other participant was a 10-year-old boy with microcephaly, cerebral palsy and profound mental retardation who exhibited aggressive behavior and SIB. Data were analyzed in two ways. First, the researcher assessed whether the SDA
resulted in a greater frequency of problem behavior than the descriptive assessment by scoring the frequency of 10-s intervals in which problem behavior occurred in close temporal contiguity with each targeted environmental event. Classes of events recorded were the same as those typically manipulated during a conventional analogue analysis (i.e. attention removal/deprivation, instruction delivery, tangible removal, attention delivery, instruction removal, tangible delivery). For one participant, all events except tangible delivery showed a significant increase with a range from 53% to 212%. Tangible delivery essentially showed no difference. For the other participant, four out of the six classes of events showed a significant increase including attention delivery, instruction delivery, instruction removal and tangible removal with a range from 30% to 336%. Decreases in occurrence were evident for tangible delivery (43%) and attention removal (19%). The results show that structuring the descriptive assessment produced an increase in occurrences of targeted environmental events as compared to the unstructured descriptive assessment. Outcomes of the structured assessment and functional analysis were compared by calculating the percent of intervals that problem behavior occurred in each condition across assessments. Results showed that the hypotheses regarding the function of the problem behavior generated by the SDA matched the operant function identified by the functional analysis. Although this study provided some support for the utility of SDA, the extent to which the SDA outcome led to the development of an effective treatment was not directly evaluated.

Subsequently, several studies have further investigated the utility of SDAs (Anderson & Long, 2002; Borrero et al., 2004; English & Anderson, 2004; English & Anderson 2006). Anderson and Long (2002) compared results from an SDA conducted in a classroom to those from an analogue functional analysis. The results of three of the four SDAs matched the
identified function from the functional analysis. Anderson and Long then implemented treatments derived from the SDAs. Shortly after the functional assessments were completed for one of the participants, her problem behavior significantly decreased and was withdrawn from the study (she was one of the three for whom the functional assessments matched). Results from the SDA alone were sufficient in developing a treatment for 2 of the 3 remaining participants since the functional analysis did not provide any additional information that might have led to a more effective treatment. For the 3rd participant both assessments were necessary for developing an effective treatment. The outcome of the analog analysis showed that the behavior was sensitive to tangible reinforcement and the SDA outcomes suggested that the behavior was maintained by escape from demands. Although treatment derived from the SDA was successful in reducing the problem behavior to zero for the last eight sessions, the antecedent event of tangible deprivation was not present during treatment. During follow-up observations conducted 21 months later, caregivers reported anecdotally that high rates of problem behavior had been occurring when the participant was requested to share a toy. A procedure designed to address behavior maintained by contingent tangible delivery successfully reduced the problem behavior, lending support for the external validity of the outcomes of the functional analysis. Borrero, Vollmer, and Borrero (2004) narrowed the classes of antecedent events presented during the SDA to two topographies of task presentation: pleasant instructions and abrasive instructions. The researchers selected these topographies based on an interview with the participant’s mother, who had indicated that abrasive instructions specifically might be the setting occasion for problem behavior. The participant was a 13-year-old boy with moderate mental retardation who exhibited aggression. Because the problem behavior was only reported to occur in two contexts (the morning care routine and removal of toys), observations were only conducted during those
contexts. Data were analyzed in terms of proportion of problem behavior following the occurrence of a specific antecedent event (i.e., pleasant instructions, abrasive instructions, low attention, and restricted access to tangibles) and the proportion of problem behavior that was followed by a specific event (attention, escape from instructions, and access to tangibles). Results showed that the participant was much more likely to comply when instructions were pleasant (0.91) and much less likely to comply when instructions were abrasive (0.07). Also, aggression was much more likely to follow abrasive instructions (0.71) and less likely to follow pleasant instructions (0). Problem behavior only occurred during the delivery of instructions; more specifically, it was most likely to occur during abrasive instructions. A functional analysis similar to the procedures described by Iwata, Dorsey, Slifer, Bauman and Richman, (1994) was modified to include two escape conditions. The demands delivered in one condition were abrasive and the demands delivered in the other were neutral. Results showed that behavior primarily occurred during the escape (abrasive instructions) condition and except for one session during the attention condition, occurred at zero or near zero rates for all other conditions. Four treatment components were implemented: (1) contingent praise for compliance; (2) noncontingent escape plus enriched environment; (3) extinction; and (4) altered topography of instructions (pleasant instructions rather than abrasive). The researcher employed a component analysis design to evaluate the relative effect of each component. Results for the treatment assessment showed that aggressive behavior occurred at or near a zero rate for each of the treatment conditions. Although extinction alone may have been an effective procedure, it was not tested since the assessment showed that using pleasant instructions was key in reducing problem behavior to zero and therefore, it was not necessary to implement a potentially aversive procedure. This study extended the findings of previous SDA research by developing a more
streamlined approach to implementing an SDA. The outcomes of this streamlined SDA corresponded with the experimental analysis and were validated by a successful function-based treatment. By basing SDA and experimental analysis procedures on information gained via interview with the caregiver, procedures were less complex and the treatment was implemented more quickly. However, the information regarding the idiosyncratic variable (pleasant versus abrasive instructions) was obtained through the interview process; thus, it remains unclear whether an SDA was needed at all. Although the study shows agreement between SDAs and functional analyses, it also lends support to the conclusion that suspected idiosyncratic variables can be identified via anecdotal data and tested directly in functional analyses without the intermediary step of an SDA (Lerman & Iwata, 1993).

Anderson, English and Hedrick (2006) conducted SDA with four typically functioning children at the participants home or day-care and evaluated treatments based on the hypothesized function for two of the participants. Problem behaviors included aggression, disruption and SIB. Although classes of antecedents were controlled during the SDA, they were subcategorized according to potentially relevant properties and scored individually. For example, attention was scored as positive or negative and whether it was delivered by a teacher or peer. Two of the participants were withdrawn from the study before treatment could be evaluated. Of the two remaining participants, treatment corresponding to SDA outcomes was effective to reduce their problem behaviors to near-zero levels. Results of this study showed that effective treatments could be based on SDA outcomes alone, without conducting an analogue assessment. In addition, this study extends findings that SDA is useful for identifying idiosyncratic variables. For example, SDA outcomes revealed that peer attention (not typically manipulated in an analogue analysis) appeared to maintain one participant’s problem behavior. This information
was then used in the treatment by implementing timeout away from peers as a consequence for problem behavior.

English and Anderson (2006) conducted an interview with the participants and their caregivers to identify possible idiosyncratic maintaining variables for problem behavior, which was followed by a structured descriptive assessment and an analogue functional analysis. Participants were a 2-year-old with developmental delays, an 8-year-old with autism and mild mental retardation and a 9-year-old with autism. Problem behaviors were aggression, disruption and SIB. The analogue functional analysis was embedded in an ABA’ design (reversal design) with caregiver-conducted phases and experimenter-conducted phases counterbalanced across participants. For example, for one participant, phases A and A’ were caregiver-conducted and phase B was experimenter-conducted. For another participant, phases A and A’ were experimenter-conducted and phase B was caregiver-conducted. For each of the participants, function-based interventions were developed from each of the assessments (i.e. the SDA, experimenter-conducted analogue, and caregiver-conducted analogue). For example, baseline for the intervention was conducted for one participant during attention sessions (caregiver analogue), demand sessions (based on the caregiver and experimenter analogues and SDA), and tangible sessions (based on caregiver and experimenter analogues). Since little or no problem behavior was observed during the attention and tangible sessions, interventions were not conducted for those conditions. The researcher evaluated two interventions during the demand condition. One intervention was based on a hypothesis derived from both analogue analyses that problem behavior was maintained by escape from demands. For this intervention, the caregiver implemented an escape extinction procedure and a 15-s break without attention delivery contingent on compliance. The other treatment was based on a hypothesis derived from the SDA
that problem behavior was maintained both by escape from demands and by attention delivery during the escape period. The procedures were the same for this intervention except that attention was delivered during the 15-s escape period contingent on compliance. Multi-component interventions (based on the various assessments and analyses) were implemented after the study for all participants. Results showed that the functional assessments yielded discrepant results for all three participants. While the caregiver-conducted analogues suggested the same antecedents as the SDAs, they suggested different hypotheses about the maintaining consequences. For all three participants, interventions based on the SDA were more effective than interventions based on either analogue analysis. Finally, the results show that interviewing caregivers to include idiosyncratic variables in the analogue assessment was not sufficient to identify all relevant variables. That is, although idiosyncratic variables from interviews were incorporated in the analogue analysis, having the assessment conducted by experimenters in a laboratory setting did not lead to the development of an outcome on which effective, function-based treatment could be based. Previous research that found discrepancies between SDAs and analogue assessments interpreted the results as a weakness of SDAs, but did not test the relative effectiveness of interventions derived from each assessment (Lerman & Iwata, 1993). This study extends SDA research by demonstrating that hypotheses derived from the SDAs, when inconsistent with results of the analogue analysis, can be more useful for developing effective intervention.

Structured descriptive assessment appears to offer a reasonable alternative when analogue functional analyses produce unclear results. For example, SDAs may be useful when rates of behavior are undifferentiated across conditions during analogue analysis, or when zero behavior rates are observed across conditions. In addition, although a large body of research supports the
internal validity of analogue functional analyses, growing evidence suggests that a successful experimenter-conducted treatment in an analogous environment does not ensure that the treatment will address all of the functionally relevant variables occurring in the natural environment. Therefore, treatment developed from an analogue functional analysis alone should be evaluated in the natural environment. The literature on SDA also suggests that, in some situations, it may be reasonable to substitute an SDA for an analogue assessment. For example SDAs may be useful when institutional constraints do not allow the participant to be removed from their natural setting to a clinic or when problem behaviors evoked by the transition from the participant’s natural environment to a novel clinic setting preclude the conduct of the assessment.

The purpose of the current study was to further evaluate the utility of the SDA. Following an analogue assessment with inconclusive results, an SDA was conducted with one participant. Treatment interventions based on SDA outcomes were then evaluated. This study contributes to the structured descriptive assessment literature in at least three ways. First, this study replicated previous research by assessing the utility of SDA to identify variables associated with problem behavior and second, evaluating the effects of treatments based on those identified variables. Third, the present study extended previous research by conducting the SDA as a means for clarifying undifferentiated analogue analysis results.
CHAPTER 2
EXPERIMENT 1: ANALOGUE FUNCTIONAL ANALYSIS

Method

Participants and Settings

The study was conducted at a large-scale inpatient state facility for people with Mental Retardation. Sessions were conducted in a 3.35 m by 2.74 m room with a 2-way observation mirror. The participant, Carrie, was a 34-year-old woman diagnosed with moderate mental retardation and was referred for aggressive and disruptive behaviors. Carrie had a history of aggressive and disruptive behaviors documented for the previous 12 years. At the time of the study, she received daily dosages of 2000 mg of Depakote (mood stabilizer), 2000 mg of Neurontin (mood stabilizer) and 100 mg of Trazadone (antidepressant). These medications were prescribed to address her aggression (Carrie does not have a history of seizures) and dosages remained constant throughout the study.

Response Definitions, Data Collection, and Interobserver Agreement

Data were recorded using Dell Axim X51® hand-held computers with InstantData v0.8b®. A second observer simultaneously but independently scored 81% of sessions. IOA was calculated by dividing session time into 1-s intervals. For each interval, the smaller number of recorded responses was divided into the larger number. The results were summed across 1-s intervals, divided by the total number of seconds in the session, and multiplied by 100. Interobserver agreement for the functional analysis was 100%. Since no behavior was observed during the Functional Analysis (FA), interobserver agreement was not calculated.

All events recorded during the FA were recorded as frequency measures. Aggression was defined as throwing objects within 1 m of another person, or hitting, kicking, pushing,
pulling, or biting others. Disruption was defined as throwing objects (but not within 1 m of another person), forceful contact of the hand or feet with tables, walls, or floors; and any behavior that produced damage to property. Attention was defined as verbal statements that were not demands, including physical interaction from therapist, reprimands, or any other questions or statements in a context other than instructional. Demands were defined as verbal, physical, or gestural requests to complete a task. Compliance was defined as engaging in the task requested by the therapist. Access to tangible was defined as the placement of preferred items within arms’ reach of Carrie.

**General Procedure**

**Diverted Attention.** Two therapists implemented the protocol for this condition. When Therapist 1 entered the room, he placed leisure materials (a magazine and a Magnadoodle®) on the table and stated that he would talk to his friend (Therapist 2). Therapist 1 then sat within arms’ reach of Carrie, facing away from her and towards Therapist 2, with whom he conversed continuously unless problem behavior occurred. If problem behavior occurred, Therapist 1 would have delivered attention to the participant in the form of statements of concern (problem behavior never occurred). This condition was designed to determine whether the problem behavior was maintained by social positive reinforcement in the form of attention.

**Play.** During this condition, the therapist entered the room, he stated that they were going to hang out together, watch a movie and play with some toys. After this statement, the therapist placed the preferred items on the table, turned on the movie and sat beside Carrie. The therapist reciprocated any interaction initiated by Carrie that was not a target behavior. Every 30 s the therapist initiated an interaction with Carrie in the form of comments about the movie or statements pertaining to the preferred items on the table. The therapist would have ignored
problem behavior. Preferred items were identified through interviews with Carrie’s family members and caregivers, and a Multiple Stimulus Without Replacement (MSWO; see DeLeon & Iwata, 1996) preference assessment. This condition was designed to serve as a control condition.

**Demand.** During this condition, no preferred items or leisure materials were available. The therapist sat within arms’ reach of Carrie, placed an unfolded towel on the table and asked Carrie to fold it. If Carrie folded the towel, the therapist said *good* and presented another unfolded towel immediately. If Carrie did not fold the towel after the first request, the therapist would have used a gestural prompt with the verbal request to fold the towel. If Carrie did not fold the towel after the second request, the therapist would have provided a model with a third request. If Carrie did not comply after the third request, the therapist physically guided Carrie to fold the towel. If Carrie engaged in a target behavior, the therapist would have withdrawn the request for 30 s. If Carrie engaged in a target behavior during the 30-s escape interval, the interval would have been reset. This condition was designed to evaluate whether problem behavior was maintained by social negative reinforcement in the form of escape from demands.

**Tangible.** During this condition, the therapist sat within arms’ reach of Carrie and placed a spoonful of pudding on the table within arms’ reach of Carrie and began to read a magazine. If Carrie reached for the pudding, the therapist prevented her from accessing it by blocking the reach with his hands. Spoonfuls of pudding would have been delivered contingent on target behaviors. This condition was designed to evaluate whether the behavior is maintained by social positive reinforcement in the form of access to preferred items. The preferred item was identified through interviews with Carrie’s family members and caregivers, and a MSWO preference assessment.
Results

Results are shown in Figure 1. During 33 sessions, zero occurrences of target behavior were observed across all conditions.

![Graph showing the frequency of occurrence of problem behavior during the analogue functional analysis.](image)

*Figure 1.* Frequency of occurrence of problem behavior during the analogue functional analysis.
Discussion

It should be noted that the no-interaction condition was omitted from the functional analysis. Since aggressive behavior towards others is unlikely to be automatically maintained, it was decided that only conditions testing for a socially mediated function would be required.

According to interviews with Carrie’s guardians and caregivers and direct observation, problem behavior was most likely to occur when a favorite caregiver provided attention to other peers or caregivers in Carrie’s presence. The diverted attention condition procedures were adapted accordingly by having the therapist from the primary attention condition converse with a second therapist in the room. Also, the primary therapist conducted the play condition in an attempt to increase the value of his attention.

Casual observations at Carrie’s vocational site indicated that problem behaviors continued to occur during the period of the functional analysis. However, caregivers reported that Carrie enjoyed working and were not able to provide the researcher with examples of tasks that were likely to evoke problem behavior. In addition, tasks at the vocational site changed frequently so it so incorporation of the same tasks into the functional analysis would have been unwieldy.

In light of increasing injuries of peers due to Carrie’s aggression, it was decided to discontinue efforts to assess problem behavior in a clinical setting and conduct a structured descriptive assessment (SDA) in the natural environment.
CHAPTER 3

EXPERIMENT 2: STRUCTURED DESCRIPTIVE ASSESSMENT

Method

Setting

Sessions conducted in Carrie’s natural environment during times in her schedule likely to provide antecedent events relevant for SDA conditions based on casual direct observation. For example, the demand condition was conducted while Carrie was at work when the rate of demands was high. The attention condition was conducted in Carrie’s living room during a time when caregivers were typically busy and the ambient level of attention delivery was low. The tangible condition was conducted in Carrie’s room when she typically watched television. The play condition was conducted during snack time at work when she typically received one-on-one attention from a caregiver and continuous availability of a preferred item (snack food and soda) and no demands.

Response Definitions, Data Collection, and Interobserver Agreement

Data were collected using the same hand-held computers and data collection software used in Experiment 1. A second observer simultaneously but independently scored 39% of sessions. IOA was calculated by dividing session time into 1-s intervals. For each interval, the smaller number of recorded responses was divided into the larger number. The results were summed across 1-s intervals, divided by the total number of seconds in the session, and multiplied by 100. Interobserver agreement for the structured descriptive assessment was 92%, with a range of 83.43% - 98.8%.
Behavior definitions were the same as those used during experiment 1. Aggression and disruption were recorded as frequency measures. Attention, demand, compliance, and access to tangible items were recorded as duration measures.

*Data Analysis*

Data were analyzed by comparing percentage of interval in which problem behavior occurred across conditions and by calculating conditional probabilities of target consequent events following problem behavior (Anderson & Long, 2002). Also, mean intervals containing target antecedents events were calculated for each condition. Conditional probabilities were calculated in two ways: 1) behavior-based conditional probability and 2) event-based conditional probability. The purpose of calculating behavior-based conditional probability was to determine the proportion of problem behaviors that were followed by attention, escape from demand, and access to tangible items. Those events that occurred within 10 s following the problem behavior were included in this analysis. Escape from demand was included only when a demand preceded the problem behavior within 10 s and no demand or compliance occurred within 10 s after the problem behavior. Behavior-based conditional probabilities were calculated by dividing the number of a given consequence that followed problem behavior within 10 s by the number of problem behaviors during a session.

The purpose of calculating event-based conditional probabilities was to determine the proportion of attention deliveries, occurrences of escape from demand, and access to tangibles that were followed by problem behavior. Each occurrence of attention and access to tangibles was included in this analysis. Escape from demand was included for instances in which no compliance and no demand was scored within 10 s of a demand. Event-based probabilities were
calculated by dividing the number of problem behaviors by the number of a given event (attention, escape from demand and access to tangibles).

The mean number of intervals in which attention deprivation, demands and tangible deprivation occurred was calculated to evaluate the extent to which the relevant antecedent events were present for each condition. Each session was divided into 10-s intervals. For attention deprivation, each interval that did not contain attention for the whole interval was scored. For demands, each interval that contained a demand was scored and, for tangible deprivation, each interval for which access to tangible was absent following the removal of a tangible was scored.

**General Procedure**

*Low Attention.* During this condition, the therapist interacted with Carrie continuously for 2 min before the session began. The therapist was instructed not to deliver any demands during the session and not to provide any leisure materials. When the session began, the therapist withdrew her attention and returned to her ongoing duties. The therapist was instructed to respond as she normally would to any problem behavior. If 2 min elapsed without any attention from the therapist, the observer prompted the therapist to interact with Carrie for 10 – 15 s. This scheduled delivery of attention was intended to signal the continued availability of attention. This condition was designed to evaluate the effects of low levels of attention on target behaviors.

*Low Tangible.* During this condition, the therapist was instructed to withhold the delivery of any demands for the duration of the session. The therapist turned on the television for 2 min before the session began. When the session began, the therapist turned the television off. Every 2 min, the observer prompted the therapist to turn the television on for 10 – 15 s. The
therapist was instructed to respond to problem behavior as she normally would. This condition was designed to determine the effects of tangible deprivation and antecedent tangible removal on target behaviors.

Play. During this condition, the caregiver was instructed to interact with Carrie continuously without presenting demands. The therapist was instructed to respond as she normally would when problem behavior occurred. The observer did not deliver any prompts to the therapist during the play condition. This condition was designed as a control.

Demand. During this condition, the therapist was instructed to continue to present work requests as she normally would. The therapist was not given any instructions regarding attention delivery for either problem behaviors or task completion and there were no preferred items in the room. If the therapist did not deliver a demand for 2 min, the observer prompted the therapist to deliver a demand. This condition was designed to identify the effects of demands on target behavior.

Results

Figure 2 displays the percentage of intervals in which the problem behavior occurred across conditions. These data permit the analysis of the density of the schedule of delivery of target events for problem behavior. Problem behavior occurred most frequently in the Demand condition, occurring during 5 of 7 sessions, with a condition mean of 1.17 and a range of 0-5. Problem behavior was observed during 2 of 6 sessions in the Low Attention condition, with a mean of 0.66 and a range of 0-3. No problem behavior occurred in the Low Tangible or play conditions.
Figure 2. Percent of intervals in which problem behavior occurred during the structured descriptive assessment.

Figure 3 shows behavior-based conditional probabilities. Of the problem behavior occurring in the Low Attention condition, 87.5% was followed by attention. Escape from demand and access to tangibles were not observed as consequences for problem behavior during the Low Attention condition. All instances of problem behavior during the Demand condition were followed by attention. Escape from demand and access to tangibles were not observed as consequences for problem behavior during the Demand condition.
Figure 3. Proportion of problem behavior preceding events during the structured descriptive assessment.

Figure 4 displays event-based probabilities. These data permit the analysis of the extent to which the delivery of target events was dependent on the occurrence of problem behavior. Attention delivery followed 28\% of problem behavior observed in the Demand condition, 8.5\% of problem behavior during the Low Attention condition. No other social consequences followed problem behavior (i.e., most problem behavior did not produce responses from the therapists).
Figure 4. Proportion of events consequent to problem behavior during the structured descriptive assessment.

Figure 5 displays mean intervals containing target antecedents for each condition. These data permit the analysis of the extent to which relevant antecedent events were present for each condition. Mean intervals containing attention deprivation were 45 in the Low Attention condition, 43.29 in the Demand condition, 15.33 in the play condition, and 48.67 in the Low Tangible condition. Mean intervals containing demands were 1 in the Low Attention condition, 13.57 in the demand condition, 1.5 in the play condition, and 0 in the Low Tangible condition. Mean intervals containing tangible deprivation were zero in the Low Attention and Demand conditions, 6.5 in the Play condition, and 49.5 in the Low Tangible condition.
Figure 5. Mean intervals containing antecedents across each condition of the structured descriptive assessment.

Discussion

The results of the SDA were interesting because the problem behavior primarily occurred during the Demand condition but never was followed by escape from demands. In both conditions in which problem behavior occurred (Low Attention and Demand); the only socially mediated event observed to follow problem behavior was attention. These results are similar to those in other SDA studies and underscore the importance of calculating conditional probabilities rather than relying on comparisons of levels of problem behavior across conditions for interpretations of operant function (Anderson & Long, 2002; Anderson, English & Hedrick,
2006). Because the only observed consequence to follow problem behavior was attention, it was hypothesized that the problem behavior was maintained by attention.

However, because the Demand condition contained the highest frequency of problem behavior, the possibility that escape from demand maintained Carrie’s problem behavior remained. For example, it could be possible that caregivers typically responded to problem behavior by placing Carrie in timeout when observers were not present, effectively providing escape from an aversive demand. Another possibility is that escape was delivered on a schedule too thin to be captured during 10-min sessions. Thus, even if attention followed behavior on a dense schedule, escape from demands could have been the maintaining variable for the problem behavior. According to figure 5, the fewest intervals with attention deprivation were recorded during the Demand condition; a result that is seemingly inconsistent with the hypothesis that problem behavior was maintained by attention. However, it is possible that antecedent events during the SDA functioned idiosyncratically for Carrie’s problem behavior. For example, if caregivers had typically been less likely to respond to problem behavior when Carrie was sitting in the living room, then less problem behavior may have been emitted in the Low Attention condition, due to the lack of discriminative stimuli in that condition. In the Low Tangible condition (when attention deprivation was the highest), she was in her room with only the caregiver and the observer. Caregivers and the guardian reported that the problem behavior was most likely to occur when caregivers were attending to other residents in Carrie’s presence. Although instances of caregivers attending to peers were not recorded during the SDA, the observer anecdotally reported that this event never occurred during the Low Tangible condition and occurred most often during the Demand condition. Based on these outcomes it was hypothesized that contingent attention maintained problem behavior but that escape also may
have reinforced problem behavior that occurred during demand situations in the natural environment. In order to determine the relative contributions of these potential contingencies of reinforcement to the maintenance of Carrie’s problem behavior, a treatment was designed that was expected to reduce problem behavior if it was maintained by attention or to increase problem behavior if it was maintained by escape.
CHAPTER 4
EXPERIMENT 3: TREATMENT ASSESSMENT

Method

Setting

Baseline and treatment conditions were conducted in Carrie’s workroom with a caregiver serving as a therapist. Carrie sat at the table with her peers and the therapist although no peers were seated immediately on either side of her (as during the demand condition of the SDA).

Response Definitions, Data Collection, and Interobserver Agreement

Target behaviors were recorded by trained observers using the same hand-held computer and data collection software as in Experiment 1 and 2. In addition to the behaviors measured in Experiment 1 and 2, data were collected on appropriate mands for attention, defined as anytime Carrie initiated the following interactions with another person: waving, smiling with eye contact, blowing a kiss, showing her work, dancing while seated, extending a hand for a high-five and hugging.

A second observer simultaneously but independently scored 34% of sessions. IOA was calculated by dividing session time into 1-s intervals. For each interval, the smaller number of recorded responses was divided into the larger number. The results were summed across 1-s intervals, divided by the total number of seconds in the session, and multiplied by 100. Mean IOA was 99.45% for disruption (range, 98.3% to 100%), 99.73% for aggression (range, 99.3% to 100%), 98.92% for appropriate mand (range, 95.5% to 99.9%), 87.15% for compliance (range, 67.8% to 99.7%), 92.89% for attention (range, 63.5% to 99.7%), and 93.17% for demand (range, 66.8% to 99.8%).

Data Analysis
Several analyses were conducted to analyze procedural integrity and assess possible confounds. Event-based and behavior-based conditional probabilities were calculated using identical methods to Experiment 2 to analyze the extent to which the therapist responded to problem behavior as prescribed in the treatment protocol. Mean intervals containing attention deprivation and demands were displayed to analyze the extent to which prescribed antecedents were present or absent. Mean intervals containing alternative behaviors (appropriate mands), mean intervals followed by attention and mean duration of attention delivery following alternative behaviors were displayed to analyze the extent to which therapists responded to alternative behaviors as prescribed in the treatment protocol. Additionally, the data paths for the treatment assessment graph were separated by days in order to analyze trends of problem behavior across consecutive sessions occurring within days.

Procedures

Treatment procedures were developed based on the outcome of the SDA. A reversal design was used, although instructions to the caregiver were modified for contingency reversal conditions.

Demand Baseline. All SDA demand condition sessions were included in the baseline. Five additional baseline sessions were conducted following the discontinuation of other SDA conditions. These sessions were procedurally identical to demand sessions from the SDA.

Timeout from Attention Plus Escape from Demands (TO/ESC). For this condition, the therapist delivered demands as during SDA demand sessions. The therapist withdrew attention and demands for 30 s contingent on problem behavior (timeout from attention). After 30 s elapsed, the observer prompted the therapist to deliver a demand. If aggression or disruption occurred during the timeout period, the timer was reset. If Carrie aggressed against another
person, the therapist blocked further aggression without eye contact or a verbal response. When Carrie left her chair as part of an act of aggression, the therapist physically guided Carrie back to her chair without eye contact or a verbal response. After 30 s, the therapist issued a new demand.

Timeout from Attention Plus Escape from Demands Plus Differential Reinforcement of Alternative Behavior (TO/ESC + DRA). During this condition, the therapist was instructed to deliver attention for at least 10 s following an appropriate mand for attention. All other procedures were identical to the TO/ESC condition.

Timeout from Attention Plus Escape from Demands Plus DRA Plus Discriminative Stimulus (TO/ESC + DRA + SD). During this condition, the observer and therapist wore a red shirt when the condition was in effect and took off the shirt when the condition was not in effect. In addition, two therapists were selected from the caregivers at the home to be the therapists for the remainder of the study (previously, several caregivers had served as therapists, based on their availability). All other procedures were identical to the TO/ESC + DRA condition.

Demand Baseline +Alternative Behavior Extinction (Demand BL + Alt EXT). During this condition, the therapist was instructed not to attend to appropriate mands for attention. All other procedures were identical to Demand Baseline. This condition was designed to better approximate the schedule of attention delivery observed during Demand Baseline.

Demand Baseline +Alternative Behavior Extinction +Attend to Peers (Demand BL + Alt EXT + Peers). During this condition, the therapist was prompted by the observer to interact with other residents for at least 30 s every 2 min. If problem behavior occurred during the interaction with other residents, the therapist was instructed to respond as they typically did during the
Demand Baseline condition. All other procedures were identical to the Demand Baseline condition.

Results

Figure 6 displays the percent of intervals in which problem behavior occurred during the treatment assessment. During the TO/ESC and the TO/ESC + DRA conditions, problem behavior decreased slightly, although not to a clinically significant level. A decreasing trend occurred in the TO/ESC + DRA + SD condition with problem behavior at zero for six consecutive sessions at the end of the condition. During the Demand BL + Alt EXT condition, despite a temporary reemergence, the rate of problem behavior decreased to zero for ten consecutive sessions at the end of the condition. During Demand BL + Alt EXT + Peers, a slight increase in problem behavior occurred although the severity (anecdotally reported) and frequency were not clinically significant (e.g., slightly shifting the table once every 10 min). During return to Demand BL + Alt EXT, problem behavior decreased back to zero or near-zero.
Figure 6. Percent of interval for which aggression and disruption occurred during the treatment assessment.

Figure 7 displays the percent of intervals in which problem behavior occurred during the treatment assessment, as in figure 6, except that data paths are separated by days. In addition, demand baseline was omitted because sessions were only run once daily during that condition. These data permitted an analysis of within-day trends of problem behavior. Days were not counted as containing a trend if no problem behavior occurred or if there were less than two data points for that day. During TO/ESC, a decreasing trend occurred 3 out of 6 days with no days containing zero problem behaviors across all sessions and one day containing less than three sessions. During TO/ESC + DRA, a decreasing trend occurred 5 out of 5 days with 1 day containing zero problem behavior across all sessions and no days with less than three sessions.
During TO/ESC + DRA + SD, a decreasing trend is evident for 5 out of 8 days with one day containing zero problem behavior across all sessions and one day containing less than three sessions. During Demand BL + Alt EXT, a decreasing trend occurred 2 out of 3 days with two days with zero problem behavior across all sessions and no days with less than three sessions. During the Demand BL + Alt EXT + Peers, a decreasing trend occurred 3 out of 3 days with no days containing zero problem behaviors across all sessions and one day with less than three sessions. During the return to Demand BL + Alt EXT, a decreasing trend occurred 1 out of 1 day, with one day containing zero problem behavior across all sessions and one day with less than three sessions.
Figure 7. Percent of interval for which aggression and disruption occurred during the treatment assessment. Data paths are separated by days.

Figure 8 displays the mean frequency of alternative behaviors, the mean frequency of attention delivery following alternative behaviors during each condition, and the mean duration of attention delivery following alternative behaviors during each condition. These data permit an analysis of the schedule of attention following alternative behavior (appropriate mands) for each condition. The mean frequency of alternative behaviors per session was 0.4 for Demand Baseline, 6.27 for TO/EXT, 4.6 for TO/EXT + DRA, 3.0 for TO/EXT + DRA + SD, 2.64 for Demand Baseline + Alt EXT, 1.22 for Demand Baseline + Alt EXT + Peers and 1.67 for the second Demand Baseline + Alt EXT. The mean frequency of attention delivered following alternative behavior was 0.2 for Demand Baseline, 5.04 for TO/EXT, 3.6 for TO/EXT + DRA,
1.83 for TO/EXT + DRA + SD, 2.08 for Demand Baseline + Alt EXT, 0.67 for Demand Baseline + Alt EXT + Peers and 0.62 for the second Demand Baseline + Alt EXT. The mean duration of attention delivery for alternative behavior was 5 for Demand Baseline, 5.62 for TO/EXT, 6.83 for TO/EXT + DRA, 12.56 for TO/EXT + DRA + SD, 4.83 for Demand Baseline + Alt EXT, 7.17 for Demand Baseline + Alt EXT + Peers and 4.88 for the second Demand Baseline + Alt EXT.

![Figure 8](image.png)

**Figure 8.** Mean frequency of alternative behaviors and mean frequency of attention delivery following alternative behaviors during each condition is on the primary y-axis. Mean duration of attention delivery following alternative behaviors during each condition is on the secondary y-axis.
Figure 9 displays mean intervals containing target antecedents. Mean intervals containing attention deprivation were 46.42 for Demand Baseline, 47.65 for TO/EXT, 44.52 for TO/EXT + DRA, 45.24 for TO/EXT + DRA + SD, 51.25 for Demand Baseline + Alt EXT, 53.5 for Demand Baseline + Alt EXT + Peers and 53.08 for the second Demand Baseline + Alt EXT. Mean intervals containing attention deprivation were 11.92 for Demand Baseline, 11.96 for TO/EXT, 9.56 for TO/EXT + DRA, 18.64 for TO/EXT + DRA + SD, 14.75 for Demand Baseline + Alt EXT, 13.2 for Demand Baseline + Alt EXT + Peers and 9.77 for the second Demand Baseline + Alt EXT.
Figure 9. Mean intervals containing antecedent events for each condition during the treatment assessment.

Figure 10 displays the proportion of problem behavior preceding target events. The proportion of intervals containing problem behavior preceding attention were 0.91 for Demand Baseline, 0.07 for TO/EXT, 0.12 for TO/EXT + DRA, 0.02 for TO/EXT + DRA + SD, 0.92 for Demand Baseline + Alt EXT, .08 for Demand Baseline + Alt EXT + Peers and 1.0 for the second Demand Baseline + Alt EXT. The proportion of intervals containing problem behavior preceding escape were 0.0 for Demand Baseline, 0.11 for TO/EXT, 0.01 for TO/EXT + DRA, 0.0 for TO/EXT + DRA + SD, 0.05 for Demand Baseline + Alt EXT, 0.06 for Demand Baseline + Alt EXT + Peers and 0.01 for the second Demand Baseline + Alt EXT.
Figure 10. Proportion of problem behavior preceding events during the treatment assessment.

Figure 11 displays the proportion of event intervals following problem behavior. The proportion of intervals containing attention following problem behavior were 0.19 for Demand Baseline, 0.01 for TO/EXT, 0.01 for TO/EXT + DRA, 0.0 for TO/EXT + DRA + SD, 0.05 for Demand Baseline + Alt EXT, 0.06 for Demand Baseline + Alt EXT + Peers and 0.01 for the second Demand Baseline + Alt EXT. The proportion of intervals containing escape following problem behavior were, 0.0 for Demand Baseline, 0.01 for TO/EXT, 0.01 for TO/EXT + DRA, 0.01 for TO/EXT + DRA + SD, 0.0 for Demand Baseline + Alt EXT, 0.0 for Demand Baseline + Alt EXT + Peers and 0.0 for the second Demand Baseline + Alt EXT.
Figure 11. Proportion of event intervals following problem behavior during the treatment assessment.

Discussion

Because problem behavior occurred primarily during the demand condition of the SDA but the only consequence recorded to follow problem behavior was attention, the initial treatment was designed to clarify whether the contingent attention or escape functioned to maintain Carrie’s problem behavior. During the first treatment condition, the therapist refrained from delivering attention for 30 s following each instance of problem behavior. This was intended to decrease problem behavior maintained by attention by withholding the hypothesized reinforcer (extinction). By default, the therapist also did not deliver instructions during the 30 s of timeout.
from attention. This would be expected to increase problem behavior if the behavior was maintained by escape from demands (by providing escape from demands on a continuous schedule contingent on problem behavior). Although it is generally recommended that a socially appropriate alternative behavior be reinforced when implementing an extinction procedure, these procedures were designed specifically as an experimental analysis to identify the operant function of the problem behavior, given that previous assessments had not clearly identified the maintaining consequences. Because a broad repertoire of appropriate mands for attention was well established in Carrie’s repertoire, it was expected that these behaviors would increase when the extinction procedure was implemented if the problem behavior was, indeed, maintained by attention (assuming also that those behaviors would be reinforced by the therapists). It was intended that a comprehensive treatment package would be recommended to Carrie’s psychologist at the conclusion of the study.

Results from the TO/ESC condition showed a slight decrease in problem behavior; however, the decrease was not clinically significant. According to figure 8, there was an increase in appropriate mands during this condition, although the duration of attention delivery increased by only 11% from 5 to 5.62 seconds. To address the insufficient increase in reinforcement for alternative behavior, a DRA was added to the procedure for appropriate mands. However, after the therapists were instructed to deliver at least 10 s of attention for each appropriate mand (TO/ESC + DRA), the number of appropriate mands decreased. The schedule of reinforcement for appropriate mands essentially did not change (from VR 1.2 to VR 1.3) and the mean duration of attention delivery increased by 18% from 5.62 seconds to 6.83 seconds.

Two variables were determined to be the most likely cause for the procedure’s lack of effect during the TO/ESC + DRA condition. First, many different therapists implemented
procedures from session-to-session. This resulted in a lack of consistency in the implementation of procedures, as well as variation in the quality and apparent value of the caregiver attention that was intended to function as reinforcement for appropriate mands. In an effort to address this lack of consistency, two caregivers were selected to serve as therapists for the remainder of the experiment.

Secondly, it is possible that the conditions in effect during treatment sessions were not sufficiently discriminable from those operating in the typical environment. Caregivers were instructed to follow the current behavior support plan, which included redirection contingent on problem behavior when the treatment assessment was not being conducted. Additionally, the experimental treatment was implemented by those same caregivers and in the same environment; therefore, very little changed in the environment between experimental and non-experimental conditions except the contingency itself and the presence of the experimenter. According to Figure 7, decreasing trends occurred across sessions within each day during TO/ESC + DRA. These trends could not be compared to Demand Baseline because only one session was run per day. However, a post-hoc comparison with results from the contingency reversal conditions indicated that her problem behavior followed a decreasing trend even during the contingency reversal. In an attempt to address the possible confound of poor discrimination between treatment and non-treatment contexts, the therapist and observer wore red shirts when treatment assessment sessions were conducted.

Although limiting the number of therapists to only two caregivers resulted in an increase in the duration of attention that was delivered following appropriate mands from 6.83 s to 12.56 s, the proportion of appropriate mands preceding attention decreased from 0.78 to 0.61. The decrease in proportion of appropriate mands preceding attention may explain why mean
appropriate mands decreased during TO/ESC + DRA + SD. Although a significant decrease in problem behavior occurred in this condition, it is not clear whether changes made in this condition were responsible for the reduction in rate of problem behavior, because the subsequent contingency reversal did not recapture high rates of problem behavior.

An increase in problem behavior never occurred during treatment conditions, supporting the conclusion that escape from demands did not maintain Carrie’s problem behavior. Although Figure 10 does not show a significant increase in the provision of escape following problem behaviors, escape was only recorded if Carrie discontinued her work. The reason for this apparent discrepancy is that Carrie often engaged in problem behavior while holding work materials in one hand and returned to work immediately thereafter. This provided further anecdotal evidence that the problem behavior was not maintained by escape from demands.

Three major events occurred during the study that were outside of the experimenter’s control and may have affected the outcomes. First, Carrie moved to a new home during the TO/ESC + DRA + SD condition (see figure 6). Anecdotal reports from the guardian and caregivers indicated that, in Carrie’s previous home, she spent most of her time in her room watching television and spent very little time interacting with others or actively engaged in activities. After she moved to her new home, it was reported that she spent more time in the living room engaged in activities and interacting with others. Relocation may have been at least partially responsible for the reduction in problem behavior, because the reported increase in attention at home may have decreased the value of attention at her vocational site. Other studies have found that changes in reinforcement in one setting can influence rates of problem behavior in another setting (Roane, Kelly, & Fisher, 2003; Wahler, Vigilante & Strand, 2004). Second, during the TO/ESC + DRA + SD condition, the researcher reported signs of discomfort
displayed by Carrie following loud noises to a nurse. The nurse subsequently diagnosed Carrie with an ear infection. The discovery of her ear infection immediately preceded the decreasing trend observed during that condition (see figure 6). It should be noted that, while it is possible that Carrie had an undetected ear infection since the beginning of her behavior problems approximately 1 ½ years prior, Carrie was under routine medical surveillance that most likely would have detected a middle ear infection. Most adults with mild or moderate mental retardation can be assessed for middle ear infection using methods typically employed by general practitioners (Evenhuis, Mul, Lemaire, & de Wijs, 1997). Additionally, Carrie’s aggression had been documented for 12 years prior to the study; it is doubtful that an ear infection can account for this extensive course of problem behavior. Ultimately, surgery was performed (myringotomy) to treat the infections during the Demand BL + Alt EXT condition. Following the discovery of chronic ear infections, sessions were conducted only when Carrie did not have an active ear infection as determined by her nurse, and when she did not display signs of physical discomfort such as covering her ears, jumping, or wincing following loud noises. Her ear infections could be reasonably suspected to have affected her problem behavior in at least two ways. First, pain and discomfort may increase the value of escape from demands (although the data from the current analysis are inconsistent with this account). Alternatively, pain and discomfort may alter the value of attention as a reinforcer. In the absence of changes in reinforcement or other motivating conditions, this effect would be evidenced by a change in measures of both problem behaviors and appropriate mands, as was seen in the current study (figure 8). However, if chronic ear infection was primarily responsible for decreases in problem behavior, one would expect that problem behavior would reemerge during contingency reversal conditions that were implemented following ear surgery. That is, if ear infection functioned to
decrease the value of attention of reinforcement, then attention-maintained problem behavior would be expected to return when ear infections were no longer present and reinforcement was available for problem behavior.

A significant decrease in Carrie’s problem behavior did not occur until after the ear infection was discovered and after Carrie moved to a new home during the TO/EXT + DRA + SD condition. According to figure 9, mean intervals containing attention deprivation remained high and even increased during the contingency reversal conditions. Figure 10 shows that the schedule of attention following problem behavior did indeed return to baseline levels during the contingency reversal conditions conducted at the end of the study. Figure 8 shows that the mean frequency of appropriate mands decreased beginning with the TO/ESC condition regardless of the schedule of reinforcement. For example, the most dense schedule of reinforcement for mands occurred during the return to Demand BL + Alt EXT, which was also the condition with the lowest mean frequency of appropriate mands. However, figure 11 shows that smaller proportions of attention were delivered subsequent to problem behavior during contingency reversals than during the original baseline. Taken together, the overall increase in mean intervals containing attention deprivation at the end of the experiment, the decrease in mean frequency of appropriate mands, and the decrease in rates of problem behavior despite a denser schedule of contingent attention delivery, all provide indirect evidence of a decrease in the value of attention as a reinforcer. Because there was a higher caregiver-to-resident ratio at Carrie’s new home, it is likely that she received more attention at home (confirmed by anecdotal reports from caregivers, her interdisciplinary team, and her guardian) and, therefore, attention was less valuable at her vocational site. Also, because it was not possible to determine the degree of pain caused by Carrie’s chronic ear infections, remains possible that ear infections contributed to a decrease in
value of attention. However, data showing that problem behavior did not increase following ear surgery suggest that ear infections alone were not responsible for the observed decreases in attention-maintained behavior.
CHAPTER 5

GENERAL DISCUSSION

Identifying all functionally relevant variables influencing the occurrence of problem behavior in the natural environment at times is critical in the development of effective, reinforcement-based treatments. Two common assessment approaches, descriptive assessment and analogue functional analysis, are associated with particular advantages and disadvantages. SDA incorporates aspects of descriptive assessment and analogue functional analysis procedures by controlling the schedule of targeted classes of antecedent events in the natural environment while allowing natural consequences to occur. In an effort to overcome the limitations of common functional assessment procedures, SDA represents an assessment strategy that allows variation - within limits - of events surrounding problem behavior, thereby increasing the possibility of discovering idiosyncratic variables associated with problem behavior that may not be identified by an analogue functional analysis. The limitations placed on the variability make it more likely that problem behaviors will occur during the observation and less likely that extraneous antecedent events will obscure the outcome of the assessment, as compared to standard descriptive assessment procedures.

The purpose of the current study was to evaluate the utility of SDA to generate hypotheses regarding the operant function of problem behavior when functional analysis results were inconclusive, and to evaluate the effectiveness of interventions based on those hypotheses. To complete this evaluation three analyses were conducted: (1) analogue functional analysis, (2) structured descriptive assessment, and (3) treatment. Treatment interventions were then developed and assessed to evaluate the validity of the SDA outcomes.
The results of Experiment 1 revealed a false negative outcome from the analogue functional analysis. Although information regarding idiosyncratic variables provided from preassessment interviews and direct observation was incorporated into the analogue analysis, no problem behavior was observed across conditions of the analysis. Additionally, 4 hrs of direct observation were conducted prior to the FA, during which problem behavior was rarely observed. During the SDA, problem behavior occurred both in the attention and demand conditions. Conditional probabilities showed that the only targeted social event that followed problem behavior in both the attention and demand conditions was attention from caregivers, supporting an account that problem behavior was maintained by attention. The results of interventions corresponding to this account showed slight decreases in the TO/ESC and TO/ESC + DRA conditions and a significant decrease in the TO/ESC + DRA + SD condition.

Although problem behavior decreased when intervention procedures were in place, baseline levels of problem behavior were not recaptured during contingency reversals (although a slight increase occurred during the Demand BL + Alt EXT + Peers). The failure to recapture problem behavior during the contingency reversal conditions limits the extent to which conclusions about the effectiveness of the SDA-based treatments. One potential account for these outcomes is that the treatment produced irreversible effects on Carrie’s behavior. That is, it may have been the case that, following Carrie’s experience with TO/ESC, TO/ESC + DRA, and TO/ESC + DRA + SD contingencies, the conditions of baseline no longer evoked escape behavior. Data indicating that staff continued to present attention following alternative behavior during reversals are consistent with this account. However, the overall declines in both problem behavior and alternative behavior suggest that intervention effects, alone, may not fully account for the behavior change observed during the study. These outcomes, along with data assessing
procedural integrity, suggest that an abolishing operation originating outside the treatment assessment sessions (e.g. moving to a new home with more staff available to provide attention and a chronic ear infection) may have decreased the overall effectiveness of attention as reinforcement during treatment sessions and, therefore, was at least partially responsible for decreases in problem behavior observed during the course of treatment.

Although the current data do not permit definitive conclusions about the utility of SDA for the development of effective intervention, it is notable that the SDA generated a relatively controlled baseline of problem behavior. This was especially important in light of the failure of direct observation or an analogue functional analysis to produce a useable baseline. Thus, the SDA identified immediate antecedent conditions that reliably produced problem behavior, even though the consequences that maintained the behavior remained somewhat ambiguous throughout the study. That it was not possible to convincingly demonstrate the extent to which the treatment influenced problem behavior may be less a function of a limitation of the SDA than of confounding variables that were not under control of the experimenter. This underscores the challenges of conducting and evaluating the effects of assessments and treatments in the natural environment. Thus, this study extends the SDA literature by demonstrating that the SDA enabled the experimenter to observe and, therefore, manipulate contingencies for, problem behavior that did not occur under more controlled experimental analysis procedures. Although it may have been possible to observe and place contingencies on problem behavior without the use of SDA, the absence of controlled antecedent conditions would have made it less possible to predict when problem behavior would occur and would likely have further reduced the confidence with which observed changes in problem behavior could be attributed to intervention procedures. Given that no other studies investigating SDA-based treatments have reported
difficulties with control over relevant events in the natural environment, this study is also an important extension demonstrating the potential utility of SDA in the face of challenges present in the natural environment.

Some limitations of the current study and SDA, more generally, should be noted. Whereas analogue functional analysis controls relevant dimensions of antecedent and consequential events, SDA only provides control only over the presence of certain targeted classes of antecedent events and no control over consequences. Although this absence of control may be viewed as a strength in that it enables the observer to record idiosyncratically occurring consequences (i.e., topographies and schedules of consequences that would not otherwise be represented in a structured experimental analysis), it also results in a greater likelihood of unsystematic variability in consequences and, therefore, variability in assessment outcomes that precludes interpretation. For example, all treatment assessments in the current study were conducted at Carrie’s vocational site where noise level fluctuated, staffing patterns varied from day-to-day, and the environment was often chaotic (e.g., groups of strangers entering the room for inspection, groups of Carrie’s co-workers coming and going, peers exhibiting problem behavior, etc.). In such an environment, the influence exerted by the classes of antecedents targeted in SDA may be obscured or masked by other, untargeted but functionally relevant variables. These challenges however, do not constitute an argument against evaluating treatment in the natural environment. Simply removing Carrie to a clinical environment might result in an apparently successful intervention in that environment; however, ultimately, relevant variables present in the natural environment must also be present during intervention in order to assure appropriate generalization of treatment effects. Therefore, an emphasis for future research
should be adapting SDA and treatment procedures to more fully account for the broad range of potentially relevant variables present in natural environments.

Because there was only one participant, generalization of the results of this study is limited. Additionally, the failure to recapture baseline levels of responding suggest that there may have been important changes in Carrie’s environment that were not detected or controlled during the study. Future research may clarify the conditions under which SDA leads to efficacious intervention and how alternative accounts might best be evaluated.

In conclusion, the results of this study extend previous research on SDA by showing that the SDA was useful in allowing the experimenter to observe the behavior under conditions in which relevant variables were at least partially controlled. However, it was not possible to determine the extent to which the manipulations made during treatment conditions affected problem behavior, because baseline levels of problem behavior were not replicated during reversal conditions. Analogue functional analysis remains the standard among methods of functional assessment because it provides a greater amount of control over potentially relevant antecedents and consequences and is supported by a long history of research demonstrating its validity. However, if an analogue functional analysis is not feasible or if the results of analogue analysis do not appear to be consistent with observations from the natural environment (i.e., if the external, or ecological, validity of the analysis appears to be limited), use of an SDA may be an effective alternative. Previous research has indicated that SDA outcomes frequently correspond with those of analogue functional analysis and can produce information that is useful in the development of effective treatments (Anderson & Long, 2002; Anderson, English, & Hedrick, 2006; Borrero, Vollmer, & Borrero, 2004; English, & Anderson, 2006; Freeman, Anderson, & Scotti, 2000). The results of this study provide cautionary evidence highlighting not
only the potential utility of SDA but also the complexity and challenges that may be encountered when conducting SDA and evaluating treatments in natural environments.
REFERENCE LIST


