CLARIFYING VARIABLES ASSOCIATED WITH PROBLEM BEHAVIOR
USING STRUCTURED DESCRIPTIVE ASSESSMENT

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This study evaluated the utility of a structured descriptive assessment (SDA) as an alternative method of functional assessment. Initially, an analogue functional analysis, conducted to assess the problem behavior of two adults with developmental disabilities, produced inconclusive results. Subsequently, SDAs was conducted in the individuals’ natural environment with the direct-contact caregivers acting as therapists. This assessment manipulated antecedent variables similarly to the analogue functional analysis but allowed for consequences to occur naturally. The results from SDAs suggested that problem behaviors, for both participants, were occasioned by removal of personal items and maintained by their return. Treatments based on the results of SDAs were implemented in a reversal design and resulted in a notable reduction in the occurrences of problem behavior for both participants. These outcomes suggest that SDA procedures may be useful when results from the analogue functional analysis are inconclusive.
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CHAPTER 1

INTRODUCTION

For over 25 years, there has been a strong interest in understanding how aberrant behavior, such as self-injury and aggression, is affected by environmental variables. Carr (1977) suggested that self-injurious behavior (SIB) can be maintained by a range of variables, including external or internal (e.g., sensory stimulation or pain attenuation) sources of reinforcement. The notion that such behavior is maintained by idiosyncratic variables suggests that treatment must correspond to these variables to produce effective and consistent results (Carr, 1977; Iwata, Dorsey, Slifer, Bauman, & Richman, 1982/1994). In fact, numerous studies have shown that function-based treatments 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).

A range of functional assessment procedures have been used to analyze the variables that produce and maintain aberrant behaviors. These assessments evaluate the role of the environment as the occasion for the occurrence of behavior (i.e., in terms of its antecedent influence) and as outcomes that shape and maintain behavior (i.e., in terms of its consequential influence) (Skinner, 1953). Two common methods to obtain information about the antecedents and
consequences that affect behavior are descriptive assessment and analogue (experimental) functional analysis (see Skinner, 1953, p.37).

A descriptive assessment involves direct observation of behavior and environmental events in the individual’s natural environment. An advantage of this approach is that it may provide information about naturally occurring schedules of antecedents and consequences, as well as idiosyncratic variables associated with problem behavior. Descriptive assessments may also be useful when analogue functional analyses are inconclusive or difficult to conduct (Mace & Lalli, 1991). A disadvantage of descriptive assessment is that it only provides correlational information and, thus, does not support causal statements about environment-behavior relations (Anderson & Long, 2002; Mace, Lalli, & Shea, 1992). There is also no control over environmental variables, meaning that functionally relevant stimuli may not occur during the observation (Anderson & Long, 2002) or may occur in ways that do not reveal important functional relationships. For example, if caregivers systematically (but, perhaps, “unconsciously”) do not present antecedent conditions that set the occasion for problem behavior, then long observation periods may pass without an opportunity to observe either the presentation of the antecedent condition or the occurrence of the problem behavior. Similarly, if problem behavior is followed by intermittent reinforcement, descriptive assessment may not reveal a strong correlation between the behavior and its maintaining consequence. Another important disadvantage of descriptive assessments is that the relevant function
of the behavior may be disregarded due to the frequent occurrence of irrelevant environmental events. For example, consider a case in which problem behavior is maintained because it produces escape from aversive therapy routines. If the therapist frequently presents reprimands (an irrelevant or “neutral” consequence) following the problem behavior but occasionally terminates therapy routines following the behavior, then the results of descriptive assessment may suggest that the behavior was maintained by attention in the form of reprimands, when the behavior, in fact, was maintained by escape.

Analogue functional analysis procedures (also known as “experimental analysis” or “functional analysis”) (e.g., Iwata et al., 1982/1994) systematically assess situations similar to those in the natural environment by directly manipulating the antecedents and consequences that are suspected to be associated with problem behavior. An advantage to this approach is that it allows greater control over events that may confound the outcomes of assessment by eliminating extraneous variables that may occur in the natural setting. This approach demonstrates cause-and-effect relationships between controlling variables and the problem behavior (Anderson & Long, 2002). Some disadvantages of analogue functional analysis are that it can require extensive time, effort, and professional expertise to conduct and interpret (Miltenberger, 2001). Another potential disadvantage is that analogue functional analysis procedures might establish a new reinforcement contingency by exposing an existing behavior to a new and different source of reinforcement (Iwata, Vollmer,
& Zarcone, 1990). For example, if an individual’s SIB is maintained by negative reinforcement and the individual receives attention as a consequence for the problem behavior during an analogue functional analysis condition (e.g., attention condition), it is possible that an additional source of maintenance for the behavior (positive reinforcement) may be established. An additional disadvantage of the analogue functional analysis is that it may not test for certain idiosyncratic variables that might maintain aberrant behavior in the natural environment. Unless these variables are identified through other sources prior to the functional analysis, test conditions may not be developed to assess their influence and, therefore, the assessment might produce outcomes that lead to false negative errors (i.e., a conclusion that the behavior is not a significant problem, according to Call, 2003). Finally, conducting functional analyses involve introducing participants to novel circumstances that may impede the ability to conduct procedures or interpret outcomes. For example, these procedures are often conducted in controlled settings, such as offices, clinics, or laboratories; thus, transporting participants to these settings may occasion resistance or other behavior that is uncharacteristic of typical patterns and/or interfere with the ability to conduct the assessment (e.g., attempts to avoid or escape the novel setting). Alternatively, conducting assessments in settings in which stimuli and conditions previously associated with (and potentially functionally related to) problem behavior are not present may result in a failure to observe problem behavior during the assessment. For example, if only certain caregivers have historically
delivered reinforcing consequences contingent on the occurrence of problem behavior, then the behavior may not be observed in the presence of other therapists. Alternatively, similar “false-negative” outcomes may be produced if therapists conduct analogue procedures in ways different from those that occur in the natural environment (e.g., tone of voice during task demands, characteristics of attention provided as a consequence for problem behavior, etc.).

Research has compared the results of the descriptive assessment and the analogue functional analysis in an effort to identify the relative strengths and limitations of each approach (Belfiore, Browder, & Lin, 1993; Lerman & Iwata, 1993; Mace & Lalli, 1991; Sasso, Reimers, Cooper, Wacker, Berg, Steege, Kelly, & Allaire, 1992). These studies have produced mixed results. For example, some outcomes suggest that descriptive and analogue approaches produce corresponding outcomes (e.g., Belfiore et al., 1993; Sasso et al., 1992). Sasso and colleagues compared the assessment procedures twice, with two separate teachers implementing both descriptive and analogue procedures. With both teachers, each procedure produced outcomes indicating that their participants’ problem behavior was maintained by negative reinforcement. Similarly, Belfiore and colleagues reported consistent results across descriptive procedures when they used the results of the descriptive analysis as a basis for the development of analogue functional analysis conditions.
Other studies have shown less direct correspondence between assessment methods. For example, Mace and Lalli (1991) conducted descriptive and analogue functional analyses that yielded divergent conclusions. The descriptive analysis suggested that the participant’s “bizarre speech” could have been maintained by either positive or negative reinforcement. The analogue functional analysis, which, like that conducted by Belfiore and colleagues (1993) was developed based on the outcomes of the descriptive assessment, suggested that only positive reinforcement maintained the problem behavior. Lerman and Iwata (1993) reported similar findings, concluding that, whereas the descriptive analysis only provided evidence whether the behavior was maintained by social vs. nonsocial consequences, the functional analysis identified the specific operant contingency associated with the problem behavior. Although these studies did not show perfect correspondence between assessment methods, the results of the descriptive assessments produced information about the general source of reinforcement for problem behavior (social vs. nonsocial). Furthermore, Mace and Lalli, as well as Belfiore and colleagues, used descriptive assessments to identify events and schedules of antecedents and consequences that occurred in the natural environment. This information contributed to the design and interpretation of the analogue functional analyses, thus indicating the potential utility of descriptive assessment to identify idiosyncratic variables whose influence can subsequently be more directly evaluated using analogue analysis.
In an effort to overcome some of the limitations of descriptive assessment and analogue analysis, some researchers have integrated the two approaches, using a procedure known as Structured Descriptive Assessment (SDA) (Freeman, Anderson, & Scotti, 2000). SDA contains two basic components. First, it is conducted in the natural environment, such as home or vocational settings, using therapists that are indigenous to those settings (e.g., parents, teachers, or caregivers). Second, SDA involves systematic presentation of specific antecedent conditions similar to those present in experimental analyses, while allowing therapists to deliver naturally occurring consequences for problem and other behavior. Thus, as with analogue analysis, the environment is arranged to increase the likelihood that environmental variables of interest will occur. However, unlike analogue analysis, consequences are not programmed and, therefore, may vary “freely.” Therefore, SDA can be considered a “hybrid” assessment, involving aspects of both experimental and descriptive procedures.

Freeman, Anderson, and Scotti (2000) developed SDA procedures to evaluate problem behavior exhibited by two participants. The researchers compared the frequency of environmental events that occurred during standard descriptive assessments to those during SDA. Specifically, they measured antecedent events including task delivery, attention removal, and tangible removal, as well as subsequent events including attention delivery, tangible delivery, and task removal. For one participant, all six events occurred more often during SDA, with differences showing 3% to 212% increases over
descriptive assessment. For the other participant, four of the six events occurred more frequently during SDA, with increases ranging from 30% to 336%. Two of the six events, tangible delivery and attention removal, decreased in frequency relative to descriptive assessment. Overall, results indicated that SDA procedures resulted in more frequent occurrences of targeted environmental events—in particular, antecedent events—when compared to the descriptive assessment. Freeman et al. also compared patterns of responding observed through analogue functional analyses to those observed during SDAs. For both participants, results revealed that SDAs and analogue functional analyses generated data patterns that supported common hypotheses about the operant function of the problem behavior. Although the results obtained by Freeman et al. support the utility of SDA, they are preliminary findings with several limitations. First, conditional probabilities were not calculated for SDA; therefore, the authors could not determine if specific environmental events and problem behavior tended to occur in close temporal proximity. Another important limitation of this study is the absence of empirical data indicating that the results of SDA led to effective treatment interventions. Although outcomes from SDA and analogue functional analysis produced congruent hypotheses regarding the operant function of problem behavior, treatment interventions based on the identified function were not implemented and tested. As a result, the utility of SDA to produce information that could be used to develop effective, function-based treatments remained unclear.
Anderson and Long (2002) compared results of SDAs to those obtained through analogue functional analyses with 4 participants. Outcomes of the two assessment procedures corresponded for 3 of 4 participants. Based upon these outcomes, effective treatment interventions were developed for 2 of these 3 participants, while the third participant did not continue in the study. For 1 of the 4 original participants, the analogue functional analysis and SDA produced inconsistent results. The analogue functional analysis suggested that problem behavior was maintained by access to preferred tangible items; whereas, SDA suggested that problem behavior was maintained by escape from or avoidance of tasks. Further analysis revealed that all relevant establishing operations for each condition were in effect during SDA (i.e., antecedent conditions were correctly implemented across conditions); however, the only consequence that occurred in conjunction with problem behavior during SDA was escape from tasks. For this participant, a treatment intervention was developed based upon the hypothesis that problem behavior was maintained by escape from or avoidance of tasks. The intervention for this participant, escape extinction and differential reinforcement of appropriate behavior, resulted in significant reductions in problem behavior. During follow-up sessions, the initial intervention continued while another intervention was developed to reduce problem behavior related to toy sharing with peers. The association of problem behavior with toy sharing supported the hypothesis originally obtained in the analogue functional analysis, that problem behavior was maintained by access to
tangible items. During the intervention, escape extinction was combined with differential reinforcement for manding (e.g., “Train please”). This treatment intervention also resulted in considerable decreases in problem behavior. In summary, the results for this participant indicated that problem behavior was multiply controlled by both escape and access to tangibles; therefore, both assessments were necessary to identify all variables maintaining problem behavior for this participant. Anderson and Long concluded that SDA may be a useful adjunct to functional analysis. Although each assessment procedure produced information that would have been sufficient for the development of effective treatment for 3 participants, neither assessment, by itself, would have provided a basis for a comprehensive treatment approach for the 4th participant. Thus, evaluation of intervention effectiveness was an important measure of validity for both functional analysis and SDA outcomes in this study.

Many of the limitations associated with various methods to assess problem behaviors are related to the level of control implemented during the assessment. For example, although analogue functional analyses involve a high level of control over antecedents and consequences, they sometimes fail to identify idiosyncratic variables maintaining problem behavior because those variables are not systematically incorporated into the assessment. On the other hand, purely descriptive assessments do not involve any control over antecedents or consequences, sometimes resulting in a failure to observe and/or clearly identify variables functionally related to problem behavior. SDA, however,
incorporates aspects of both procedures by controlling some features of antecedent conditions while allowing natural consequences to occur. Thus, as suggested by the outcomes for one participant in the Anderson and Long (2002) study, SDA may identify idiosyncratic variables maintaining problem behavior in the natural environment that may not be apparent in the outcomes of analogue analyses.

Although a large body of research supports the utility of analogue functional analysis to identify functional relationships between environmental events and problem behavior in numerous studies, there may be cases in which SDA procedures might be more suitable. For example, as previously discussed, the novelty of the functional analysis procedures may occasion resistance to participate or generate atypical response patterns due to the “artificiality” of the setting and procedures. In such cases, outcomes of functional analyses may be inconclusive, producing undifferentiated response patterns among test conditions or failing to occasion the target behavior at all (i.e., type-II errors or “false negatives” [Call, 2003; Wacker, Berg, Harding, & Cooper, 2004]). Some researchers have suggested various methods of identifying variables that contribute to false negatives and modifying the experimental design of the functional analysis to obtain clear, conclusive results (Call, 2003; Northup, Wacker, Sasso, Steege, Girand, Cook, & DeRaad, 1991; Vollmer, Marcus, Ringdahl, & Roane, 1995). An alternative strategy is to implement SDA as a method of assessing functional properties of problem behavior when analogue
functional analyses outcomes are inconclusive. Because the assessment is conducted in the natural environment without disruption of the participant’s routine, SDA might be more feasible under the constraints of a residential facility or outpatient setting. Furthermore, by conducting the assessment with therapists, stimuli, and conditions that are indigenous to the natural setting, the likelihood of producing atypical behavior patterns or false negatives may be reduced.

The purpose of the current study was to further evaluate the utility of SDA. Following analogue analyses that yielded inconclusive results, SDAs were conducted with 2 participants. Treatment interventions based on outcomes of SDA were then evaluated. The current study contributes to the structured descriptive assessment literature in at least three ways. First, this study replicates previous research by assessing the utility of SDA to identify variables associated with problem behavior. Second, this study extends previous research by conducting SDAs as a means to clarify undifferentiated analogue functional analysis results. Lastly, this study replicates and extends previous research by evaluating the effectiveness of treatments based solely on the results of SDA.
CHAPTER 2

EXPERIMENT 1: ANALOGUE FUNCTIONAL ANALYSIS

Method

Participants and Setting

Experiment 1 was conducted at a large, long-term, state residential facility for adults with developmental disabilities. Two participants, Lucy and John, were referred to the Behavior Analysis Resource Center for assessment and treatment of severe problem behavior. Lucy, a 50-year-old female with severe mental retardation, was referred to the center for self-injurious behavior (SIB) in the form of biting. John, a 35-year-old male with severe mental retardation, was referred for physical aggression to others (PAO). During the current study, Lucy’s psychotropic medications were Seroquel (800 mg), Abilify (15 mg), and Ativan (dosage unknown) and John’s was Navane (15 mg). Sessions were conducted in a 2.74 m by 3.41 m observation room that contained a table, two chairs, a one-way observation mirror, and appropriate materials for each session.

Response Definitions, Data Collection, and Interobserver Agreement

Target behaviors were recorded by trained observers using a Hewlett-Packard iPAQ® Pocket PC (Hewlett-Packard Development Company, L.P., Houston, Texas). Observers sat outside the room and observed session procedures through the one-way mirror. Data for all sessions were recorded as the sessions took place.
The operational definitions used during the functional analysis were based on the participant’s formal behavior intervention program as well as direct observation in the natural environment. For Lucy, biting was defined as contact between the teeth, arms, or hands (including fingers). For John, PAO was defined as any instance of head butting, kicking, hitting, scratching, biting, pushing, grabbing, or throwing items at others. Duration recording was used to record biting during Lucy’s assessment and frequency recording was used to record PAO during John’s assessment. Frequency recording was used to record the following therapist responses: (a) attention delivery, defined as verbal statements that were not demands; (b) demand, defined as requesting that the participant complete a task; (c) tangible delivery, defined as delivering a preferred item to the participant; and (d) tangible removal, defined as removing a preferred item from the participant. Tangible delivery was recorded only during John’s assessment. Frequency recording was used to record compliance during demand sessions for both participants. Compliance was scored if the participant engaged in the requested task prior to the third (physical) prompt.

A second observer simultaneously but independently scored 52% of Lucy’s sessions and 76% of John’s sessions. Interobserver agreement (IOA) was calculated by dividing session time into 1-s intervals. For each interval, the smaller number of recorded responses was divided by 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 for Lucy was 99.72%.
General Procedure

Experimental analysis conditions similar to those described by Iwata et al. (1982/1994) were presented using a multielement design. All sessions were 10 min in length and test and control conditions were presented sequentially for each participant. For Lucy, the order of conditions was alone, attention, play, demand, and tangible. For John, the order was no interaction, attention, tangible, play, and demand. One to 5 sessions were completed per day, at the same time each day, 3-4 times a week. The following is a description of the experimental conditions (see Iwata et al., 1982/1994, for a more complete description of these conditions).

**Alone (Lucy) or no interaction (John).** During this condition the participant was seated in the observation room by herself (alone condition) or with a therapist present (no interaction condition). No materials were present and the
therapist provided no consequences for problem behaviors. This condition was
designed to evaluate whether problem behavior was maintained by automatic
(e.g., sensory) reinforcement.

Attention. During this condition, the participant and the therapist were in
the observation room together. Leisure materials (e.g., books, toys, cards,
magazines, etc) were placed on the table. Contingent on the problem behavior,
attention from the therapist was given in the form of statements of concern. This
condition was designed to evaluate whether problem behavior was maintained by
social positive reinforcement in the form of attention.

Play. During this condition, the participant and therapist were in the
observation room together. Preferred leisure items (e.g., books, toys, cards, play
dough, magazines, etc.) were placed on the table. Preferred items were
determined by caregivers and parent interviews for both participants and a
multiple stimulus without replacement (MSWO) preference assessment for John.
No demands were given and the therapist interacted with the participant at least
once every 30 s (e.g., play cards, talk about leisure items, sing songs, etc).
Problem behaviors were ignored. This condition was designed to serve as a
control.

Demand. During this condition, the participant and the therapist were in
the observation room seated at the table. During Lucy’s assessment, the
therapist initiated a task trial every 30 s (e.g., “Lucy, walk to the chair”) using a 3-
prompt sequence (verbal prompting, modeling, and physical guidance). Task
trials were presented in a continuous presentation format during John’s assessment. The tasks for each participant were chosen based on the participant’s level of functioning and training objectives. Compliance prior to the third prompt resulted in verbal praise (e.g., “Good job”) and termination of the trial. Contingent on the problem behavior, the trial was terminated for 30 s. This condition was designed to evaluate whether problem behavior was maintained by social negative reinforcement in the form of escape from task trials.

*Tangible.* During this condition, the participant and the therapist were in the observation room. Immediately before each tangible session, the participant was allowed noncontingent access to the preferred item (leisure or edible) for approximately 5 to 10 s. The leisure item for Lucy, a purse, was chosen prior to the beginning of the assessment based on direct observation and anecdotal reports from Lucy’s caregivers. John’s preferred edible item, cookie, was chosen based on results from an MSWO preference assessment conducted prior to the beginning of the assessment. After the participant had received 5 to 10 s access to the preferred item, the item was removed and the session began. During the session, the participant and therapist were seated in the observation room. The therapist held the preferred item in view of the participant. Contingent on problem behavior, the item was presented to the participant for 5 to 10 s (i.e., Lucy received 5 to 10 s of access to the purse; John received access to a bowl of
cookies for 5 to 10 s). This condition was designed to evaluate whether problem behavior was maintained by access to positive reinforcement in the form of tangible items.

Results

Lucy

Lucy’s results are shown in Figure 1. Biting was observed only during sessions 3, 7, 8, 9, 11, and 12, in the play, attention, demand, and alone conditions. The outcomes were inconsistent and no differentiation was apparent in the data. As a result, no conclusions could be drawn from the outcomes of Lucy’s functional analysis. For informational purposes, this assessment was a component of an extensive analogue functional analysis, in which reinforcement contingencies were also placed on skin picking (not shown in Figure 1). Prior to the assessment for biting, there were 80 sessions conducted to identify variables associated with skin picking. The outcomes of the analogue functional analysis for skin picking were also inconclusive. Although the current study only pertains to Lucy’s biting, the combined outcomes of the analogue functional analysis for both problem behaviors and the longevity of the assessment were influential in concluding the analogue functional analysis.

John

John’s results are shown in Figure 2. PAO was observed only during sessions 9, 16, 22, and 24 in the play, no interaction, and attention conditions. During sessions 16, 22, and 24, in the no interaction, attention, and play
conditions, respectively, physical aggression occurred only when John was grabbing the therapist and pulling her away from the door in an apparent effort to leave the experimental setting. The results from John’s analogue functional analysis were inconsistent and no differentiation was apparent in the data. Therefore, no conclusions could be drawn from these outcomes.

Discussion

The undifferentiated functional analysis outcomes for both participants may have resulted from various factors. Specifically, the functional analysis conditions may not have been sufficiently analogous to those operating in the natural environment to evoke problem behaviors. For example, a difference between the natural environment and the analogue functional analysis setting was that therapists who conducted the functional analysis were unfamiliar, unlike caregivers who interacted with the individual on a daily basis. Therefore, previous histories with specific caregivers may have been relevant factors in the evocation of problem behavior. Another difference between the functional analysis conditions and potentially relevant environmental conditions was the location of the assessment. The experimental setting may not have contained or sufficiently simulated particular activities, items, peer interactions, and daily routines that were present in the natural environment. If integrated into the functional analysis conditions, it may have been possible to identify which, if any, of these variables were functionally related to the participants’ problem behavior. However, variables such as peer interactions, group activities, and routines were
either impossible or impracticable to reproduce in the setting of an analogue functional analysis. In response to the inconclusive results of the analogue functional analysis for both participants, an SDA was implemented to identify variables associated with the problem behavior that were not apparent during the analogue functional analysis.
Figure 1. Lucy’s functional analysis graph.
Figure 2. John’s functional analysis graph.
CHAPTER 3

EXPERIMENT 2: STRUCTURED DESCRIPTIVE ASSESSMENT

Method

Setting

All SDA sessions were conducted on the participants’ home or in a workshop setting (John). Materials necessary to conduct each condition were present, as were work and leisure materials, peers, caregivers, and other persons and items indigenous to each setting. The experimenter, a direct-contact caregiver, and, during IOA sessions, a second observer were present during all sessions. A direct-contact caregiver served as the therapist for each session, while the experimenter provided instructions and prompts to the therapist as appropriate.

Response Definitions, Data Collection, and Interobserver Agreement

Target behaviors were recorded by trained observers using a Hewlett-Packard iPAQ® Pocket PC (Hewlett-Packard Development Company, L.P., Houston, Texas). The definitions for problem behaviors as well as data recording procedures for both participants were identical to those used during experiment 1. Frequency recording was used to record compliance during a demand session. Compliance was scored only if the participant engaged in the requested task. Frequency recording was used to record therapist responses, which included (a) attention delivery, (b) demands, (c) tangible removal, and (d)
tangible delivery. For Lucy, attention delivery 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. For John, attention delivery was defined as for Lucy, but the specific form of attention delivery, including physical interaction from therapist, verbal statements, and reprimands, was recorded separately. Some examples of physical interaction from therapist included hugs, high fives, holding hand, scratching back, tossing a ball, and physical redirection. Some examples of verbal statements included compliments, conversational questions (e.g., "How are you?"), singing, and praise (e.g., "Great job!"). Some examples of a reprimand included “No”, “Don’t do that”, “Stop”, “Quit” and “Get back over here.” Demands were defined as verbal, physical, or gestural requests to complete a task. This definition was exclusive to requests in an instructional context, as opposed to requests during a game or preferred activity (e.g., “Toss me the ball”). Reprimands were distinguishable from demands because they were immediately preceded by a behavioral event, whereas demands functioned as an antecedent event that was not presented in response to a participant's prior behavior. For example, if a caregiver said, “Get back over here” in response to a participant walking away the interaction was scored as a reprimand. On the other hand, if the caregiver said, “Come here” as an instruction to walk toward the therapist (and not in response to a participant's prior behavior) the interaction was scored as a demand. Tangible removal was defined as removing a preferred object from the
participant or from within his or her reach. Tangible delivery was defined as giving a preferred item to the participant or placing a preferred item within reach of the participant.

A second observer simultaneously but independently scored 31% of Lucy’s sessions and 69% of John’s sessions. IOA was calculated by dividing session time into 1-s intervals. For each interval, the smaller number of recorded responses was divided by 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 for Lucy was 97.46% for biting (range, 87.5% to 100%), 95.44% for attention delivery (range, 85.5% to 100%), 99.42% for demands (range, 97.8% to 100%), 98.66% for compliance (range, 93.3% to 100%), 99.86% for tangible delivery (range, 99.7 to 100%), and 99.72% for tangible removal (range, 99.3 to 100%). Mean IOA for John was 99.48% for physical aggression to others (range, 97.2% to 100%), 98.32% for physical interaction from therapist (range, 95.2% to 100%), 99.71% for reprimands (range, 98.5% to 100%), 95.13% for verbal statements (range, 88.9% to 99.2%), 97.69% for demands (range, 88% to 100%), 99.07% for compliance (range, 94.5% to 100%), 99.77% for tangible delivery (range, 98.3% to 100%), and 99.73% for tangible removal (range, 98% to 100%).

Data Analysis

Several analyses were conducted to determine the relation between problem behavior and environmental events during SDA. First, the duration
(Lucy) or frequency (John) of problem behavior was compared, session-by-session, across conditions of SDA.

Second, conditional probabilities were calculated for environmental events that occurred within 10 s of the problem behavior (Anderson & Long., 2002; Freeman et al., 2000; Lerman & Iwata, 1993). Sessions were divided into 10-s intervals. The environmental events analyzed were attention delivery, escape, and tangible delivery. Attention and tangible deliveries were recorded for each session, as described above. Escape was scored if a demand occurred in the preceding interval, the participant did not comply, and no additional demands were presented during the subsequent interval. Two types of probabilities were calculated for each participant (Anderson & Long). First, behavior-based probabilities were calculated to analyze the proportion of problem behavior that occurred within 10 s prior to environmental events. These probabilities were calculated by dividing the number of intervals containing problem behavior that preceded the environmental event by 10 or fewer s by the total number of intervals scored with problem behavior. Second, event-based probabilities were calculated to determine the proportion of environmental events that followed problem behavior within 10 s. These probabilities were calculated by dividing the number of intervals containing problem behavior that preceded the environmental event by 10 or fewer s by the total number of intervals scored with the event.

Mean intervals containing antecedent events were also analyzed to determine if the therapists implemented SDA antecedent conditions as
prescribed (Anderson & Long, 2002). Each session was divided into 10-s intervals and partial-interval data were collected on the occurrence of the following antecedent events: (1) attention deprivation, scored when there was no attention delivered for a complete interval, (2) demand, scored when a demand occurred at any time during an interval, and (3) tangible deprivation, scored when the participant did not have access to the preferred tangible item for a complete interval. Mean number of intervals per session containing antecedent events were calculated by dividing the total number of intervals containing the antecedent event for each SDA condition by the total number of sessions for that SDA condition. For example, if 10 attention sessions were completed and the sum of intervals containing attention deprivation during attention sessions was 350, then 350 would be divided by 10, resulting in an average of 35 intervals containing attention deprivation during attention sessions.

*General Procedure*

Four conditions (attention, play, demand, and tangible) were presented using a multielement design. All sessions were 10 min in length and were presented sequentially for each participant. For Lucy, the order of conditions was attention, play, demand, and tangible. For John, the order was attention, play, tangible, and demand. One to 3 sessions were completed per day, 4-5 days per week. All sessions were scheduled to integrate with typical activities conducted in the participant’s natural environment. With Lucy, for example, demand sessions followed mealtime, when she typically was asked to complete
a large number of tasks (e.g., brushing teeth, washing hands, using the restroom). For John, the demand sessions were conducted during his vocational training. Although therapists received instructions and prompts to deliver or withhold specific antecedent events and stimuli, they were instructed to respond to problem behavior as they normally would across all conditions of SDA. That is, there were no programmed or prescribed consequences for the participant’s problem behavior during SDA.

Attention. During this condition, the therapist was instructed to provide continuous attention to the participant for two consecutive min prior to the session. When the session began, the therapist was instructed to withdraw the attention and to assume other duties. If two min elapsed without the delivery of attention or the occurrence of problem behavior, the therapist was instructed to deliver attention for 10-15 s. If attention was delivered following problem behavior, the experimenter instructed the therapist to withdraw attention after 30 s. This condition was designed to evaluate whether problem behavior was maintained by social positive reinforcement in the form of attention.

Play. During this condition, the therapist was instructed to engage the participant in preferred activities, deliver continuous attention, and to withhold demands. No prompts were delivered to the therapist by the experimenter to implement the prescribed procedures. The play condition served as a control condition.
Demand. During this condition, the therapist was instructed to deliver demands to the participant. If 2 min elapsed without the presentation of a demand or occurrence of problem behavior, the therapist was instructed to deliver a demand. This condition was designed to evaluate whether problem behavior was maintained by social negative reinforcement in the form of escape from tasks.

Tangible. The tangible item used in Lucy's assessment was a purse, which was the same item used in the tangible condition of the analogue functional analysis. She was given access to this item for 2 min prior to the beginning of the session. The tangible items used in John's assessment were cookies, the same items used in the tangible condition of his functional analysis. He was given 10 to 15 s access to the cookies prior to the beginning of the session. The tangible condition was similar to the attention condition, except that the tangible item, rather than attention, was withdrawn at the onset of the session. If 2 min elapsed without the delivery of the tangible item or the occurrence of problem behavior, the therapist was instructed to deliver the item for 10 to 15 s. If the tangible item was delivered following problem behavior, the researcher instructed the therapist to withdraw the item after 30 s. This condition was designed to evaluate whether problem behavior was maintained by access to positive reinforcement in the form of tangible items.
Results and Discussion

Lucy

Figure 3 displays the duration of Lucy’s biting across SDA conditions. Biting occurred almost exclusively during tangible sessions, with the exception of low measures in 1 session each of the play, demand, and attention conditions. Biting was observed in all but 1 of the 7 tangible sessions, with an average duration of 172 s per session. Biting averaged 0.6 s per session in the play condition, 3 s per session in the demand condition, and 0.6 s per session in the attention condition. The results of SDA were, thus, highly differentiated, and suggested that Lucy’s biting was maintained by positive reinforcement in the form of access to preferred tangible items.

Figure 4 displays mean intervals containing antecedent events across conditions during Lucy’s SDA. These data permit an analysis of the extent to which the therapists applied the antecedent conditions as prescribed. During the attention condition, the therapist never delivered demands or manipulated access of the preferred tangible item. However, attention deprivation was in effect for the majority of intervals, with a condition mean of 57 of 60 intervals per session. Compared to all conditions, attention deprivation occurred most often in the attention condition. The play condition contained the lowest amount of attention deprivation and demands when compared to all conditions, with an average of 30 intervals per session containing attention deprivation and 1 interval containing demands. There was zero tangible deprivation during play. During the demand
condition, the therapist delivered demands during an average of 26.67 intervals per session; this was the highest number of intervals containing demands when compared to all conditions. The demand condition also contained an average of 41.67 intervals of attention deprivation per session and zero intervals of tangible deprivation. Measures of attention deprivation were expected to be high during the demand condition because demands, rather than attention statements, were programmed to occur during this condition. As expected, the tangible condition contained the highest measures of tangible deprivation relative to any other condition, with an average of 53 intervals per session of tangible deprivation. The tangible condition also contained an average of 48 intervals per session of attention deprivation and 2.14 intervals containing demands. Measures of attention deprivation were high in the tangible condition, because the therapist tended to remove the tangible item, walk away from the participant, and engage in other responsibilities with other residents. Although measures of attention deprivation were similar across the attention and tangible conditions, the tangible condition differed from the attention condition in that tangible deprivation was scored during the majority of intervals in the tangible condition and during zero intervals in the attention condition. In summary, these data indicate that the therapists applied the antecedent conditions with a relatively high level of integrity.

Figure 5 displays event-based probabilities, or the proportion of event intervals following problem behavior. This figure reveals that less than half of all
events delivered by the therapist (e.g., attention delivery, tangible delivery, and
demands) followed biting within 10 s. These outcomes also show that attention
delivery, escape, and tangible delivery occurred as consequences for biting only
during the tangible condition. Most importantly, the proportion of tangible
delivery following biting within 10 s was greater than proportions of attention
delivery or escape.

Figure 6 displays behavior-based probabilities, or the proportion of
problem behavior intervals preceding events. These probabilities reveal that
biting was seldom followed by any social consequence when the relevant
antecedent condition was present. These probabilities also indicate that, of the
measured consequences, biting was more frequently followed by attention
delivery. Although attention followed problem behavior more frequently than did
tangible deliveries, a higher proportion of tangible deliveries followed biting, as
indicated in the event-based probabilities. That is, a smaller proportion of
attention actually followed problem behavior within 10 s when compared to the
proportion of tangible deliveries.

The results of SDA indicate that antecedent conditions were applied by
the therapist as prescribed, and that certain of these conditions were functionally
related to Lucy’s problem behavior. The duration of problem behavior was
highest during the tangible condition, and the results were highly differentiated
across SDA conditions, suggesting that Lucy’s biting was maintained by positive
reinforcement in the form of access to the preferred tangible item. The
conditional probabilities were consistent with this interpretation, demonstrating that social consequences occurred only in the tangible condition and a higher proportion of tangible deliveries than other events followed biting. It should be noted that the results of the analysis of conditional probabilities, taken alone, are also consistent with an interpretation that Lucy’s biting was maintained by social positive reinforcement in the form of attention. However, combined with outcomes showing that biting occurred almost exclusively under conditions of tangible deprivation, it was concluded that Lucy’s biting was maintained, at least in part, by positive reinforcement in the form of access to the preferred tangible item (i.e., purse).

John

Figure 7 displays the frequency of problem behavior across SDA conditions for John. PAO was observed in each of the 4 SDA conditions. The attention condition contained PAO during 44% of sessions, with a mean of 2.89 occurrences per session. During the play condition, PAO was observed during 67% of sessions, with a mean of 1.89 occurrences per session. PAO was less frequently observed in the demand sessions, occurring during 22% of sessions with a mean of 1.44 occurrences per session. PAO was initially observed in 77% of sessions in the tangible condition, with a mean of 4 occurrences per session. Given that the highest measures of PAO were observed in the tangible condition, 4 additional tangible sessions were conducted to determine if PAO would persist in the tangible condition. PAO was observed during 100% of the additional
sessions, with a mean of 5.75 occurrences per session. Overall, PAO was observed during a total of 85% of the tangible sessions during SDA, with a mean of 4.5 occurrences per session. Although PAO was observed across SDA conditions and, thus, sensitivity to other reinforcement contingencies remains possible, comparisons across conditions suggest that John’s PAO was maintained by positive reinforcement in the form of access to preferred tangible items.

Figure 8 displays the mean intervals containing antecedent events across conditions. There were 60 total intervals in each session. During the attention condition, the therapist never removed the preferred tangible item and delivered demands during, on average, 0.78 intervals per session. Attention deprivation, however, was present during nearly all intervals, with a mean of 51.22 intervals per session. During the play condition, attention deprivation occurred at low levels (i.e., the therapist provided a greater amount of attention, relative to other SDA conditions), with a mean of 31 intervals per session. The therapist never manipulated the preferred tangible item during the play condition and delivered demands during an average of 2.67 intervals per session. Thus, the play condition contained the lowest levels of all antecedent conditions implemented by the therapist, thus suggesting that it served as an appropriate control condition against which to compare results of the other SDA conditions. The tangible condition contained the highest number of intervals containing tangible deprivation than in any other condition, as was prescribed, with a mean of 48.33
intervals per session containing tangible deprivation. Attention deprivation occurred during an average of 45.33 intervals per session, and demands were scored during an average of 1.56 intervals per session. As with Lucy, high measures of attention deprivation occurred in both the attention and tangible conditions. However, tangible deprivation also occurred in the tangible condition, but was not observed during the attention condition. During the demand condition, the therapist delivered demands during an average of 28.56 intervals per session, which was the highest number of intervals containing demands across all conditions. Attention deprivation was scored during an average of 45.33 intervals per session, and zero intervals of tangible deprivation were observed. As with Lucy, the attention deprivation was expected to occur at high levels during the demand condition because verbal interactions with the participant were mostly demands rather than other forms of attention. These data indicate that the caregiver applied the antecedent conditions with a relatively high level of integrity, thus signifying control over antecedent variables as well as the presence of relevant establishing operations.

Figure 9 shows the event-based probabilities, or the proportion of event intervals following problem behavior. These probabilities reveal that less than a quarter of all events delivered by the therapist (e.g., attention delivery, tangible delivery, and demands) followed PAO within 10 s. Small proportions of attention delivery followed PAO in each SDA condition. Very small proportions of escape followed PAO in the play and demand conditions. Interestingly, the highest
proportion of escape occurred in the tangible condition rather than in the demand condition, where the relevant establishing operation was more frequently in effect. Tangible delivery, however, occurred only in the tangible condition at a slightly higher proportion to escape. Most importantly, the tangible condition was the only condition where all three social consequences followed problem behavior within 10 s. Based on these probabilities, a smaller proportion of attention occurred subsequent to PAO than comparable proportions of tangible delivery and escape.

Figure 10 represents behavior-based probabilities, or the proportion of problem behavior intervals preceding events. These probabilities reveal that very small proportions of PAO were followed by any social consequence when the relevant antecedent condition was present. These probabilities also reveal that PAO was followed by attention delivery in each SDA condition. This is likely because John required a one-on-one level of supervision, including monitoring and constant redirection, at the residential facility to prevent severe injury to himself and his peers. Interestingly, the largest proportion of PAO that was followed by attention delivery occurred in the play condition. A possible explanation for this effect is that the therapist was instructed to provide continuous attention throughout the session, resulting in more instances of attention delivery, overall, than in any other SDA condition. This is consistent with the finding that although a large proportion of PAO was followed by attention deliveries, the event-based probabilities reveal that a small proportion of attention
deliveries actually followed PAO within 10 s (i.e., although PAO was often followed by attention, very little of the overall attention given to John occurred just after PAO). Small proportions of PAO were followed by escape in the play, tangible, and demand condition, and escape was more likely to follow PAO in the demand condition. Unlike attention delivery, the proportion of PAO preceding escape in the tangible condition was small, but the proportion of escape following PAO within 10 s during the tangible condition was relatively high. Lastly, PAO was most likely to be followed by tangible deliveries during the tangible condition. Although the proportions of PAO intervals preceding attention and tangible deliveries were similar, a slightly higher proportion of PAO preceded tangible deliveries. In addition, the event-based probabilities reveal that, whereas a small proportion of attention deliveries followed problem behavior within 10 s, a higher proportion of tangible deliveries followed PAO.

In summary, the antecedent conditions were implemented by the therapist with a high level of integrity. The results of SDA reveal PAO occurred throughout all conditions; however, the tangible condition consistently produced the highest frequency of problem behaviors (mean = 4.5) as well as the highest percentage of sessions containing PAO (85%). The conditional probabilities support the results of SDA by demonstrating that social consequences occurred mostly in the tangible condition. During the tangible condition, a higher proportion of PAO preceded tangible deliveries than other consequences and a higher proportion of tangible deliveries followed PAO. Although the proportion of escape following
PAO in the tangible condition was similar to tangible deliveries, there were very few PAO intervals preceding escape (0.07) and escape intervals following problem behavior (0.01) during the demand condition, which was the relevant antecedent condition for escape. Therefore, no conclusions could be drawn as to whether PAO was maintained by negative reinforcement in the form of escape from demands. Based on these outcomes, SDA strongly suggested that John’s PAO was maintained by positive reinforcement in the form of access to the preferred tangible item (i.e., cookies).
Figure 3. Lucy’s structured descriptive assessment graph.
Figure 4. SDA therapist responses across antecedent conditions during Lucy’s SDA.
Figure 5. Event-based probabilities during Lucy’s SDA.
Figure 6. Behavior-based probabilities during Lucy’s SDA.
Figure 7. John’s structured descriptive assessment graph.
Figure 8. SDA therapist responses across antecedent conditions during John’s SDA.
Figure 9. Event-based probabilities during John’s SDA.
Figure 10. Behavior-based probabilities during John’s SDA.
EXPERIMENT 3: TREATMENT ASSESSMENT

A treatment plan corresponding to the outcomes of SDA was implemented for each participant. The plans were developed based on the hypothesis that each participant’s problem behavior was maintained, at least in part, by positive reinforcement in the form of access to preferred tangible items (a purse for Lucy and edible items such as cookies for John). The treatment components included extinction for problem behavior (i.e., withholding presentation of the tangible item) and differential reinforcement of the omission of problem behavior (DRO) for Lucy and differential reinforcement of an alternative behavior (DRA, requesting a cookie) for John. A DRA treatment was developed for John because he was able to demonstrate a clear potential alternative response (“Cookie”) prior to the treatment assessment.

Method

Setting

All treatment sessions were conducted at the participants’ homes (see Setting, Experiment 2) and direct-contact caregivers served as therapists.

Response Definitions, Data Collection, and Interobserver Agreement

Target behaviors were recorded by trained observers using a Hewlett-Packard iPAQ® Pocket PC (Hewlett-Packard Development Company, L.P., Houston, Texas). The definitions for problem behavior, therapist responses, and
data recording procedures were identical to those used in Experiment 2. Therapist prompts and cookie requests were also recorded during John’s treatment assessment. Therapist prompts included phrases such as, “Let me know if you want a cookie,” and “I have some cookies. If you want one, let me know.” Cookie requests were recorded when John said “Cookie.” Frequency recording was used to record both of these measures during John’s assessment.

A second observer simultaneously but independently scored 37.5% of Lucy’s sessions and 47.62% of John’s sessions. IOA was calculated by dividing session time into 1-s intervals. For each interval, the smaller number of recorded responses was divided by 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 for Lucy was 96.25% for biting (range, 87.5% to 100%), 94.67% for attention delivery (range, 89.1% to 96.66%), 99.6% for demands (range, 98.5% to 100%), 100% for compliance, 99.68% for tangible delivery (range, 99.3 to 100%), and 99.53% for tangible removal (range, 99.3% to 100%). Mean IOA for John was 99.58% for physical aggression to others (range, 98.3% to 100%), 99.61% for physical interaction from therapist (range, 99.2% to 100%), 99.87% for reprimands (range, 99.5% to 100%), 96.31% for verbal statements (range, 93.7% to 99.3%), 99.03% for demands (range, 97.7% to 100%), 99.84% for compliance (range, 98.8% to 100%), 99.31% for tangible delivery (range, 98.7% to 99.7%), 99.33% for tangible removal (range, 98.3% to
100%), 99.12% for therapist prompts (range, 96.5% to 100%) and 99.14% for cookie requesting (range, 98.3% to 99.8%).

Procedures
Each participant’s treatment plan was developed based on the outcomes of SDA. Reversal designs were implemented to assess treatment effectiveness. Baseline session procedures for both participants were identical to those used in the tangible condition of SDA during experiment 2. All baseline sessions were 10 min in length for both participants. Treatment sessions for John were also 10 min in length; the length of sessions varied across Lucy’s treatment, as discussed below. One session was completed per day, at the same time each day, 3-5 times a week. The following is a description of the treatment procedures for each participant.

Lucy. A DRO 10-min schedule was developed for Lucy. According to this schedule, the purse was removed from her possession at the start of each session but was returned to her contingent upon 10 min without biting. Prior to each session, Lucy was given 2 min of access to the purse. After the session began, the therapist was instructed to approach Lucy, explain that the therapist needed to place the purse on the back of the chair just for a short time, remove the purse from Lucy’s hands, and place the purse on the back of her wheelchair. Positive but minimal interaction was given while removing the purse. The therapist was instructed to gently take the item from Lucy, as opposed to grabbing or struggling with her. If Lucy reached for the purse or placed it back in
her lap, the therapist verbally and physically redirected her by telling her that the purse will be on the back of her chair, taking the purse without further interaction, placing the purse on the back of the chair, and engaging her in another activity. If no problem behavior was observed for 10 min, the purse was returned to Lucy and the session was terminated. If Lucy engaged in problem behavior the DRO interval was reset until 10 min elapsed with no problem behavior, at which time the therapist returned the purse to Lucy and terminated the session.

John. A DRA treatment was developed for John. According to this schedule, problem behavior produced no social consequences and verbal requests for cookies produced access to a piece of cookie. Prior to each session, John was given 10 to 15 s access to cookies. The session began when the therapist removed the cookies from John and gave the first prompt for John to request a cookie. The therapist was instructed to interact with John in a typical manner through conversation, delivery of items (other than cookies), or engagement in typical daily activities. If John requested a cookie by saying the word “Cookie,” the therapist delivered the cookies for 10 to 15 s and then withdrew access to the cookies. Each time the cookies were removed, the therapist delivered another prompt for John to request a cookie. If John engaged in problem behavior simultaneously with a request for a cookie, the therapist did not deliver the cookies. If John did not receive a cookie for 2 consecutive min, the therapist delivered a prompt for John to request a cookie.
Results and Discussion

Lucy

Figure 11 displays the results from the first 10 min of each session during Lucy’s treatment assessment. The 4 data points under the first tangible baseline condition were taken from the last 4 sessions of SDA and served as a baseline against which to evaluate the effects of the treatment. During baseline, biting occurred at an average of 162 s per session. When treatment was implemented, a significant decrease in the duration of biting was observed, with an average of 7 s per session. During the second presentation of the tangible baseline condition, an increase in biting to an average of 120 s was observed. When treatment was re-implemented, the duration of biting again decreased to an average of 2.25 s per session. Although 7 direct-contact caregivers participated as therapists, there was no differentiation in the duration of biting as a result of different therapists.

John

Figure 12 illustrates the results from John’s treatment assessment. The 4 data points under the first tangible baseline condition were taken from the last 4 sessions of SDA and served as a baseline against which to evaluate the effects of treatment. During baseline, PAO was somewhat variable, averaging 5.75 occurrences per session (range, 3 to 7). Although 9 requests for cookies occurred the first baseline session, requests then decreased across sessions, eventually falling to zero occurrences during the fourth session (mean = 3
occurrences per session). Occurrences of PAO decreased following implementation of treatment to an average of 0.6 occurrences per session (range, 0 to 1). Cookie requests showed an increasing trend during the first treatment phase (mean = 2.2 occurrences per session; range = 1 to 4 occurrences per session).

During the second presentation of baseline, PAO remained stable around treatment levels until there was a considerable increase in the fifth baseline session. PAO remained at a high level for the remainder of the second baseline (mean = 4.14 occurrences per session; range, =1 to 9 occurrences per session). Cookie requests increased substantially during the first and third sessions of the second baseline (9 and 10 occurrences, respectively), suggesting a possible extinction burst (Goh & Iwata, 1994; Lerman & Iwata, 1995; Lerman, Iwata, & Wallace, 1999). Cookie requesting then stabilized at lower levels for the remainder of this phase (mean = 4.86 occurrences per session; range = 2 to 10 occurrences per session). During the final treatment condition, occurrences of PAO showed an immediate and substantial decrease (mean = 0.6 occurrences per session; range = 0 to 1). Cookie requests occurred at stable levels during this condition (mean = 4.6 occurrences per session; range = 4 to 5 occurrences per session).

Between the third and fourth session during the first treatment condition, John’s physician increased his psychotropic medication, Navane, from 15 mg to 20 mg. Data patterns were closely examined to detect if there were any
noticeable effects of this uncontrolled change, and no significant changes in either PAO or cookie requests were observed. If the increase in medication affected PAO, the effect was only slight and temporary, as evidenced by the substantial increase in PAO observed during the last three sessions of the second baseline.

Five direct-contact caregivers participated in both baseline and treatment sessions during John’s treatment assessment; however, one caregiver worked most frequently with John (this caregiver conducted 16 of the 21 sessions during the treatment assessment). No differentiation in the data was associated with the different therapists, suggesting that the use of different therapists did not present a challenge to the validity of the treatment assessment outcomes.
Figure 11. Lucy’s treatment assessment graph.
Figure 12. John’s treatment assessment graph.
CHAPTER 5

GENERAL DISCUSSION

Systematic and comprehensive assessment of the operant function of aberrant behavior is critical to the development of effective reinforcement-based treatment. Two common assessment approaches, descriptive assessments and analogue functional analyses, are associated with particular advantages and disadvantages. SDA incorporates aspects of descriptive assessment and analogue functional analysis procedures by controlling some potentially relevant features of antecedent conditions, while allowing natural consequences to occur. In an effort to overcome limitations of common functional assessment procedures, SDA focuses on the use of an assessment strategy that allows for variability—within limits—of events surrounding problem behavior. This variability increases the possibility of discovering idiosyncratic variables associated with problem behavior that may not be identified via functional analysis.

The purpose of the current study was to evaluate the utility of SDA to generate hypotheses regarding the operant function of problem behavior and to evaluate the effectiveness of treatment interventions based on these hypotheses. To complete this evaluation, three experiments were conducted: (1) analogue functional analysis, (2) SDA, and (3) treatment. SDAs were conducted following
inconclusive results of the analogue functional analyses. Treatment interventions were then developed and assessed to evaluate the validity of the outcomes of SDAs.

The results of Experiment 1 revealed undifferentiated functional analysis outcomes for both participants. The outcomes of SDA were highly differentiated for Lucy and supported a hypothesis that biting was maintained by positive reinforcement in the form of delivery of a tangible item (a purse). The conditional probabilities analyzed during Lucy’s SDA were consistent with this interpretation. For John, the results of SDA reveal PAO occurred throughout all conditions; however, the tangible condition consistently produced the highest mean frequency of problem behaviors and the highest percentage of sessions containing PAO. The conditional probabilities for John’s SDA supported these results by demonstrating that social consequences occurred most frequently in the tangible condition. Treatment interventions corresponding to the hypothesized operant function of problem behavior for both participants resulted in significant decreases in problem behavior. In addition, John’s treatment resulted in an increase in requesting when requests produced the same consequence hypothesized to maintain PAO. In summary, results from the current study suggest that SDA was an effective method for assessing the operant function of problem behavior and developing successful treatment interventions.
The current study replicates and extends the literature on functional assessment procedures in several ways. First, the results of the current study suggest that SDA can be a useful adjunct to or potential substitute for an analogue functional analysis. As with previous research on SDA (Anderson & Long, 2002; Freeman et al., 2000), the current outcomes indicate that SDA procedures can be effectively implemented by indigenous caregivers in natural environments. The use of familiar therapists and natural settings may increase the likelihood of the presentation of antecedent and subsequent conditions that are typical of those present when problem behavior occurs in the natural environment, thus potentially improving the “ecological” validity of the assessment (Gresham, Gansle, & Noell, 1993; see Smith, Vollmer, & St. Peter [in press] for a discussion of some variables affecting ecological validity).

However, even if caregivers can effectively implement the SDA procedures, a professional is necessary to oversee the implementation of the correct procedures and to manage and analyze the data. Substantial professional oversight is imperative to ensure the “ecological” validity of the assessment. Similarly, treatment interventions also were in the natural environment, and were implemented by the participants’ regular caregivers. This method of treatment implementation allows caregivers to participate actively in treatment development, implementation, and evaluation, potentially resulting in several benefits. First, caregivers may implement procedures with greater fidelity following direct coaching by experimenters during initial treatment evaluation.
Second, caregiver participation during early stages of treatment development may result in the development of procedures that are more acceptable to caregivers (Hawkins, 1991; Schwartz & Baer, 1991; Winett, Moore, & Anderson, 1991). Third, participation in treatment assessment permits caregivers an opportunity for direct observation of treatment effects, which also may contribute to acceptance of and compliance with treatment procedures (Hawkins, 1991; Schwartz & Baer, 1991; Winett et al., 1991). Fourth, assessing treatment interventions in natural environments may reduce problems associated with failure of treatment effects to generalize appropriately to other therapists and settings, relative to treatments evaluated under laboratory conditions.

Relatedly, the current SDA outcomes extended previous research on SDA by identifying variables (associated with both participants’ problem behavior) that remained unclear following functional analysis and basing treatment development on SDA, rather than functional analysis, outcomes. Results of the treatment evaluations demonstrated that interventions based on SDA outcomes produced orderly and substantial decreases in problem behavior (and corresponding increases in a functionally-equivalent alternative behavior for John). Whereas previous work had shown that SDA can produce outcomes that correspond with (Freeman et al., 2000) or complement (Anderson & Long, 2002) functional analysis, the current results indicate that SDA may be a useful substitute for functional analyses when results of functional analyses are undifferentiated or inconclusive. Future research is needed to determine whether
the SDA might be a useful alternative assessment when analogue functional analyses are not feasible to conduct and/or when treatments based on functional analysis results are ineffective. Thus, although the results are preliminary, the current study extends previous research by demonstrating that effective treatment interventions can be developed solely on the outcomes of SDA.

As with other functional assessment methods, there are limitations to SDA. An important difference between an analogue functional analysis and SDA is that analogue procedures insure a higher level of control of antecedent and consequent events. Although SDA prescribes some general categories of antecedent events, the frequency, timing, and precise nature of these events were, to some extent, uncontrolled. This lack of control may result in several problems when attempting to determine the operant function of problem behavior. First, if unprescribed antecedent events occur, the outcomes of the SDA may be invalidated. For example, if a therapist removes both attention (as prescribed) and a preferred item (not prescribed) during an attention session, it would be impossible to distinguish the effects of either action on problem behavior occurring subsequently. A second, and more critical concern, is that consequences may occur that do not correspond to the operant contingency being assessed in a given condition. For example, if problem behavior occurring during demand sessions produce attention rather than escape from the task, at least two interpretations would be reasonable. First, one could argue that the problem behavior was maintained by negative reinforcement (in the form of
escape from tasks) because it occurred in the context of the relevant motivating operation (presentation of task demands). Alternatively, the behavior may be maintained by positive reinforcement (in the form of attention), because it occurred in a context in which it resulted in attention from the caregiver.

It is possible to compensate—to some extent—for the increased degree of variability in the types of social and environmental events occurring during assessment. For example, more detailed analyses were conducted in the current study, as well as in other applications of SDA (Anderson & Long, 2002; Freeman et al., 2000) to further evaluate the relationship between environmental events and problem behavior. Mean intervals containing antecedent events across conditions were calculated to assess whether the therapists implemented the antecedent conditions as prescribed. Also, conditional probabilities were helpful in examining the proportion of social consequences that followed problem behavior within each SDA condition.

Some limitations of the current study include the inclusion of a small number of participants, the nature of the identified contingency for both participants, and type of setting in which the research was conducted. Because there were only 2 participants, the generalization of the findings may be limited. In addition, both participants’ problem behavior was maintained by a contingency of positive reinforcement in the form of tangible items. Additional research should be conducted to determine the utility of SDA across a larger number of participants whose problem behavior is maintained by a range of operant
contingencies. Also, assessments and treatment interventions for both participants were conducted in a large residential facility for adults with developmental disabilities, where several uncontrollable constraints limited the ability to conduct the assessments and intervention in a timely and orderly manner. For example, frequent unavailability of therapists (direct-contact caregivers) occurred as a result of caregiver turnover, shifts/patterns, or refusal to participate, resulting in cancellation of several sessions. In addition, the resulting use of multiple therapists necessitated training for each on session procedures as well as careful inspection of data to identify patterns in the data associated with particular caregivers. Also, other potentially relevant environmental events, such as changes in medications or daily routines, were not controlled. For example, a change was made in John’s psychotropic medication between the third and fourth sessions of his treatment assessment. Although inspection of the data did not indicate that this change affected John’s PAO, this and other uncontrolled changes in routines are common in large residential settings and illustrate the challenges of conducting systematic assessments in those environments. Regardless of the multiple constraints of the facility, SDAs from the current study identified variables associated with problem behavior for both participants; thus, suggesting characteristics of resilience and robustness.

Further investigation is needed to examine the general utility of SDA. First, the current procedures should be replicated across a range of participants, behavior problems, and maintaining variables, to determine if effective
treatments can be based on SDA results when functional analysis results are inconclusive. Positive results would suggest that SDA may be a viable adjunct to functional analysis procedures when those procedures do not produce useful information. Second, research showing a direct progression from SDA to treatment should be conducted in order to determine if SDA may function as a potential substitute for functional analyses. Such investigations may contribute to the validity of SDA as a primary method of assessing the function of problem behavior. In addition, even though SDA procedurally addresses the limitations of existing functional assessment methodology, research should also address the limitations of SDA. More specifically, various training methods should be evaluated to identify an effective method of training therapists to implement the prescribed antecedent events for each condition. Also, research should evaluate whether conditional probabilities are a necessary component for developing relevant hypotheses. One strategy for doing so would be to conduct multiple SDAs with different participants, analyze the conditional probabilities for those SDAs, and compare the consistency of outcomes across conditional probabilities and SDAs.

In conclusion, the results of the current study extend previous work of SDA by clarifying undifferentiated analogue functional analysis results and then using the results of SDA to develop effective treatments. The use of analogue functional analyses are recommended as the primary method of assessing the function of problem behavior because they allow for the greatest amount of
control and have been extensively empirically validated. However, if effective treatment interventions can be developed solely on the outcomes of SDA, then SDA may be an alternative method when analogue functional analyses are not practical or permissible. Although these results are preliminary, they, in combination with previous research (Anderson & Long, 2002; Freeman et al., 2000), suggest that SDA holds promise as an advance in the functional assessment of behavior disorders.
REFERENCES LIST


