

## LINKING DESCRIPTIVE AND EXPERIMENTAL ANALYSES IN THE TREATMENT OF BIZARRE SPEECH

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Descriptive and experimental methods were used to analyze the environmental determinants of an adult's bizarre speech. A descriptive analysis of behavior under natural conditions indicated that bizarre vocalizations occurred most often in the presence of task-related demands and in the absence of adult attention. Further, bizarre speech occurring during tasks was followed frequently by the cessation of task demands by staff or the subject's voluntary disengagement from task-related activities; bizarre speech observed during noninteractional periods (i.e., in the absence of adult attention) was frequently followed by staff attention. The escape and attention hypotheses were tested under analogue conditions. Results of the experimental analysis supported only the attention hypothesis; that is, bizarre speech appeared to function as an attention-producing behavior. The functional analysis data were used to select two different yet functionally equivalent treatments. The first treatment provided the subject with noncontingent scheduled attention. The second intervention taught the subject social language skills in the form of initiation and expansion statements. Both interventions were effective in suppressing maladapted speech. Advantages of linking descriptive and experimental analyses are discussed.

DESCRIPTORS: schizophrenia, bizarre speech, functional analysis

A behavior problem that has received little attention in the functional analysis literature, but that is common in developmentally disabled and psychiatric populations, is bizarre or maladapted speech. Whereas psychodynamic and organic theories view bizarre vocalizations as symptoms of an underlying disorder, behavior analysts consider these behaviors to be successful operants (Burns, Heiby, & Tharp, 1983; Layng & Andronis, 1984; Skinner, 1957). Accordingly, bizarre comments may function as veiled mands shaped and maintained by positive and negative reinforcement contingencies.

We have found only two studies that experimentally analyzed the reinforcement contingencies maintaining bizarre vocalizations. Mace, Webb, Sharkey, Mattson, and Rosen (1988) assessed the bizarre comments of a woman diagnosed with

schizophrenia during three analogue conditions. Maladapted statements occurred most often when the therapist temporarily discontinued task demands and were relatively frequent when the therapist provided indulgent attention contingent on bizarre comments. Similarly, Durand and Crimmins (1987) varied levels of task demands and adult attention and found the maladapted vocalizations of a 9-year-old boy with autism to correlate with the presence and absence of task demands.

Methods used to analyze the function of aberrant behavior have varied considerably. Most studies have used an experimental approach in which the variables hypothesized to control the target behavior are manipulated by the experimenter under well-controlled analogue conditions. Using experimental methods, some researchers have alternately introduced and withdrawn antecedent stimulus conditions that may occasion aberrant behavior and inferred the operant function based on the pattern of responses observed (e.g., Carr & Newsom, 1985). Others have arranged varying consequences for the

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problem behavior, permitting a more direct inference regarding the reinforcement contingencies maintaining the aberrant behavior (e.g., Iwata, Dorsey, Slifer, Bauman, & Richman, 1982).

Descriptive analysis represents an alternative approach for assessing the function of maladapted behavior. A descriptive analysis assesses behavior-environment interactions in the natural settings in which maladapted behavior occurs without manipulating variables suspected to influence the target behavior. The resulting data are by nature correlational rather than experimental and are only suggestive of functional relationships operating in the subject's natural environment. Descriptive data provide an empirical basis for formulating hypotheses to test later via experimental analysis (Bijou, Peterson, & Ault, 1968; Mace & Belfiore, 1990; Mace, Lalli, & Pinter-Lalli, 1991).

Given the respective advantages of descriptive and experimental analyses, combining these approaches may improve the validity of a functional analysis. The present study illustrates this combination to identify contingencies maintaining the bizarre statements of a 46-year-old man with moderate mental retardation (Experiment 1). The descriptive analysis provided an empirical basis for formulating hypotheses tested subsequently in an experimental analysis during analogue conditions. These findings were used to develop two different yet functionally equivalent interventions to reduce bizarre vocalization (Experiment 2).

## EXPERIMENT 1

### METHOD

#### *Subject and Setting*

The subject in this investigation was Mitch, a 46-year-old man with moderate mental retardation. He had grand mal seizures controlled to a frequency of one per week with 500 mg of tegretol twice daily and 250 mg of mysoline thrice daily. Mitch's psychiatrist also prescribed 100 mg of mellaril twice daily to treat "delusional and hallucinatory" speech. Although Mitch was observed occasionally to speak in complete sentences using a large vocabulary, he rarely initiated conversations with others, nor did

he expand on conversations initiated by staff or other clients. Rather, Mitch was observed frequently to make bizarre or unusual statements. These vocalizations included self-talk, statements unrelated to the topic being discussed, and mumbling. Bizarre comments were often accompanied by unusual gestures or body movements (e.g., slapping the floor with both hands and saying "I've got to put out that fire.").

All analysis sessions were conducted in the university-affiliated group home where Mitch resided with five other clients who had moderate or severe mental retardation. Observations during the descriptive analysis and generalization phases of the study were obtained in several different rooms of the group home with zero to two staff and zero to five clients present as Mitch moved about freely. Experimental analysis sessions were conducted in the home's large eat-in kitchen with a large oval table and eight chairs.

#### *Procedures*

*Descriptive analysis.* Two independent data collectors observed Mitch in an unobtrusive manner during naturally occurring situations at the group home. Observation sessions were 30 to 60 min in duration and were conducted at random times between the hours of 3:00 p.m. and 9:00 p.m. The observation system permitted data to be collected concurrently on naturally occurring antecedent events, bizarre speech, and naturally occurring events subsequent to aberrant speech. On the basis of informal observations and available functional analysis research, four antecedent and five subsequent event categories were recorded. The antecedent event categories were (a) interaction, (b) no interaction, (c) task, and (d) alone. Subsequent event categories were (a) social disapproval, (b) positive interaction, (c) tangible reinforcement, (d) task disengagement, and (e) no staff/client response. Operational definitions for bizarre speech and the antecedent and subsequent event categories are available from the authors upon request.

Concurrent data on the target behavior and naturally occurring environmental events were obtained using a continuous 10-s partial-interval re-

coding procedure (Mace et al., 1991). Antecedent event categories were scored throughout the entire observation session because each occurrence of these events was a potential antecedent to aberrant speech. Subsequent event categories were scored immediately following each instance of aberrant speech and for the next three 10-s intervals.

*Experimental analysis.* Analysis of the descriptive data suggested two viable hypotheses regarding the function of Mitch's bizarre speech. Hypothesis 1 was that Mitch's maladapted vocalizations were positively reinforced by staff attention, usually in the form of socially disapproving comments. According to Hypothesis 2, bizarre comments were negatively reinforced by staff discontinuation of instruction or Mitch's voluntary disengagement from the task. The validity of these two hypotheses were tested experimentally during four analogue conditions. Bizarre vocalizations were measured using a continuous 5-s partial-interval recording procedure. Integrity measures for the independent variables were measured on an occurrence and non-occurrence basis using a continuous 5-s interval recording procedure. The percentage of correct applications of each independent variable according to the procedure and schedule exceeded 85% in all cases. The analogue conditions described below were presented during 15-min sessions according to a randomized multielement arrangement, with two conditions per day separated by a 10-min free period.

In the first condition, no demand–social disapproval, the experimenter instructed another client in a food preparation task using prompts and praise for correct responses. Mitch was free to move around the kitchen but generally stood at a distance of 1 to 3 m from the experimenter. The experimenter did not look at or speak to Mitch unless Mitch emitted a vocalization. The experimenter made eye contact with Mitch and responded positively to each of Mitch's appropriate vocalizations (e.g., "Thanks for telling me, Mitch," or "I had a good day today; thanks for asking.>"). Contingent on bizarre vocalizations, the experimenter provided a disapproving comment on a variable-ratio (VR) 2 schedule (e.g., "Mitch, stop talking like that. You know your

mother's not here.>"). This condition, including the schedules of reinforcement, was designed to test the attention hypothesis.

The second condition, no demand–interaction, consisted of one-to-one discussion between Mitch and the experimenter while both were seated facing each other at the kitchen table. The experimenter initiated conversation by directing a question to Mitch (e.g., "What did you do at work today?"). The experimenter responded to each appropriate vocal response by asking a follow-up question related to the topic of Mitch's statement. All bizarre vocalizations were ignored by the experimenter. Each time the conversation paused for 15 s, the experimenter directed a statement to Mitch to continue the discussion (e.g., "I stopped at Pete's today for a cup of coffee.>"). Because this condition provided Mitch with noncontingent attention without task-related demands, bizarre speech was expected to occur infrequently.

The third condition, task disengagement, represented naturally occurring situations in which Mitch was engaged in a household task, and occurrences of bizarre vocal responses were followed by the experimenter's discontinuation of instructions for task performance. The experimenter presented Mitch with one household task per session. Tasks were selected that required an instructor's assistance to complete (e.g., meal preparation). Instruction consisted of a least-to-most intrusive prompt hierarchy (i.e., vocal, gestural, model, physical) with an interprompt interval of 10 s. The experimenter provided descriptive praise contingent on correct responses to each prompt. To test the escape function of bizarre speech, the experimenter backed away two steps from the subject and discontinued instruction for 30 s, contingent on occurrences of bizarre speech. A VR 2 schedule, approximating the schedule observed during the descriptive analysis, was followed. After the 30-s escape interval, the experimenter resumed task instruction. The experimenter responded to each of Mitch's appropriate vocalizations as in the first condition.

The fourth condition, task–social disapproval plus disengagement, was designed to approximate sit-

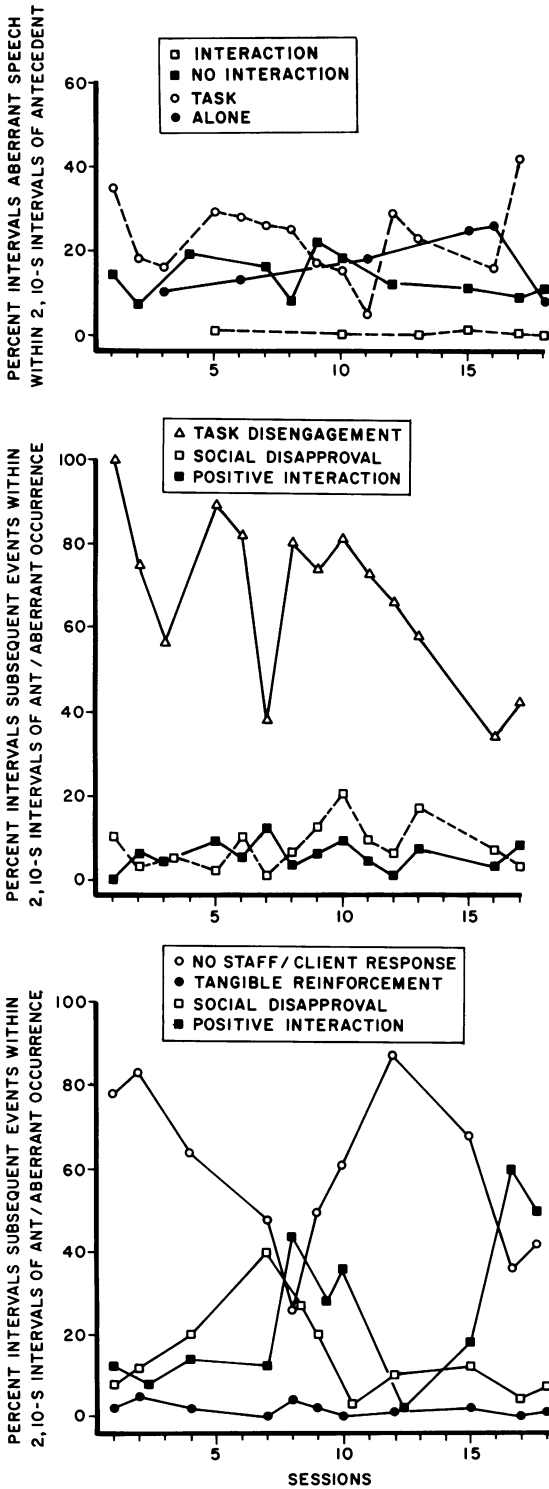


Figure 1. Results of the descriptive analysis of bizarre speech observed in Mitch's natural environment. The upper panel shows percentage of intervals with aberrant speech

uations in which bizarre vocalizations were followed by the experimenter's disapproving comment and discontinuation of the task. In addition, this condition permitted comparisons to the other conditions while varying only one variable at a time. Procedures in this condition were identical to the third condition with the following exception. Immediately following a bizarre vocalization, the experimenter provided a disapproving comment (VR 4 schedule) and then began the 30-s escape interval (VR 2 schedule). Again, the consequences and schedules applied to bizarre speech paralleled those observed during the descriptive analysis.

*Interobserver Agreement*

A second independent observer collected data on the relevant dependent and independent variables during a minimum of 30% of the sessions per condition and experimental phase. Total, occurrence, and nonoccurrence agreements were calculated on an interval-by-interval basis according to Page and Iwata (1986). Mean interobserver agreement values were 81% or higher for all observational categories during the descriptive analysis and were 90% or higher for all measures during the experimental analysis.

**RESULTS**

Figure 1 presents three different analyses of the descriptive data collected under natural conditions. The upper panel reflects the probability of observing bizarre speech within 20 s following the occurrence of a given antecedent event. This measure, for each session in which a minimum of 2 min of the antecedent condition was observed, was calculated by dividing the number of intervals scored with bizarre speech and a given antecedent by the number of intervals scored with a given antecedent. This analysis indicated that bizarre speech was ob-

scored during four antecedent environmental events. The middle panel depicts percentage of intervals with subsequent events observed within 20 s of aberrant speech during a task. The lower panel shows percentage of intervals with subsequent events observed within 20 s of aberrant speech during no demand-no interaction situations.

served with moderate frequency subsequent to task conditions and when social interaction was unavailable (i.e., the alone and no interaction conditions). By contrast, virtually no bizarre speech was observed when Mitch was interacting with staff in the absence of task-related demands (i.e., the interaction condition).

The middle panel of Figure 1 shows the distribution of subsequent events given the occurrence of bizarre speech during a task. The measure was calculated by dividing the number of intervals jointly scored task and bizarre speech that were followed within two intervals by a given subsequent event by the number of intervals jointly scored task and bizarre speech. Jointly scored is defined as the antecedent event occurring within the same or preceding two intervals. The objective of this analysis was to determine whether disengagement from task-related activities naturally followed bizarre speech either as a result of staff discontinuing instruction or Mitch's voluntary disengagement from the task, a relation that would be expected to occur if bizarre vocalizations were negatively reinforced by escape from task-related demands. Results of this analysis showed that Mitch frequently disengaged himself from his assigned task following maladapted comments. However, staff attention in the form of positive interaction and social disapproval was observed intermittently to follow bizarre speech during task conditions.

Finally, the lower panel of Figure 1 presents the distribution of subsequent events given the occurrence of bizarre speech during no demand–no interaction conditions. Calculation of this measure was the same as that used for the task condition, except that the relevant antecedent and subsequent event categories were substituted. This analysis indicated that, when Mitch was not interacting with others, the majority of his bizarre vocalizations received no response by staff or other clients. However, approximately 50% of the intervals jointly scored no demand–no interaction and bizarre speech were followed by attention either in the form of social disapproval or positive interactions. Together, these three analyses provided an empirical basis for two hypotheses concerning the function of Mitch's

bizarre vocalizations: (a) bizarre speech was negatively reinforced by escape from task-related demands, and (b) bizarre speech was positively reinforced by the attention of others.

## EXPERIMENT 2

### METHOD

#### *Subject, Setting, and Measurement*

The subject, setting, and the definition and measurement of bizarre speech for this portion of the study were identical to Experiment 1.

#### *Procedure*

*Intervention 1: Scheduled attention.* The first intervention provided response-independent attention (i.e., scheduled comments) and attention for appropriate vocalizations, and required staff to discontinue attention that had been contingent on Mitch's bizarre vocalizations (i.e., extinction). The experimenter instructed another resident in a food preparation task as described in the no demand–social disapproval condition. However, in the course of providing instruction to Mitch's coresident, the experimenter directed a comment to Mitch on a variable-time schedule (VT 90 s, VT 60 s, or VT 30 s, in different experimental phases). Examples of experimenter comments were "Mitch, Ellen's doing a great job cooking the spaghetti," and "Mitch, I heard that you guys are going bowling tonight." The experimenter ignored all bizarre vocalizations.

*Intervention 2: Initiation and expansion training.* The effectiveness of scheduled attention provided further support for the attention hypothesis and suggested that other interventions that provided Mitch with attention would also be effective. This second intervention was designed to teach Mitch a socially appropriate response that would function equivalently to bizarre speech (i.e., evoke staff attention). Carr and Durand (1985) demonstrated that clients successfully acquired socially appropriate responses and substituted these responses for maladapted behaviors when the behaviors were functionally equivalent (i.e., produced the same consequences).

Conversation initiation and expansion skills were taught separately and sequentially using procedures taken directly from Haring, Roger, Lee, Breen, and Gaylord-Ross (1986). Training was conducted in the kitchen while the experimenter was instructing a coresident in a food preparation task. Sessions were 20 min in duration and occurred three to four times per week. Briefly, training entailed providing vocal prompts to initiate or expand on conversations every 90 s. If Mitch did not respond appropriately to the prompt, the trainer provided a verbal model of the skill; this was repeated until Mitch emitted the target response. Initiations consisted of any statement that began a conversation or changed its topic. Expansions referred to contextually appropriate statements or questions that added new information to the conversation. (Detailed training procedures and operational definitions are available in Haring et al., 1986, or upon request from the authors.) Both conversation skills were measured using a continuous 10-s partial-interval recording procedure.

The effects of initiation and expansion training on Mitch's conversation skills were evaluated during a five-phase sequence. Conditions during the no demand phase were identical to the no demand-social disapproval condition, except bizarre vocalizations were ignored. The no demand-prompts to converse phase added experimenter vocal prompts for Mitch to initiate or expand conversation every 90 s. Initiation training procedures continued until Mitch responded correctly during three consecutive sessions to a minimum of 75% of the prompts to initiate. During initiation maintenance and expansion training, initiation prompts were discontinued while holding other aspects of the training sessions constant. Expansion training continued until Mitch responded correctly to 75% of the prompts across three consecutive sessions. Finally, during the generalization phase, Mitch's initiation and expansion skills were assessed across different staff, locations of the group home, and times of the day. One of three staff (other than the original trainer) met with Mitch in a different location in the group home at a randomly determined time between 3:00 p.m. and 9:00 p.m. Generalization sessions were initi-

ated with the staff member saying "Mitch, how was your day today?" The staff person replied appropriately to each of Mitch's initiation and expansion statements and provided no further prompts.

#### *Interobserver Agreement*

Interobserver agreement data were collected for bizarre speech, initiations, and expansions, as well as for the correct application of each independent variable in the experimental analysis and conversation skills training phases. Agreement data were obtained for a minimum of 30% of the sessions distributed equally across experimental conditions and phases and were analyzed in the manner described in Experiment 1. Mean interobserver agreement values were 82% or higher for all measures.

#### *Experimental Design*

The effectiveness of scheduled attention was evaluated using a modified reversal design with the no demand-social disapproval condition of the experimental analysis serving as the initial baseline. The sequence of phases was A/B1/A/B1/B2/B3/B1/A/B1/A, where A is no demand-social disapproval and B1, B2, and B3 are scheduled attention at VT 90 s, VT 30 s, and VT 60 s, respectively.

A multiple baseline design across initiation and expansion skills was used to assess the effects of the training procedure on Mitch's conversation. Subsequent to training, Mitch independently initiated or expanded on conversations such that it was not possible to evaluate the effects of the training procedure on bizarre speech with a reversal design.

#### RESULTS

The results of the experimental analysis appear in Figure 2. Experimental manipulation of the consequences of Mitch's bizarre speech resulted in high levels of maladapted vocalizations only during the no demand-social disapproval condition. The other three conditions, which supplied noncontingent attention in the form of positive interaction or task instruction, resulted in little or no occurrences of bizarre speech. Considered collectively, the results of the descriptive and experimental analyses indi-

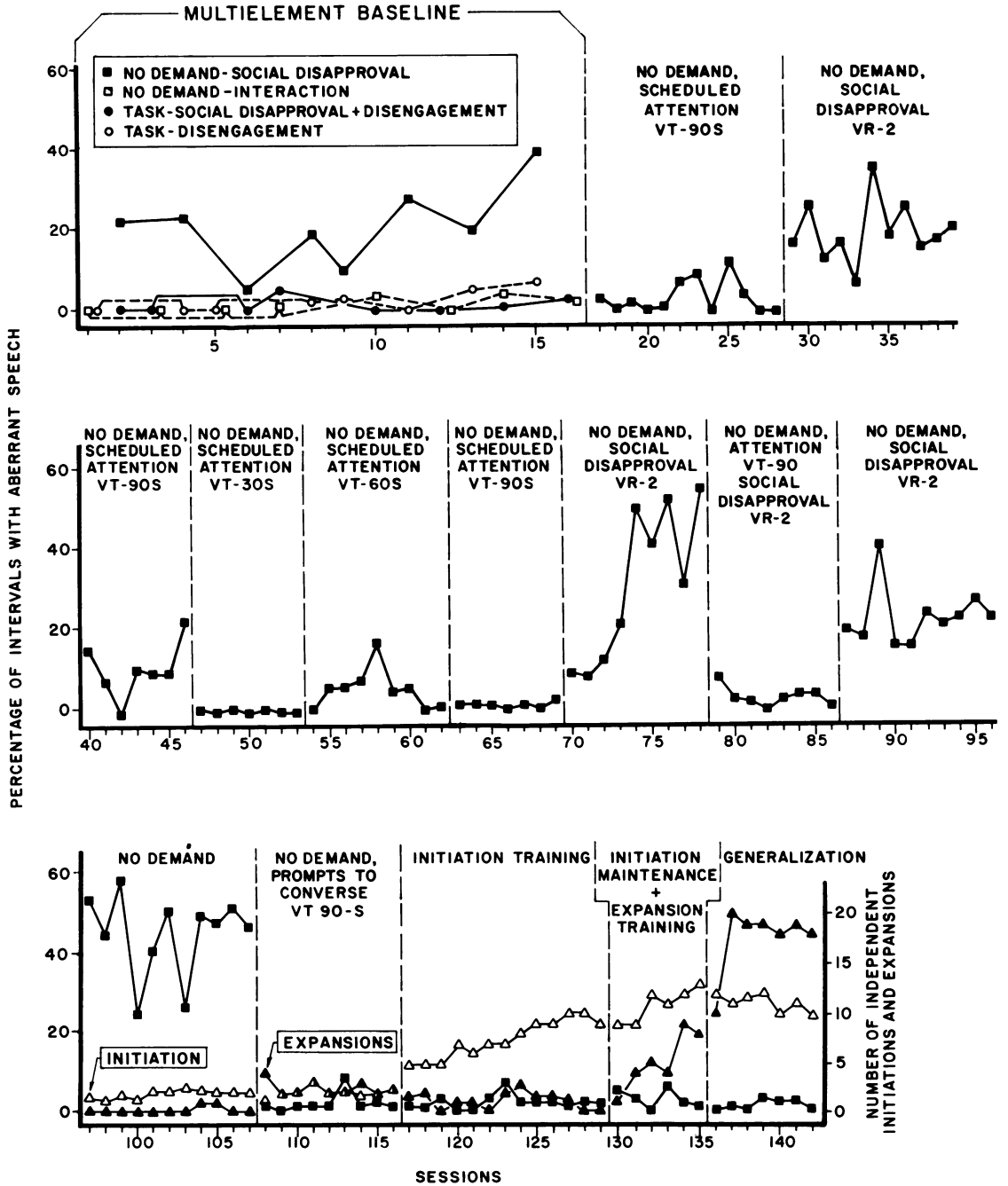


Figure 2. Percentage of intervals with aberrant speech during experimental analogue conditions (i.e., multielement baseline), analysis-derived treatment conditions (i.e., scheduled attention and conversation training), and baseline conditions (i.e., no demand-social disapproval, no demand). The number of independent initiation and expansion statements are presented during the last five phases in which the effects of the conversation training intervention were evaluated.

cated that Mitch's bizarre speech occurred as a function of the attention this behavior evoked from others at the group home. Experiment 2 evaluated the effectiveness of two treatments for Mitch's bizarre speech derived from the descriptive and experimental analyses.

Figure 2 also presents the results of the evaluation of the two analysis-derived interventions. The no demand-social disapproval condition of the experimental analysis served as the initial baseline. Providing attention on a VT 90-s schedule independent of bizarre vocalizations resulted in a sharp decrease in the target behavior to near zero levels. When scheduled attention was discontinued and social disapproval for bizarre speech was reinstated, maladapted speech returned to pretreatment levels. However, the first replication of the VT 90-s scheduled attention condition failed to recapture the initial treatment effect. Bizarre speech decreased to near zero rates, once again, when the rate of response-independent attention was increased to a VT 30-s schedule and was later thinned to VT 60-s and VT 90-s schedules in successive phases.

Evaluation of the effects of conversation initiation and expansion training began with a high level of bizarre speech ( $M = 42.5\%$  intervals) during the no demand phase (see Figure 2). Introduction of prompts (no demand-prompts to converse phase) reduced bizarre vocalizations apparently because it provided Mitch with a form of regular attention functionally equivalent to the scheduled attention condition. Low levels of bizarre speech were maintained during and subsequent to initiation and expansion training (i.e., during the initiation maintenance and generalization phases). That is, following conversation training, experimenter-initiated attention was discontinued without a resumption of bizarre speech.

With the introduction of conversation training, Mitch's independent initiations and expansions per training session increased from zero to two and zero to six to seven and 20, respectively. Both skills were maintained or increased when all experimenter prompts were discontinued and no other experimenter-initiated attention was supplied. In addition,

initiations and expansions were generalized to other staff members.

## DISCUSSION

We presented a methodology for linking descriptive and experimental analyses of bizarre speech. The descriptive analysis involved repeated direct observations of client behavior during uncontrolled natural situations. Concurrent data on bizarre speech and environmental events antecedent and subsequent to the target response were analyzed using simple conditional percentages to reflect the likelihood of bizarre vocalizations occurring under different environmental circumstances. Two plausible hypotheses regarding the function of Mitch's bizarre vocalizations emerged from the descriptive analysis. First, bizarre comments may have been negatively reinforced by the discontinuation of task-related demands. Second, such comments may have been positively reinforced by the attention of others. When these hypotheses were tested using traditional experimental methods (e.g., Carr, Newsom, & Binkoff, 1980; Iwata et al., 1982), bizarre speech was found to be functionally related to attention and not to Mitch's escape from task-related demands.

We believe this case illustrates some of the benefits of combining descriptive and experimental approaches to functional analysis. Had our intervention been developed on the basis of the descriptive analysis alone, treatment during task conditions may have consisted of increased reinforcement for task completion, reduction of task difficulty, penalties for dawdling, or even guided compliance. These treatments were not only unnecessary, but their implementation could have been counterproductive inasmuch as inadvertent attention may have been supplied for inappropriate behavior.

However, the descriptive analysis contributed importantly to the design and interpretation of the experimental analysis. First, repeated observations under natural conditions indicated (a) the type of demand and no-demand situations that Mitch normally encountered, (b) common forms of attention



and escape that accompanied bizarre speech, and (c) an estimate of the natural schedule for escape and attention. This information permitted the design of experimental analogue conditions similar to Mitch's natural environment, a factor that should enhance the generality of the experimental analysis. The finding that Mitch's bizarre speech was maintained by attention required a small degree of inference to natural conditions. Second, to the extent that the descriptive analysis narrows the scope of plausible hypotheses, the experimental analysis can test fewer hypotheses with greater precision. With two hypotheses to test, we were able to design four experimental conditions that differed minimally except for the variable under study.

This study also illustrated that pretreatment analysis of the function of maladapted behavior can give rise to multiple treatment approaches that may prove effective. Knowing that Mitch's bizarre speech was positively reinforced by the attentive reactions of others suggested that, in addition to ignoring bizarre comments, increasing the rate of noncontingent attention would decrease this problem behavior. This treatment objective was accomplished via two distinct interventions. First, scheduled attention supplied the same class of reinforcers that maintained bizarre speech, but did so independently of the target behavior. Although response-independent reinforcement is an effective response-reduction procedure, scheduled attention had practical limitations that did not augur well for its long-term adoption. The effectiveness of scheduled attention appeared to depend on reliable implementation by the group-home staff, who have numerous competing responsibilities. Moreover, this intervention would require training other service providers and citizens in the community in order to achieve generality of the treatment effect.

Training Mitch to initiate and expand on conversation circumvented some of the practical problems encountered with scheduled attention. First, Mitch was able to prompt staff to attend to him by initiating and maintaining interaction. Second, Mitch could regulate the amount and timing of attention he received and thereby maintain a level

of attention sufficient to discourage high levels of bizarre speech. Finally, Mitch's skill at prompting conversation seemed better suited to community settings in which continuity of programming varies. Indeed, following initiation and expansion training, Mitch prompted interaction so readily that a reversal design to demonstrate the effects of training on bizarre speech was not possible without ignoring Mitch's prompts.

Combining descriptive and experimental analyses may be impeded by practical constraints indigenous to many applied settings. One obvious constraint is the additional time involved in conducting two analyses (i.e., number of sessions). Another obstacle to performing the descriptive portion of this methodology is the spatial proximity of the natural and treatment environments. Many outpatient and acute-care inpatient facilities do not have the resources to conduct observations in relevant community settings. Settings most amenable to this approach are those in which the natural and treatment environments are the same (e.g., classrooms, residential and vocational programs).

The availability of less time-consuming methods to assess the operant function of aberrant behavior (e.g., Cooper, Wacker, Sasso, Reimers, & Donn, 1990; Durand & Crimmins, 1988) may limit the applicability of the present methodology to certain situations. However, this approach may lead to effective treatment for particularly challenging cases to the extent that a combination of descriptive and experimental methods may yield more information about the reinforcement contingencies maintaining problem behavior in a client's natural environment.

Finally, the contributions of the functional analysis of aberrant behavior extend beyond treatment development to the advancement of a scientific understanding of the nature of behavior disorders. Traditional accounts of the etiology of behaviors such as bizarre speech continue to dominate the psychological literature (Layng & Andronis, 1984). Although experimental evidence for the behavioral basis of some behavior disorders is growing (e.g., aggression, self-injury), behavior analysis of bizarre speech has remained largely theoretical (Burns et

al., 1983; Layng & Andronis, 1984). The methodology described here seems well suited to the task of identifying complex contingencies maintaining behavior attributed to psychotic, delusional, or other unobservable processes.

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