FUNCTIONAL ANALYSIS OF LOW-RATE PROBLEM BEHAVIOR

By

NATALIE U. ROLIDER

A DISSERTATION PRESENTED TO THE GRADUATE SCHOOL
OF THE UNIVERSITY OF FLORIDA IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

UNIVERSITY OF FLORIDA

2007

To my parents, Amos and Ora

ACKNOWLEDGMENTS

I would like to thank all those who made this dissertation possible. Thanks to the graduate and undergraduate students who helped in the development and implementation of this study, especially Erin Camp, Jennifer Fritz, Jennifer Hammond, Brooke Jones, and Yanerys Leon. Thanks to my family for their love, advice, and unwavering support from across the miles. Thanks to my boyfriend, Gerard, for being my local family and providing constant encouragement. Thanks to my committee members, Drs. Scott Miller, Stephen Smith, and Timothy Vollmer for their cooperation and assistance. And finally, I extend a special thank you to my advisor, Dr. Brian Iwata, for his guidance, patience, and encouragement. His high standards have made this experience one of the most difficult and, at the same time, the most fulfilling of all.

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of the University of Florida in Partial Fulfillment of the
Requirements for the Degree of Doctor of Philosophy

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Natalie U. Rolider

August 2007

Chair: Brian Iwata
Major: Psychology

When problem behavior occurs infrequently during assessment, identification of its maintaining variables (via functional analysis) may by difficult or impossible. A strategy for altering standard functional analysis conditions was evaluated after initial assessment results yielded undifferentiated, low-rate responding. Several variables that may influence behavior were identified and systematically manipulated during modified functional analysis sessions: noncontingent attention and tangible items were delivered to peer confederates during sessions while the participant was ignored (combined establishing operations), consequences were delivered for longer durations (enhanced reinforcer characteristics), participants were given access to attention and preferred tangibles during the escape interval of demand conditions (combined contingencies), and all visible cues related to observation were removed from the alone condition (covert observation). An additional manipulation involved increased exposure to contingencies associated with each session by conducting longer sessions. Functional analysis conditions were conducted until differentiated rates of responding were observed in one or more of the modified conditions. Seven individuals participated in the study. Results for 3 participants showed that the modified conditions produced differentiation (i.e., higher rates of problem behavior in one or both of the social-reinforcement conditions). One participant began to engage

in high rates of self-injurious behavior during the covert alone condition. Results for the 3 remaining participants showed that increased exposure to standard functional analysis conditions produced higher rates of responding than standard-length sessions. The overall results suggested that this may be a viable model for the assessment of low-rate behavior.

CHAPTER 1
INTRODUCTION

The results of over 30 years of research on problem behavior such as aggression, property destruction, and self-injury have shown that these behaviors are learned responses. That is, variables responsible for the acquisition and maintenance of problem behavior are based on an individual's history of interaction with the social and physical environment in the form of reinforcement contingencies. Once these contingencies are identified, treatment can involve the modification of relevant antecedents and consequences to effect reductions in problem behavior.

In the context of behavior disorders, functional analysis methodology involves the identification of variables that influence the occurrence of problem behavior through the experimental manipulation of suspected maintaining contingencies. In a controlled environment, programmed antecedent and consequent events are varied to produce an empirical demonstration that behavior will occur in the presence of one contingency but not in its absence. A comprehensive model for concurrently assessing the sensitivity of problem behavior to positive, negative, and automatic reinforcement was first described by Iwata, Dorsey, Slifer, Bauman, and Richman (1982/1994). The utility of the procedures described by Iwata et al. has been demonstrated in hundreds of published studies and is considered the standard behavioral assessment methodology within the field of applied behavior analysis (Hanley, Iwata, & McCord, 2003).

A basic assumption of functional analysis methodology is that under optimal conditions of reinforcement, responding will occur at differential rates across conditions, thereby facilitating a conclusion of behavioral function. However, results of several large-scale studies have shown that differential functional analysis results are not always obtained. In their summary of 79 outpatient brief functional analyses, Derby et al., (1992) reported that 36.7% of individuals did

not display the target behavior during assessment. In a similar analysis conducted on a short-term inpatient program, it was reported that 9% of 152 clients (14 individuals) did not display the target behavior during the first 3 days of admission and were subsequently discharged from the clinic (Asmus et al., 2004).

The assessment and treatment of problem behavior that occurs infrequently or at very low rates poses a challenge for functional analysis methodologies (Iwata, 1994). When problem behavior occurs infrequently or sporadically during assessment, its determinants may be difficult to identify. Many factors can account for low-rate behavior during assessment, and a review of the literature generated six potential determinants of infrequent responding. Each of these factors is described below.

Response Class

In a response class hierarchy, different topographies of problem behavior that share a common effect on the environment occur in an escalating sequence (Lalli, Mace, Wohn, & Livezey, 1995). A particular topography of problem behavior may occur rarely if it is one of several members of a response class and is the least likely to occur. During functional analysis, the identification of maintaining variables for severe problem behavior may be limited if reinforcement is concurrently provided for less severe problem behavior (Harding et al., 2001; Richman, Wacker, Asmus, Casey, & Andelman, 1999), resulting in low or zero rates of severe problem behavior. Magee and Ellis (2000) demonstrated this pattern of responding with 2 participants who exhibited multiple topographies of problem behavior. When the authors provided consequences for multiple topographies of problem behavior in a functional analysis, they observed a single topography consistently in one test condition for each participant. When extinction was arranged for the most common response, a decrease in that response and concomitant increases in other responses were observed. Extinction was sequentially applied to

the other responses, and similar effects were observed. Thus, when an individual displays more than one topography of problem behavior, it may be necessary to provide consequences only for the most severe topography (and to arrange extinction for more common, less severe topographies) during functional analysis in order to increase the occurrence of an individual's most severe problem behavior.

Combined Establishing Operations

Typical functional analysis conditions involve the presentation of a single establishing operation (deprivation from attention) and the delivery of a corresponding consequence (attention) contingent on problem behavior. However, some problem behavior maintained by a given contingency may be occasioned only in the presence of more than one establishing operation. Mace, Page, Ivancic, and O'Brien (1986) described a functional analysis condition labeled "divided attention," in which the antecedent condition involved the therapist attending to another person in the room in addition to ignoring the participant. In this case, two establishing operations were present: the absence of attention and its delivery to someone else. The divided-attention condition was included in a functional analysis for 2 participants who engaged in aggression. Although both participants engaged in higher levels of aggression in other social-reinforcement test conditions, responding was higher in the divided-attention condition than in the play (control) condition, suggesting the utility of the combined establishing operation arrangement. In a subsequent study, Fisher, Kuhn, and Thompson (1998) compared levels of destructive behavior during standard-, divided-, and noncontingent-attention conditions with 1 participant and saw high levels of destructive behavior during the divided-attention condition, and near-zero rates of behavior in the standard- and noncontingent-attention conditions. These data suggest that low rates of problem behavior might be observed when it is occasioned by idiosyncratic stimulus conditions. An alternative circumstance of multiple establishing

operations was suggested by Ringdahl, Winborn, Andelman, and Kitsukawa (2002), who found that the presence of leisure items in the attention condition may suppress problem behavior maintained by attention. Thus, for some individuals the absence of attention may occasion problem behavior but only if alternative sources of reinforcement (e.g., toys) also are unavailable.

Similarly, problem behavior maintained by social negative reinforcement might only emerge when two or more establishing operations are concurrently present. For example, the presence of task demands and sleep deprivation (O'Reilly, 1995) or task demands coupled with an ear infection (O'Reilly, 1997) may occasion episodic problem behavior in some individuals. When it may be unethical to induce some of these events, it may be possible to wait for the occurrence of one establishing operation (a headache) before introducing the second establishing operation (task demands) during functional analysis conditions, although this may result in long delays between assessment sessions.

Reinforcer Characteristics

Some problem behavior may be maintained by an idiosyncratic quality of reinforcement, or by unusual consequences. When these consequences or their associated establishing operations are absent during a functional analysis, zero or low rates of problem behavior may be observed. Several studies have examined the effects of access to forms of attention other than verbal reprimands during a functional analysis (Fisher, Ninness, Piazza, & Owen-DeSchryver, 1996; Kodak, Northup, & Kelley, 2007; Piazza et al., 1999; Richman & Hagopian, 1999). For example, after an initial functional analysis resulted in low and sporadic occurrences of problem behavior for 2 participants, Richman and Hagopian conducted a second assessment that was based on direct observations of the participants' interactions with their caregivers. The second assessment consisted of comparing levels of problem behavior during a standard attention

condition (wherein brief reprimands were delivered contingent on problem behavior) to a condition in which a different type of attention (physical attention in the form of being picked up for one participant, and exaggerated high-pitched, dramatic statements about the problem behavior for the second participant) was delivered contingent on problem behavior. Results showed high and consistent levels of problem behavior in the modified-attention conditions, suggesting that these participants' problem behaviors were maintained by particular types of attention that were not included in their initial functional analysis.

It is possible that an increase in the magnitude of reinforcement (delivering more attention or allowing a longer escape interval) may facilitate the emergence of higher rates of problem behavior during a functional analysis, although no studies to date have specifically examined the use of larger magnitudes of reinforcement to clarify ambiguous functional analyses. Conducting an extended descriptive analysis (e.g., A-B-C data collection) might be necessary to identify potential reinforcers for problem behavior maintained by unusual consequences (compliance with the participant's mands [Bowman, Fisher, Thompson, & Piazza, 1997], access to self-restraint materials [Vollmer & Vorndran, 1998]).

Combined Contingencies

Unlike multiple control, in which problem behavior is maintained by two separate contingencies (aggression for either attention or escape), or control by multiple establishing operations, in which behavior maintained by a given contingency occurs only in the presence of more than one establishing operation, maintenance by combined contingencies occurs when problem behavior results in access to two different consequences at the same time (aggression during the demand condition produces both escape and access to positive reinforcement). In a recent attempt to arrange both positive and negative reinforcement contingencies within functional analysis conditions, Call, Wacker, Ringdahl, and Boelter (2005) exposed 1 participant

to a condition in which a therapist delivered a prompt at the beginning of the session to engage in a task and then ignored the participant except to deliver attention contingent upon problem behavior. A second participant was exposed to a condition in which a therapist prompted the participant to engage in tasks while a preferred leisure item was present but unavailable. The participant was given a 20-s break from work contingent on problem behavior, but access to the tangible item remained restricted throughout the session. Thus, although potential establishing operations for both negative reinforcement (a task demand situation) and positive reinforcement (attention or preferred items) were presented, only one of the associated consequences was delivered contingent on problem behavior (attention for the first participant; escape for the second), representing an incomplete analysis of combined contingencies.

Although not conducted in the context of a functional analysis, a study by Zarcone, Fisher, and Piazza (1996) showed that one participant's responding significantly increased when both negative and positive reinforcement contingencies (20 s break from work with access to preferred stimuli during the break) were in effect. These results suggest that the addition of an assessment condition in which problem behavior results in access to both positive and negative reinforcement simultaneously may occasion higher-rate responding in some individuals.

Covert Behavior

Covert problem behavior is behavior that occurs in the absence of social contingencies and that actually is suppressed by the presence of others. Typical test conditions for automatic reinforcement involve observing individuals while they are left "alone" in an austere environment and recording occurrences of problem behavior. Depending on the facility and resources available, observations are conducted from behind a partition or screen (Paisey & Whitney, 1989), through an observation window (Rapp, Miltenberger, Galensky, Ellingson, & Long, 1999), or via video monitoring (Long, Miltenberger, Ellingson, & Ott, 1999; Ringdahl et

al., 2002). The prevalence of covert behavior is unknown, mainly because many studies provide anecdotal reports on the covert nature of problem behavior but do not provide an empirical demonstration of such (Grace, Thompson, & Fisher, 1996; Maglieri, DeLeon, Rodriguez-Catter, & Sevin, 2000). Studies by Paisey and Whitney and by Ringdahl et al. are exceptions. Paisey and Whitney showed that an individual engaged in low levels of pica when an observer was in the room (even though the observer never interacted with the individual) but in much higher levels of pica when the observer was stationed in a closet. Ringdahl et al. showed that one individual's stereotypy did not occur when an adult was present in the room but did occur when the adult was absent. Thus, a functional analysis may result in low or zero rates of covert problem behavior when some feature of the test condition for automatic reinforcement is discriminative for the presence of others. It is possible that the assessment of covert behavior will necessitate conducting functional analysis alone sessions in settings that minimize the individuals' ability to discriminate the presence of observers.

Insufficient Exposure

Problem behavior may occur at low rates during functional analyses due to limited exposure to either an establishing operation or a reinforcement contingency. An example of this may be seen in the Derby et al. (1992) study that reported outcome data from a large number of brief functional analyses, which consisted of one, 5- or 10-min session of each test and control condition. The authors were unable to identify the function of problem behavior for 29 of 79 of participants because they never observed it during the assessment. It is unclear whether these findings were the direct result of insufficient exposure to assessment conditions, but subsequent analyses of the effects of repeated exposure to assessment contingencies (Kahng & Iwata, 1999) and of session duration (Wallace & Iwata, 1999) indicate that both may influence functional analysis outcomes. Of particular interest were three cumulative records from the Wallace and

Iwata study showing little or no responding during the first 5 min of a 15-min session. Although Wallace and Iwata did not examine session durations beyond 15 min, their data suggest that continued exposure to establishing operations and/or contingencies may be required to occasion some problem behavior.

A more extreme example of the effects of session duration was described by Kahng, Abt, and Schonbachler (2001). After an initial functional analysis (with 10-min sessions) resulted in zero instances of aggression, the authors extended the observation periods to 7 hours (9:00 AM – 4:00 PM) and conducted one functional analysis condition each day. The all-day assessment produced differentiated results in that increasing rates of aggression were observed in one condition (attention) only; however, this method may be limited in that lengthy sessions may be difficult to implement or may require imposition of severe deprivation from social interaction (e.g., during attention and ignore conditions).

Tarbox, Wallace, Tarbox, Landaburu, and Williams (2004) described an alternative procedure that was evaluated with 3 participants whose initial functional analysis resulted in low or zero rates of problem behavior. Functional analysis sessions were initiated when, during the course of daily activities, an episode of problem behavior was observed. During these sessions, moderate to high rates of problem behavior were observed in the attention and demand condition for 2 participants, and in the attention condition only for the third participant, while rates of problem behavior remained low during the control condition. Although this procedure involved a simple scheduling manipulation, it was unclear how much time and effort were required to conduct the low-rate assessment. That is, no information was provided on how much time passed or what was required to observe the participants prior to initiating the functional analysis. In addition, all 3 participants were exposed to relatively brief initial functional analyses (6 to 12, 5-

min sessions). It is possible that problem behavior eventually would have emerged had additional or longer sessions been conducted.

Purpose

The purpose of this study was to evaluate a strategy for altering functional analysis conditions when the results of an initial functional assessment yielded undifferentiated and low-rate responding. The modified assessment conditions were designed to account for the aforementioned determinants of low-rate behavior.

CHAPTER 2
METHOD

Participants and Setting

Seven individuals who attended either an adult vocational day program or a school for students with developmental disabilities participated. All participants were referred for the assessment and treatment of low frequency, high-intensity self-injurious behavior (SIB), aggression, or property destruction. Participant information is listed in Table 2-1. Sessions were conducted in therapy rooms at the day program or in a classroom at the school two to five times per day, 2 to 4 days per week.

Response Measurement and Interobserver Agreement

Target behaviors were operationally defined on an individual basis and are listed in Table 2-2. Trained observers recorded the occurrence in 10-s intervals (Jacob) or frequency (all other participants) of target and therapist behaviors using handheld or laptop computers. A second observer simultaneously and independently collected data during an average 43.7% (range, 30.7%-59.4%) of sessions for each participant. In comparing observers' records, agreement percentages for frequency data were calculated by first dividing session time into 10-s intervals. The smaller number of recorded responses in each interval was divided by the larger number; these fractions were averaged across the session and multiplied by 100% to yield the percentage agreement between two observers. Agreement percentages for occurrence data were calculated by dividing the number of intervals in which both observers scored the occurrence or nonoccurrence of responses by the total number of intervals in the session and multiplying by 100%. Mean percentage agreement across participants was 99.3% (range, 75%-100%) for the target behavior and 94.0% (range, 56.7%-100%) for therapist responses.

Procedures

Preference Assessment

Prior to the start of the study, a preference assessment was conducted to identify preferred edible and leisure items for use in the functional analysis. Items were presented either in all possible pairs (Fisher et al., 1992) or as a group (DeLeon & Iwata, 1996), and the participant was prompted to "select one." At least seven stimuli were assessed, and the participant was allowed brief access to all items prior to the assessment. The three highest-ranked items (i.e., the three stimuli approached on the highest percentage of trials) were selected for use in subsequent tangible, play, multiple Sr+, and Sr-/Sr+ conditions. Two moderate-to-low ranked items (i.e., the two items ranked fifth and sixth from the top of the hierarchy) were selected for use in subsequent attention conditions.

Standard (Initial) Functional Analysis

The initial functional analysis was conducted according to the procedures described by Iwata et al. (1982/1994), with the inclusion of a tangible condition, as well as condition-correlated stimuli (e.g., different therapists and settings, colored shirts; Conners et al., 2000) to enhance discrimination between different functional analysis conditions. Each condition was run at least six times, yielding approximately 30 sessions (Phyllis was an exception; her tangible and ignore conditions were not included until the second and third series of the functional analysis, respectively). Sessions were conducted in a room containing a table and chairs and relevant session materials (when applicable) as described below. All sessions in this phase were 10 min in length. The functional analysis conditions (alone or ignore, attention, tangible, demand, and play) were alternated in a multi-element experimental design.

Alone. The participant was alone in a room equipped with a one-way observation window through which data collectors observed the participant and recorded instances of the target

behavior. The participant did not have access to leisure items or social interaction. The purpose of this condition was to test for maintenance by automatic reinforcement. That is, if behavior persisted under conditions in which no social reinforcement contingencies were programmed and in which stimuli that may occasion escape-maintained behavior were absent, then evidence for behavior maintained by automatic reinforcement was provided. The alone condition was conducted with the participants for whom SIB was the only target behavior (Debbie and Jacob), and with Terrance, who was reported to engage in property destruction when unsupervised.

Ignore. The participant and a therapist were seated approximately 1 m from one another in a room. The participant did not have access to leisure items, and the therapist did not interact with the participant throughout the session. The purpose of this condition was similar to that of the alone condition, except the presence of the therapist was necessary for the occurrence of aggression. The ignore condition was conducted with the 3 participants who engaged in aggression (Phyllis, Glenn, and Becky) and with Tony, who had a history of engaging in property destruction (tearing paper and clothes) in his classroom. Note that paper materials were present in all conditions of the functional analysis conducted with Tony.

Attention. The participant and a therapist were seated approximately 1 m apart in a room that contained moderate-to-low preferred items from the preference assessment. The session began after the therapist instructed the participant to play with the toys while the therapist had work to do (i.e., was engaged with reading material). Contingent on each occurrence of the target behavior, the therapist delivered a brief statement of concern or disapproval (e.g., “Don’t do that, you’re going to hurt yourself”; “Don’t throw things, you might break them”) paired with brief physical contact (e.g., hand on arm or shoulder) and then resumed reading. The therapist ignored all other participant behaviors. The purpose of the attention condition was to test if the target

behavior was maintained by social positive reinforcement in the form of brief contingent attention delivered by the therapist.

Tangible. The participant and a therapist were seated in a room that contained highly preferred items from the preference assessment. The participant had free access to the preferred items for 2 min prior to the session, after which the therapist told the participant it was time to "put the toys away," removed the items, and began the session. The therapist delivered attention whenever solicited by the participant; however, questions or comments pertaining to the items were ignored. Contingent on each occurrence of the target behavior, the therapist delivered the items to the participant for 30 s and then removed them again. The therapist ignored all other participant behaviors. The purpose of this condition was to test if the target behavior was maintained by social positive reinforcement specifically in the form of contingent access to preferred items.

Demand. The participant and a therapist were seated at a table where instructional (e.g., academic, self-care, or domestic task) materials were present. The therapist presented instructional trials using a graduated, three-prompt sequence. The therapist delivered a verbal instruction initially and allowed the participant 5 s to initiate a response. If, after 5 s, the participant did not initiate the appropriate response, the therapist repeated the instruction, modeled the correct response, and waited an additional 5 s. If an incorrect or no response occurred, the therapist delivered the instruction a third time and physically guided the participant through the response, using the least amount of contact necessary to complete it. The therapist delivered praise contingent upon independent completion of a correct response (i.e., following the verbal or model prompt), and then initiated the next instructional trial. Contingent on each occurrence of the target behavior during the prompting sequence, the therapist terminated the

instructional trial, removed the instructional materials, and turned away from the participant for 30 s. At the end of the 30 s break, the therapist re-initiated the instructional trial (unless the participant was engaging in the target behavior, in which case the therapist waited until 3 s with no instances of the target behavior occurred before re-initiating the instructional trial). The purpose of the demand condition was to test whether the target behavior was maintained by social negative reinforcement in the form of escape from or avoidance of demand situations.

Play. The participant and the therapist were seated in a room that contained highly preferred items from the preference assessment. The participant had free access to the preferred items, the therapist delivered attention (i.e., praise) and brief physical contact at least once every 30 s, and no instructional demands were presented. All occurrences of the target behavior were ignored, and scheduled delivery of attention was delayed for 3 s following the occurrence of the target behavior. The play condition served as a control for the above test conditions. That is, the establishing operations (deprivation from attention or stimulation, or the presentation of instructional trials) for social and automatic reinforcement, as well as the contingencies for problem behavior, were eliminated or at least minimized in this condition.

Modified Functional Analysis

Participation in the modified functional analysis of the study required that the participant's standard functional analysis yield (a) zero or near-zero rates of responding across all conditions, or (b) isolated occurrences not indicative of any particular function. Glenn met these criteria; however, his aggression was of such high intensity that it was deemed unsafe to allow additional individuals (i.e., peer confederates) to participate in Glenn's sessions. Thus, Glenn did not participate in the modified functional analysis.

The test conditions of the functional analysis were modified to account for idiosyncratic variables that may affect responding. Specifically, establishing operations and reinforcement

contingencies were combined, and reinforcer characteristics were enhanced. All sessions in this phase were 10 minutes in length, and participants were exposed to at least three of the modified functional analysis conditions described below. The modified functional analysis conditions were alternated in a multi-element experimental design.

Multiple Sr+. The participant, therapist, and 1-3 peer confederates of the client were seated in a room that contained highly preferred items from the preference assessment. The participant had 3-5 min of pre-session exposure to attention from the therapist and confederates, as well as access to the items. At the start of the session, the therapist told the participant it was time for "the other kids to play," removed the items and delivered them to the confederates, and directed verbal and physical attention only to the confederates. Contingent on each occurrence of the target behavior, the therapist and confederates delivered 30 s of verbal and physical attention and access to the preferred items. At the end of the 30-s reinforcement interval, attention and the items were again removed and were delivered to the confederates. The therapist and confederates ignored all non-target participant behaviors, and the therapist blocked the participant's access to the items. The purpose of the this condition was to test if the target behavior would be occasioned by the unavailability of multiple positive reinforcers along with their delivery to others (combined establishing operations), and maintained by social positive reinforcement in the form of contingent access to various forms of attention and preferred items.

Sr-/Sr+. If the participant demonstrated high levels of compliance (i.e., 90% or above) in the initial functional analysis, new task demands were identified via direct observation or caregiver/teacher report. The participant and therapist were seated at a table where instructional (e.g., academic, self-care, or domestic task) materials were present, and 1-3 peer confederates were seated next to the participant and consumed the highly preferred items from the preference

assessment. The therapist presented instructional trials using the graduated, three-step prompt sequence (or a modified sequence based on direct observation or anecdotal reports). Compliance with instructional trials resulted in no programmed consequences, and the next instructional trial was initiated. Contingent on each occurrence of the target behavior during the prompting sequence, the therapist terminated the instructional trial and removed the instructional materials, and the therapist and confederates delivered 45 s of verbal and physical attention and access to the preferred items. At the end of the 45-s reinforcement interval, attention and the items were again removed and were delivered to the confederates, and instructional trials resumed. The purpose of the Sr-/Sr+ condition was to test if the target behavior was sensitive to the combined antecedent events of work and the unavailability of positive reinforcement and was maintained by social negative and positive reinforcement (combined contingencies in the form of escape plus access to attention and preferred items during break).

Modified alone. The participant was alone in a room that had no windows and was equipped with a hidden camera in lieu of an observation window. The participant did not have access to leisure items or social interaction. The purpose of this condition was to test for maintenance by automatic reinforcement in a setting that was less discriminative for the presence of others (i.e., no visual cues). The modified alone condition was intended for participants whose sole target behavior was SIB (Debbie and Jacob); however, Debbie's school could not accommodate a room equipped with a hidden camera, and a standard alone condition was conducted during her modified functional analysis.

Play. The play condition was conducted as described in the standard functional analysis (above).

Each condition of the modified functional analysis was conducted at least four times. Participants were exposed to one or both of the subsequent phases of the study if their modified functional analyses continued to yield (a) zero or near-zero rates of responding across all conditions, or (b) isolated occurrences not indicative of any particular function.

Standard Functional Analysis (30 min)

Standard functional analysis conditions were conducted as described above; however, all sessions were 30 min in length (Becky's standard functional analysis sessions consisted solely of consecutive 30-min demand sessions; see below for details). An undifferentiated (i.e., low-rate) pattern of responding as described above resulted in participation in the subsequent phase of the study.

Modified Functional Analysis (30 min)

Modified functional analysis conditions were conducted as described above; however, all sessions were 30 min in length. Becky was the only participant exposed to these procedures, which were conducted immediately following her modified functional analysis (10 min sessions). The order of phases was reversed for Becky because hers was the first functional analysis that was conducted, and the most of efficient order of conditions was not established at the time.

Table 2-1. Participant characteristics.

Participant	Age	Diagnosis	Target behaviors
Phyllis	48	Moderate MR, seizure disorder	Aggression (hair pulling)
Debbie	16	Moderate-severe MR, autism	SIB (face slapping, head banging, hair pulling)
Terrance	12	MR, autism, seizure disorder	Property destruction (object/surface banging, throwing items)
Jacob	20	MR, Prader-Willi Syndrome	SIB (skin picking)
Tony	21	Profound MR, Angelman Syndrome	Property destruction (tearing or throwing items)
Glenn	32	Moderate MR	SIB (face slapping, body hitting), aggression (hitting)
Becky	23	Mild MR, Prader-Willi Syndrome	Aggression (hitting, biting)

Table 2-2. Response topographies.

Behavior	Definition
SIB	
Body hitting	Contact between hand and chest from a distance of 6 inches or greater.
Face slapping	Contact between hand and face or head from a distance of 6 inches or greater.
Hair pulling	Fingers intertwined in hair, grabbing or pulling hair.
Head banging	Contact of head on a hard surface from a distance of 3 inches or greater.
Skin picking	Contact between fingernail and skin.
Aggression	
Biting others	Closure of upper and lower teeth on any part of another person's body.
Hair pulling	Fingers intertwined in another person's hair, pulling on hair.
Hitting others	Audible contact between participant's hand and another person.
Property destruction	
Object/surface banging	Contact between participant's hand or foot and wall or objects from a distance of 6 inches or greater.
Tearing items	Tearing of paper or clothing for at least 1/2 inch.
Throwing items	Thrown items land 6 inches or more from their original position.

CHAPTER 3
RESULTS

Figure 3-1 shows the results of the standard and modified functional analyses for Phyllis, Debbie, Terrance, and Jacob. All participants engaged in zero or near-zero rates of problem behavior across all conditions of the original (standard) functional analysis. When the functional analysis conditions were modified, Phyllis's aggression, although occurring at low rates, was observed during 5 of the 7 multiple Sr+ sessions. Thus, data indicated that her aggression was maintained by social positive reinforcement in the form of access to both attention and preferred activities in situations where those reinforcers were being delivered to others. During Debbie's modified functional analysis, increased rates of SIB were observed in the Sr-/Sr+ condition, no SIB was observed in the multiple Sr+ condition, and rare occurrences of SIB were observed in the alone and play conditions. These results indicated that Debbie's SIB was occasioned by work situations in which problem behavior produced access to attention and preferred items (Sr+) during breaks from tasks (Sr-). During Terrance's modified functional analysis, increased rates of property destruction were observed in the multiple Sr+ condition, with lower rates of property destruction in the Sr-/Sr+ and play conditions. These results were verified during a subsequent pairwise comparison, in which Terrance engaged in increasing rates of property destruction during the multiple Sr+ condition and near-zero responses during the play condition, indicating that his problem behavior was maintained by social positive reinforcement in the form of access to both attention and preferred activities in situations when others are provided access to those reinforcers. Finally, Jacob's SIB was observed only in the alone condition of the modified functional analysis; no instances of SIB were observed during the multiple Sr+, Sr-/Sr+, or play conditions. These results indicated that Jacob's SIB was maintained by automatic reinforcement,

and that a more covert setting than that typically used to conduct alone sessions occasioned responding.

Figure 3-2 shows results obtained for Tony, Glenn, and Becky. Tony engaged in zero or near-zero instances of property destruction during both the standard and modified functional analyses. However, when standard functional analysis sessions were lengthened to 30 min, high rates of property destruction were observed in the demand condition, whereas zero or rare occurrences of property destruction were observed in all other conditions. These results indicated that Tony's property destruction was maintained by social negative reinforcement in the form of breaks from tasks. However, an increase in session length was required to clarify the function of Tony's property destruction. Glenn did not engage in any occurrences of aggression or SIB during the standard functional analysis when sessions were 10 min in length. Sessions that were 30 min in length, however, resulted in increased rates of aggression and SIB during the demand condition, indicating that Glenn's problem behavior was maintained by social negative reinforcement in the form of breaks from tasks. Becky engaged in aggression in 2 of 6 tangible sessions during the standard functional analysis; however, these low and sporadic rates did not seem indicative of a clear function. Becky's aggression did not increase during the modified functional analysis when sessions were 10 min in length. Modified functional analysis sessions that were 30 min in length, however, resulted in increased rates of aggression during the multiple Sr+ and Sr-/Sr+ conditions. To clarify whether these increased rates of aggression resulted from session modification versus increased session length (both of which occurred during this phase), we conducted consecutive 30-min standard demand sessions. Results of this phase showed that Becky's aggression maintained when her exposure to standard conditions was lengthened and

suggest that the apparent cause of Becky's initial functional analysis phases was lack of exposure to functional analysis sessions.

Within-session patterns of responding were examined for the functional analyses that were clarified following increased exposure to session contingencies. Figure 3-3 shows the cumulative frequency of target behaviors during the first 30-min session in which problem behavior was observed for Tony, Glenn, and Becky (sessions 60, 33, and 49, respectively). The arrow below the x-axis points to where a 10-min session would have been terminated. These data show that Tony and Glenn began to engage in their target behaviors only after the 10th min of the session (Tony at min 13, Glenn at min 27). Becky engaged in a few responses between minutes 7 and 10, and then showed a steady rate of responding throughout the rest of the session. For all 3 participants, had the session been terminated after 10 min, little (Becky) or no (Tony and Glenn) responding would have been observed.

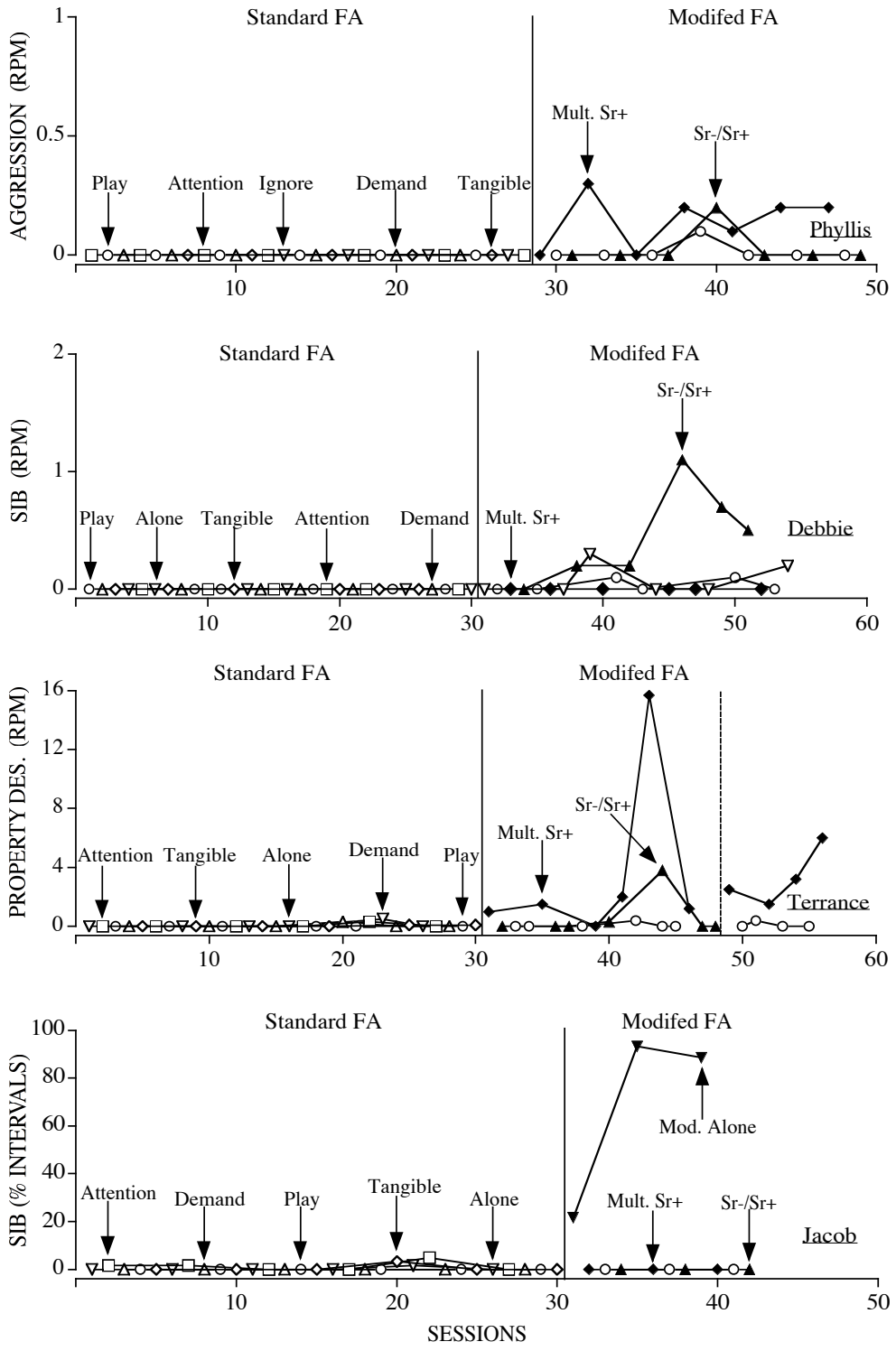

Figure 3-1. Levels of problem behavior during standard and modified functional analysis conditions for Phyllis, Debbie, Terrance, and Jacob.

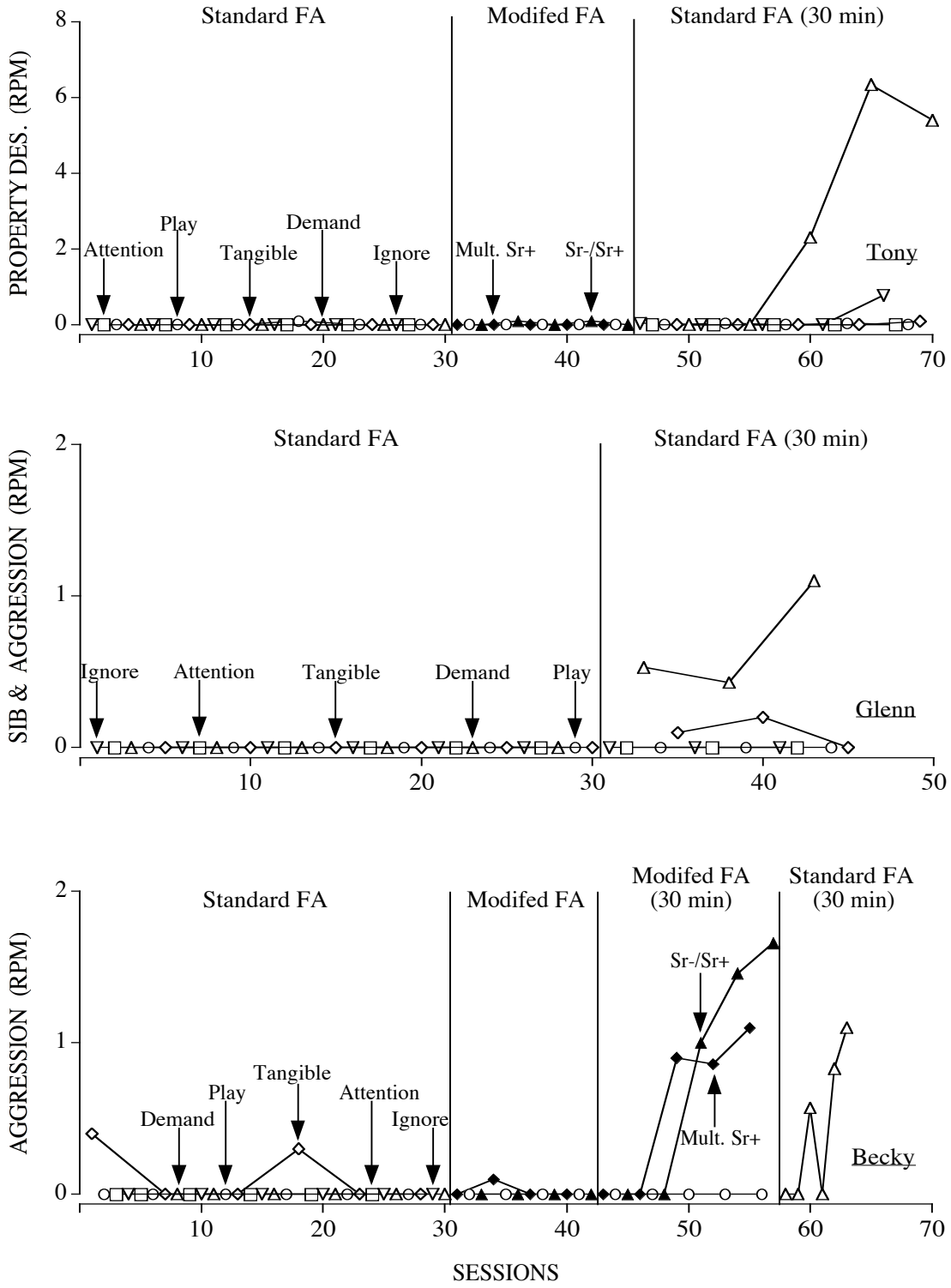

Figure 3-2. Levels of problem behavior during standard and modified functional analysis conditions for Tony, Glenn, and Becky.

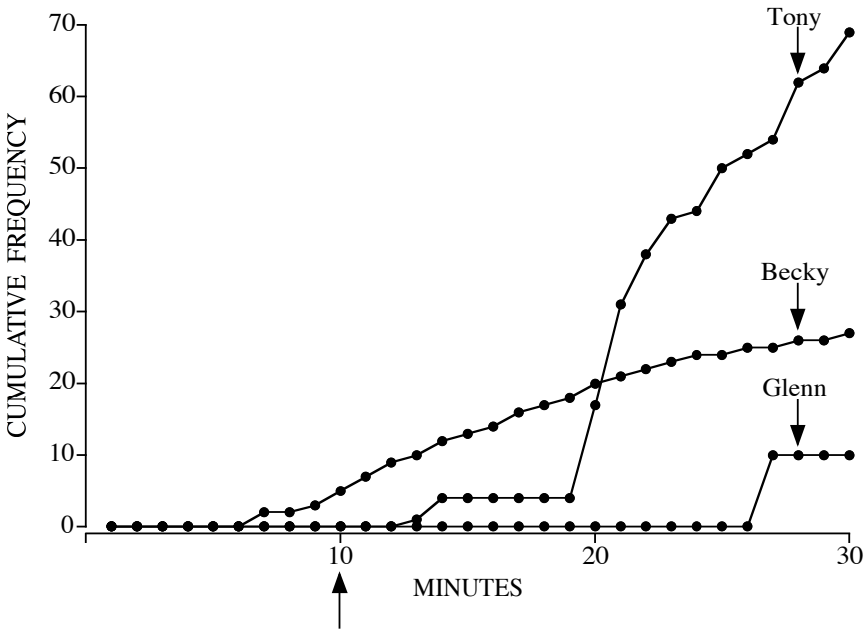

Figure 3-3. Cumulative frequency of target behaviors during the first 30-min session with problem behavior.

CHAPTER 4
DISCUSSION

Problem behavior occurs infrequently because the conditions that influence it are unusual, and several possibilities that might account for such findings have been reported in isolated studies. Through an analysis of unusual assessment findings, we identified several determinants of low-rate responding and constructed functional analysis conditions that accommodated them. The general model was evaluated with 7 individuals who engaged in low-rate, high-intensity behavior and whose initial assessments resulted in very little or no responding. These "low-rate" functional analyses accounted for approximately 12% of all functional analyses that were conducted over an 18 month-period. Modified functional analysis conditions that involved multiple establishing operations, enhanced reinforcer characteristics, and combined contingencies clarified three assessments, and increased exposure to session contingencies clarified three other assessments. A condition that involved an unobtrusive observation strategy for covert behavior clarified the final participant's assessment. These results provided a further demonstration of the versatility of experimental approaches to behavioral assessment. When it is suspected that unusual events or combinations of events influence behavior, that possibility may be tested and verified directly.

Results of the initial functional analysis resembled those reported in several studies showing that, in some cases, typical functional analysis conditions may not identify the environmental determinants of problem behavior. One possibility that may account for such results is that behavior is maintained by commonly observed reinforcing consequences such as attention or escape but that these consequences are delivered infrequently. This account is unlikely, however, because programmed consequences are delivered under dense schedules in typical functional analyses.

Another possibility is that problem behavior occurs at zero or low rates due to a lack of discrimination between the different test or control conditions (Conners et al., 2000). However, a discrimination failure was unlikely in the present study given that stimulus controls (i.e., distinctive visual cues) specifically designed to minimize interaction effects were included in all assessment conditions.

A third possibility is that occurrences of the target behavior may be infrequent if other behaviors are members of the same response class and also are reinforced during assessment (Harding et al., 2001). The effects of minimizing the number of response topographies in the contingency class were not explicitly demonstrated in the present study. That is, contingencies during the initial functional analysis were placed only on the target behaviors for which the participants were referred, thereby obviating our ability to examine changes in responding due to extinction of less-severe members of a response class during the modified conditions. However, our participants were referred for the assessment and treatment of severe problem behaviors, and even when contingencies during standard conditions were limited to those responses, target behaviors were rarely or never observed.

Fourth, problem behavior may occur infrequently during assessment if the antecedent or consequent events are insufficient to evoke or reinforce behavior, respectively. That is, the antecedent events typically manipulated in a functional analysis (i.e., low levels of attention, presentation of instructions) may constitute neutral events for some individuals. We attempted to increase the potency of antecedent influences on behavior maintained by positive reinforcement by arranging a condition wherein multiple positive reinforcers were unavailable but were delivered to others; the delivery of these reinforcers for a longer period of time following problem behavior strengthened the potency of consequent events. Although not evaluated in

isolation, the specific contribution of this manipulation may be seen in Phyllis's and Terrance's data, which showed that their respective target behaviors increased noticeably only during the multiple Sr+ condition of the modified functional analysis. Similarly, the negative reinforcement contingency could have been strengthened by increasing the duration of the escape interval. Rather than enhancing the duration of escape, however, we chose to enhance the quality of escape by providing free access to attention and highly preferred leisure items during contingent breaks from instruction, and the effects of this modification can be seen in Debbie's data, which showed an increase in responding only during the Sr+/Sr- condition of the modified functional analysis.

In a functional analysis of covert problem behavior, the target response will occur infrequently (or not at all) when assessment conditions are associated with stimuli that are discriminative for the presence of others. This may include the test condition for automatic reinforcement if some feature of the alone setting, such as the presence of an observer or even just an observation window, permits an individual to detect the presence of observers. In Jacob's modified functional analysis, the test condition for automatic reinforcement was conducted in a setting that considerably minimized this possibility, and high rates of problem behavior were observed in that condition only. Although not replicated with other participants, these results suggest that sophisticated methods of unobtrusive observation may be necessary to verify the covert nature of some behaviors.

Finally, limited exposure to session contingencies may account for low rates of problem behavior during assessment. Our results showed that extending the duration of functional analysis sessions to 30 min (in contrast to approximately 7 hours in the Kahng et al., 2001 study) was sufficient to produce differential increases in problem behavior in three cases. Given that

increased exposure was found to be an important determinant of low-rate behavior, a question that arises is whether simply continuing standard functional analysis sessions eventually would have produced differential responding. In other words, an inherent feature of the modified conditions was increased exposure to assessment. However, the standard functional analysis conditions were continued for an extended run with little or no responding, so it is unlikely that relatively quick changes observed under modified conditions were simply a function of running more sessions. Increased session duration also involved additional exposure to functional analysis contingencies; however, the within-session analysis of responding indicated that longer sessions and not simply more sessions were necessary to strengthen the establishing operations associated with the different conditions.

Some limitations of the present analysis should be noted. First, although we concluded that Becky's low-rate responding in her initial assessment was due to lack of exposure to functional analysis sessions, her modified analysis only included an evaluation of behavior under 30-min (standard) demand conditions. A more definitive conclusion regarding the determinants of Becky's behavior may have been obtained had a full set of 30-min standard conditions been conducted.

Second, the participation of peer confederates in functional analysis sessions may not be appropriate when high-intensity aggression may occur during the assessment, as was the case with Glenn. The decision to exclude peers from assessment sessions should be made by considering whether their presence places them at risk for undue harm. If this is the case, it may be possible to examine only the effects of increased exposure to standard conditions. Alternatively, the possibility of including non-peer confederates may be explored. For example, therapists trained in maintaining their own and others' safety when dealing with aggressive

clients may assume the role of confederates. Future studies may explore the effects of including pseudo versus actual peers as confederates during modified functional analysis sessions.

The overall results of the present study raise questions about the general implementation of functional analysis methodology. That is, one implication of these results is that functional analysis procedures should include the modified conditions at the outset. Such a strategy does not seem advisable for two reasons. First, results reported in a large number of studies indicate that simple contingencies often account for problem behavior; therefore, the inclusion of additional conditions during the initial assessment may further complicate the process unnecessarily. Second, some of the modified conditions contained confounded variables whose separate influences would later need to be identified. For example, if high levels of problem behavior were observed in the both of the social reinforcement conditions (multiple Sr+ and Sr-/Sr+), a subsequent test would be required to determine which of the two variables (positive or negative reinforcement) was responsible for the observed effect. Thus, the modified conditions described in the present study seem appropriate under special circumstances (i.e., following the completion of a functional analysis that rules out typical influences and results in infrequent responding).

Finally, our procedures did not account for all possible determinants of low-rate responding. For example, our analysis did not include procedures for assessing combined establishing operations such as the presence of an environmental event along with a biological one (O'Reilly, 1995, 1997), which may require delaying the occurrence of one establishing operation (e.g., presentation of task demands) until the second establishing operation (e.g., a headache) is present. In addition, our analysis did not include situations that involved highly specific consequences (e.g., attention delivered by a specific caregiver [Ringdahl & Sellers,

2002], escape from activities only when a particular alternative activity is made available, etc.), which may be useful to explore if the present procedures do not produce an increase low-rate behavior. Future research may be helpful in documenting these influences and demonstrating how they may be operationalized for the purposes of assessment.

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BIOGRAPHICAL SKETCH

Natalie Rolider received her Bachelor of Arts in Psychology in 2002 from Emek Yezreel College in Israel. After completing an introductory course in applied behavior analysis, she began serving as a therapist for home-based early intervention programs for young children with autism and assisting in conducting parent-training seminars. Those experiences led her to seek further training in behavior analysis, and so she accepted the position offered to her by the Psychology Department at the University of Florida (UF) to study under the supervision of Dr. Brian Iwata. While at UF, Natalie had the opportunity to conduct clinical research with individuals with developmental disabilities at various laboratory sites: an adult vocational program, a residential program for individuals with Prader-Willi Syndrome, an outpatient clinic for children diagnosed with autism, and a special education school. Following graduation, Natalie intends to pursue an academic career in applied behavior analysis, with emphasis on the identification and use of reinforcers to increase adaptive behavior and the assessment and treatment of problem behavior.