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The Functional Analysis of Problematic Verbal Behavior

Christopher B. Ewing, Sandy K. Magee, and Janet Ellis
University of North Texas

This study describes procedures and outcomes in a functional analysis of problem behavior of 2 public school students. For a 13-year-old honors student, bizarre tacts (labeled as psychotic speech by school staff) were maintained by attention. For a 15-year-old with autism, the functional analysis revealed that perseverative mands for toileting were controlled by attention; mands for edible items were controlled by access to any food item; and mands for nonedible items were maintained by access to the specific item manded. The "problematic" aspects of the verbal behavior differed—the bizarre speech was problematic based on its content, but the perseverative verbalizations resulted in high response cost for classroom staff. Research in the area of problematic verbal behavior is sparse and warrants further attention from behavior analysts who work in public school settings. This research demonstrates the applicability and relevance of functionally analyzing problematic verbal behavior in public school settings.

Verbal responses that concern or trouble listeners are variously labeled as perseverative (i.e., repetitive or stereotyped words or phrases), delusional (obviously false statements), psychotic (words or phrases unrelated to ongoing environmental events), hallucinatory (verbal responses to unobservable stimuli), and echolalic (persistent repetitions of words or phrases of others). These labels are included in diagnostic criteria for schizophrenia, autistic disorder (American Psychiatric Association, 2001), and various other conditions involving problematic verbal responses. Historically, such behaviors have been considered symptoms of an underlying disorder that must be identified and treated rather than directly addressing the bizarre speech as the presenting problem. By contrast, behavior analysts have viewed the verbal behavior itself as the problem to be described in empirical terms and analyzed as such. Behavior-analytic research has moved toward the goal of analyzing many types of verbalizations as operant behavior with identifiable antecedent and consequent variables accounting for its occurrence.

For example, Ayllon and Michael (1959) demonstrated that withholding attention reduced the relative frequency of psychotic talk in a patient diagnosed with schizophrenia. Ullman et al. (1965) proposed that psychotic and delusional verbalizations could be maintained by external variables including social stimuli. An experimental analysis conducted by Bartlett, Ora, Brown, and Butler (1971) showed the psychotic speech of an individual with autism to be under the control of specific environmental consequences such as tokens. On the other hand, Lovaas, Varni, and Lorsch (1977) suggested that psychotic and delusional verbalizations may be maintained independent of external reinforcing stimuli—the emission of the verbalization itself may automatically provide the maintaining variable (i.e., self-stimulation). Consistent with all of these views, Layng and Andronis (1984) described bizarre verbalizations as "successful operants" and emphasized the "con-

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Correspondence concerning this article should be addressed to Janet Ellis, Department of Behavior Analysis, P.O. Box 310919, University of North Texas, Denton, Texas 76203-0919 (e-mail: ellis@scs.cmm.unt.edu).

sequential governance of these clinically important classes of behavior" (p. 139).

Within this research milieu, Iwata, Dorsey, Slifer, Bauman, and Richman (1982/1994) introduced the functional analysis procedure, which they defined as "an operant methodology [used] to assess functional relationships between self-injury and specific environmental events" (p. 197). This method employs four experimental conditions (i.e., alone, attention, play, and demand) arranged to be analogous to the natural environment and to allow the isolated delivery of specific categories of consequences under delineated antecedent conditions. In the alone condition, no social interaction occurs and, therefore, there are no contingent sources of social reinforcement for target behavior. This condition tests for automatically produced consequences (as in self-stimulation). In the attention condition, the client has access to recreation materials and attention is delivered (in the form of social disapproval) contingent only on the occurrence of target responses. The attention condition is designed to assess sensitivity of target behavior to attention as a reinforcing consequence. In the play condition, attention is available noncontingently and no demands are placed on the participant. There are no explicit consequences for target occurrences, and this condition is a control for the other conditions. In the demand condition, the participant is instructed to engage in a specific task, and contingent on each occurrence of a target response instructional demands are terminated for a predetermined time period. This condition assesses sensitivity of target behavior to escape as a reinforcing consequence. These conditions are alternated in a multielement design, and the rate of occurrence of target behavior is examined across conditions.

Functional analysis methods have been widely implemented according to Neef (1994). Researchers have indicated that functional analysis methodology has had a strong influence on the discipline of applied behavior analysis (Mace, Lalli, & Pinter, 1991; Wacker et al., 1994). This analytic tool has implications not only for the analysis of self-injury and other types of nonverbal behavior but also for verbal behavior. Yet research reporting the functional analysis of reinforcement contingencies that maintain various types of verbalizations remains relatively rare.

Mace, Webb, Sharkey, Matson, and Rosen (1988) first applied functional analysis methodology to analyze bizarre speech and its possible maintaining contingencies. Mace et al. measured the rate of bizarre vocalizations across three functional analysis conditions and found these vocalizations to be maintained by escape from task demands and attention. Similarly, Mace and Lalli (1991) recorded the percentage of intervals with aberrant speech in four functional analysis conditions. in the first condition, no demand–social disapproval, the experimenters provided attention in the form of a disapproving comment contingent upon bizarre vocalizations. This condition was designed to determine the effects of attention on the occurrence of bizarre vocalizations. In the second condition, no demand–interaction, experimenters ignored all bizarre vocalizations while providing noncontingent attention. This condition was designed to function as a control condition for all experimental conditions. In the third condition, task disengagement, the participant was engaged in a household task, and contingent on bizarre vocal responses the experimenters discontinued task instructions and allowed 30 s of escape. This condition assessed the effects of escape on bizarre vocalizations. In the fourth condition, task–social disapproval plus disengagement, the experimenters made a disapproving comment and discontinued the task contingent on bizarre vocalizations. This condition permitted comparisons between the other experimental conditions. Because the percentage of bizarre vocalizations was highest in the no demand–social disapproval condi-

tion, these authors concluded that the participant's bizarre speech occurred as a function of the attention this behavior evoked. Finally, Wilder, Masuda, O'Connor, and Baham (2001) analyzed verbal behavior using the four functional analysis analogue conditions. Results indicated that the bizarre verbal behavior emitted by an adult with schizophrenia occurred almost exclusively during the attention condition, indicating that the behavior was maintained by social positive reinforcement.

Drash and Tudor (1991) call for a standard methodology to analyze contingencies that support verbal behavior. The present study extends the body of behavior-analytic research using functional analysis as a tool to analyze verbal behavior. Specifically, functional analyses were implemented to identify the contingencies maintaining the inappropriate verbalizations of 2 school-aged participants. At the request of their school district administrators, the analyses focused on the apparently delusional comments of 1 participant and on the high-rate repetitive requests of the other participant.

Table 1

Examples of Danny's bizarre verbalizations.

"I am a half-human-half-elf with supernatural powers."
"My father is Satan."
"My purpose for being born is to save the world from both chaos and order."
"I have created my own religion and am recruiting converts."
"As a half-elf it is in my nature to lie, to hate humans and Christianity, and to be lazy."
"I have lived over a thousand lives and my soul is hundreds of thousands of years old, yet past memories are just becoming clear to me."
"I could set your car on fire by casting a spell and have it burn up with both of us in it, and you would die but I would be untouched."
"My destiny is to find my one true love whom I met in a past life, to marry her and have a son who would be the second coming of Jesus Christ—only this time He would choose chaos instead of order."

STUDY 1: DANNY

Method

Participant and setting. Danny, a 13-year-old boy in honors classes with a WISC IQ of 140, engaged in bizarre (labeled by teaching staff as "psychotic") verbal behavior when he interacted with both classroom teachers and peers. Functional analysis sessions were conducted at his school in a classroom containing tables, chairs, desks, and materials (academic worksheets, textbooks, paper and pencils) necessary to conduct the functional analysis conditions.

Description of responses. Danny's target behavior was defined by the experimenter as bizarre speech: verbal vocalizations with content related to imaginary objects, persons, or events (Table 1). Observations made by the experimenter before the functional analysis suggested that Danny's statements always occurred in the presence of another person including, but not limited to, a schoolmate, school psychologist, school principal, vice-principal, or counselor.

Functional analysis data collection and interobserver agreement. Data were collected on customized data sheets using 10-s partial-interval recording. Occurrences of programmed antecedent events, target behavior, and the scheduled delivery of consequences were recorded in the 10-s interval in which each occurred. For Danny, two independent observers simultaneously recorded data during sessions. Data were collected over 90% of Danny's sessions and averaged 92% (range, 85% to 98%). Agreement was computed by dividing the number of exact agreements by the number of agreements plus disagreements and multiplying by 100%.

Procedure. Three daily 30-min sessions were conducted on alternating days during 2 school weeks, yielding 15 total sessions. Sessions were extended from the more typical 10- to 15-min sessions because observations before the functional analysis indicated that the target behavior occurred rather infrequently in the natural environment. A different therapist conducted each condition. All conditions were implemented in an unused classroom while Danny was seated at a regular classroom desk. An alone condition was not conducted, because casual observations had indicated that Danny did not engage in the target behavior when no one else was present. Attention, play, and demand conditions each included academic tasks from actual classroom assignments. These tasks were included to provide consistency across conditions for purposes of comparison as well as to create antecedent conditions more analogous to those in the natural environment (i.e., classroom).

Prior to each condition, Danny was instructed to work on the tasks placed on the desk. During the attention condition, the therapist ignored the student while he worked but made brief neutral statements in response to occurrences of target behavior (e.g., "oh," "okay," "really?"). During play sessions, the therapist made the same kind of statements noncontingently to Danny approximately once every 30 s. During the demand condition, the therapist ignored Danny while he worked on the aforementioned tasks but said, "Take a break," following each occurrence of target behavior. The breaks constituted the escape period and lasted for 30 s, at which point Danny was redirected to the academic tasks.

Results

Functional analysis. Results of Danny's functional analysis are shown in Figure 1. His bizarre speech occurred in all three conditions; however, percentage of intervals during which target behavior occurred was highest in the attention condition across all sessions. These data suggest that Danny's bizarre speech was maintained primarily by social positive reinforcement.

Treatment implications. The functional analysis outcomes have important treatment implications for the school professionals who interact with Danny. For example, during his school day his classroom teachers typically responded by verbally reprimanding instances of his "psychotic speech," and school psychologists and counselors engaged him in lengthy talk therapy sessions. The functional analysis findings indicated that Danny's verbal behavior was maintained by attention, suggesting that talk therapy and reprimands functioned as reinforcers and, therefore, were contraindicated as a means of changing the problem behavior. Several treatment protocols exist for problem behavior maintained by social positive reinforcement. These include noncontingent (response independent or time based) attention delivery, attention extinction (withholding or terminating attention delivery following the target behavior), differential reinforcement of other behavior (attention delivery contingent on the absence of the target behavior for a predetermined amount of time), and differential reinforcement of alternative behavior (attention delivery following the occurrence of an alternative target behavior). Each of these procedures functionally weakens or eliminates the contingent relation between the target response and the delivery of attention. Attention extinction, however, should be used in combination with one of the other procedures that deliver attention for appropriate behavior (Cooper, Heron, & Heward, 1987).

STUDY 2: ALICE

Method

Participant and setting. Alice, a 15-year-old girl who had been diagnosed with autism and moderate mental retardation, engaged in high rates of re-

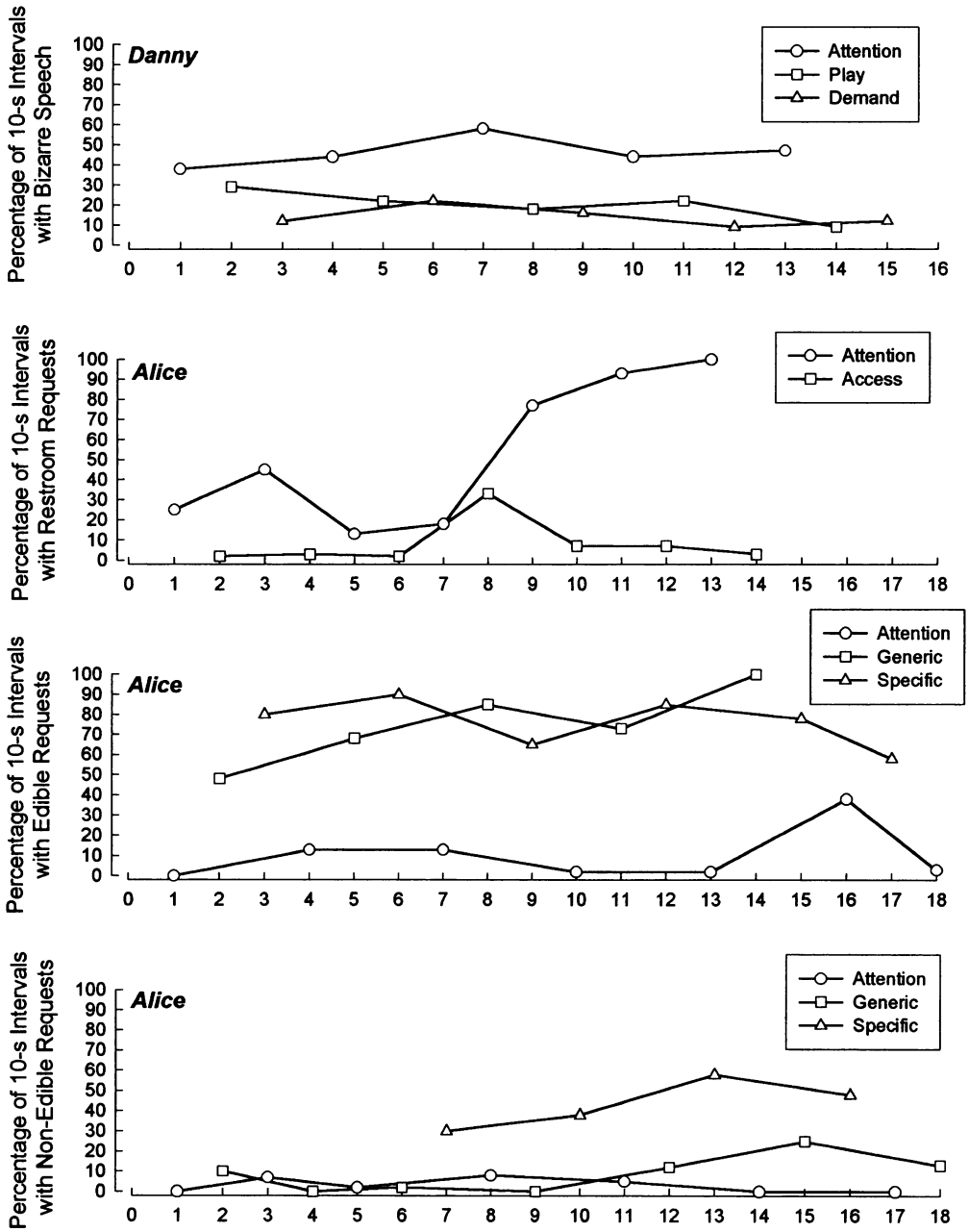

Fig. 1. Functional analysis results for Danny and Alice.

petitive, contextually inappropriate verbal demands made to all of the classroom teaching staff. Functional analysis sessions were conducted in her school classroom. The room contained tables, chairs, desks, and materials (i.e., edible snack items, children's books, and audiotapes) necessary to conduct the functional analysis conditions.

Description of responses. Her target behaviors were high-rate contextually inappropriate verbalizations, defined by the experimenter as repeated re-

quests for an item or activity immediately following access to that item or activity. Her specific mands targeted for the functional analysis included restroom requests defined as manding " I want to go potty," "I want to go poop," "Potty, potty, potty!"; edible item requests defined as "Goldfish®" or "Skittles®"; requests for nonedible items defined as "Annie®" or "Barney®" (audiotape-recorded stories) and "Three Bears" or "Three Kittens" (books that were read to her). These mands were yelled or spoken so loudly and at such high rates that they interfered with her training programs and distracted other students in the classroom.

Functional analysis data collection and interobserver agreement. Data were collected on customized data sheets using 10-s partial-interval recording. Occurrence of programmed antecedent events, target behavior, and the scheduled delivery of consequences were recorded in the 10-s interval in which each occurred. Data were collected during 50% of Alice's sessions. Alice's sessions were videotaped, and two independent observers scored the tapes. Agreement averaged 97% (range, 88% to 100%) and was computed by dividing the number of exact agreements by the number of agreements plus disagreements and multiplying by 100%.

Procedure. Functional analysis procedures involved eight daily 15-min sessions conducted on alternating days (except that 10 sessions were conducted on the final day) during 2 school weeks, yielding 50 total sessions. All conditions were conducted once in the morning and once in the afternoon while Alice was seated at her desk in her classroom work area (separated from the rest of the class by a file cabinet shipping box). The first set of conditions assessed restroom requests. The first condition was an attention condition, during which each verbalization including the words "potty" or "poop" were followed by the therapist's verbal acknowledgment (e.g., "You asked for potty"), but she was not taken to the restroom. In the second restroom condition, access, the same request was followed by 1 min on the toilet. If after 1 min Alice did not begin to void, she was returned to her desk. Results of these first two conditions were compared to determine whether restroom requests were maintained by attention or access to the restroom.

Three other conditions were conducted to determine whether edible requests were maintained by access to food in general, the specific food item requested, or attention. The first of these conditions was attention, wherein verbalizations that included food words produced the therapist's verbal acknowledgment ("You asked for Skittles®") but did not result in delivery of the requested item. Next, the generic access condition assessed the value of nonspecific food items delivered contingent on the request but not matched to the specific item requested. Finally, in the specific access condition, the therapist delivered the specified edible item contingent on each request for that item.

Three final conditions comparing the reinforcing effectiveness of attention, access to generic play item or activity, and access to a specifically requested play item or activity on nonedible requesting behavior were conducted. In the attention condition, each item or activity request produced verbal acknowledgment (e.g., "You asked for Barney") but not the item or activity. Next, the generic access condition consisted of contingently delivering 30-s access to a nonspecified item or activity from the class of items or activities requested. Finally, in the specific access condition, Alice was given 30-s access to the specific item or activity she requested.

Results

Restroom conditions. Figure 1 shows the functional analysis outcomes for Alice's restroom manding behavior.

The attention and access conditions are compared in this figure and indicate that restroom requests were maintained primarily by attention. With the exception of one session, during which verbal requests in the access condition were especially prevalent, restroom requests consistently occurred at higher rates in the attention condition and showed an increasing trend across contingent attention sessions. By contrast, restroom requests were at or near zero in most of the access condition sessions.

Edible conditions. Figure 1 also depicts outcomes of these edible conditions: attention, generic access, and specific access. Rates of mands for edible items were high in both the specific and generic access conditions. However, rate of edible requests in the attention condition were low in most sessions. These data suggest that mands for edible items were maintained by access to any (specific or generic) edible item.

Nonedible conditions. Figure 1 also shows the results of these nonedible conditions: attention, generic access, and specific access. Rates of mands for nonedible items were low during the attention and generic access conditions. Rates of mands were high in all specific access sessions. These data suggest that mands for nonedible items were maintained by access to the specific item named in the mand.

Treatment implications. The functional analysis results for Alice point to specific treatment approaches. First, each restroom mand should produce access to the restroom with minimal verbal and physical attention. Eliminating the discussion that previously followed this target response constitutes an attention extinction procedure, weakening or eliminating the contingent relation between attention and restroom mands. Combined with this is the continuous immediate delivery of restroom access contingent upon this response. Assuming that restroom access functions as a reinforcer on very few occurrences of restroom mands, only these few (under specific antecedent conditions) will, in fact, be strengthened. As previously stated, attention extinction procedures should be used in combination with other procedures designed to deliver attention for appropriate behavior. A differential reinforcement procedure, such as training a functionally equivalent response to appropriately evoke social attention, could be implemented.

Functional analysis outcomes indicated that Alice's mands for edible items, which included requests for specific food items, were actually reinforced by access to any food, whether or not the item matched the specific item manded. Perhaps, classroom staff frequently delivered nonspecific edible items following requests for specific food items that were not easily accessible or were unavailable at the time of the request.

Based on these outcomes, treatment might include delivering only the specific item requested to increase the probability that mands for specific edible items would come under more precise stimulus control. This treatment component alone is unlikely to affect the problematic high rate of these mands. However, contingently delivering the specific item requested only during lunch and snack breaks and withholding access during other activities might foster the discrimination of conditions under which these mands would be reinforced. Further examination of existing schedules of reinforcement could provide information regarding changes to these schedules that would reduce rates over time.

By contrast, the functional analysis showed that Alice's mands for nonedible items were, in fact, reinforced by access to the item specified in the mand. Therefore, these mands appear to be under appropriate stimulus control, so only the rate issue needs to be addressed in treatment.

DISCUSSION

The present study applied functional analysis methods to determine the con-

tingencies maintaining the problematic verbal behavior of 2 school-aged participants. For both participants, results indicated that manipulating consequent variables led to markedly different effects in the occurrence of bizarre speech. These outcomes suggest that Danny's bizarre speech was maintained by attention. Historically, this category of verbal behavior, if accompanied by other diagnostic criteria, may have resulted in labeling and treating Danny as schizophrenic. Our assessment, however, supports a different interpretation: This behavior may be a described as a "successful operant" (Layng & Andronis, 1984, p. 139) that has been selected by differential delivery of social reinforcement. As Skinner noted, "Special measures of reinforcement 'tell the speaker what is worth talking about' . . . in that generalized social reinforcement may strengthen particular forms or themes in the verbal behavior of a subject" (1957, p. 148). Functional analysis outcomes for Alice indicated that each mand topography was functionally unique. For example, what topographically appeared to be restroom mands were shown to be mands for attention, in that this verbal topography was maintained by generalized social reinforcement versus access to restroom facilities. The possibility exists that paraprofessionals responded to restroom requests, which occurred at inconvenient times during classroom activities, with statements that delayed or avoided engaging in the extensive restroom procedures that were required for Alice. This could explain how mands for restroom access came under control of social reinforcement, regardless of whether or not such events actually occurred.

Skinner (1957) proposed that verbal behavior is an operant and can, therefore, be analyzed like any other (i.e., nonverbal) operant behavior. Researchers have experimentally examined variables maintaining psychotic, bizarre, or delusional verbalizations and, for the most part, their findings have demonstrated the operant nature of these responses (Isaacs, Thomas, & Goldiamond, 1960; Salzinger, 1973). In addition, researchers have manipulated consequences identified as reinforcers (Ayllon & Azrin, 1968), thereby altering the occurrence of this type of verbal behavior. To Drash and Tudor's (1991) call for a standard methodology to analyze the contingencies that support verbal behavior, we add an example of how Iwata et al.'s (1982/1994) functional analysis methodology can be applied to accomplish this goal. In its present form, functional analysis methodology may not be adequate to analyze all types of verbal behavior; nevertheless, in this study it was effective, with only slight modifications, in identifying variables maintaining bizarre verbalization of 2 participants.

It is important to note that although most published functional analysis research is accompanied by an empirical evaluation of treatment implications arising from functional analysis outcomes, that is not the case in this instance. The functional analysis of Danny's bizarre verbal behavior was completed very near the end of the school year. Administrators requested an assessment only and considered our findings to be an adequate substitute for a diagnostic label, which would have obligated the district to provide costly psychiatric or psychological treatment. Although an intervention phase was suggested, it has not yet been requested by administrators. Following the functional analysis of Alice's verbal behavior, administrators at her school requested that our intervention focus solely on her aggression, which had resulted in physical injuries to others and was, therefore, considered more critical. Thus, treatment data are not available, and it is possible that the functional relations identified herein do not accurately predict relevant treatment regimens for the natural environment.

Although these participants differed in level of cognitive functioning, as well as in the form of their bizarre verbalizations, the functional analysis procedure was effective in identifying

maintaining variables for the bizarre speech of both. Attention was a maintaining variable for the targeted verbal behavior of both participants. Although the verbal behavior of both was problematic, each was problematic for different reasons. In Danny's case it was the bizarre content per se that evoked the attention that maintained it, whereas Alice's verbalizations were problematic due to the response cost they evoked and the frequency with which they were emitted. The audiences for these vocalizations also differed: Danny's audience consisted of his peers and classroom teachers (whose listening behavior was likely reinforced by the unique content of his verbalizations). On the other hand, Alice's audience consisted of paraprofessionals who functioned in a 1:1 relationship to facilitate her learning. Her verbalizations interfered with the classroom staff's ability to fulfill their job requirements (i.e., practicing tasks designed to achieve her individualized educational plan goals) and, thus, increased the staff's response efforts. For these reasons, her verbalizations appear to have functioned as aversive stimuli that evoked avoidance behavior establishing (a) an intermittent schedule of reinforcement that, in turn, increased the rate of this behavior and (b) the substitution of social attention for access to restroom facilities as well as the substitution of generic edible items for the specific edible item manded.

Although this methodology was originally implemented to assess the function of nonverbal behavior, recent research has demonstrated the efficacy of using functional analysis to analyze problematic verbal behavior. However, research in this area remains sparse. The present study included only 2 participants; therefore, we are limited in generalizing the conclusions drawn from our findings. Further delimiting parameters include the use of only a single participant from each end of the spectrum of cognitive verbal functioning. Analyzing the verbal behavior of higher functioning participants with wider verbal repertoires may require more complex experimental arrangements. Replications within each of these populations are needed to validate our conclusions regarding the usefulness of functional analysis methodology in analyzing verbal behavior.

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