Effect of Training Different Classes of Verbal Behavior to Decrease Aberrant Verbal Behavior

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Inappropriate verbal behavior that is labeled “psychotic” is often described as insensitive to environmental contingencies. The purpose of the current study was to establish different classes of rational or appropriate verbal behavior in a woman with developmental disabilities and evaluate the effects on her psychotic or aberrant vocal verbal behavior. Similar to a previous study (Arntzen, Ro Tønnessen, & Brouwer, 2006), the results of the current study suggested that the procedure helped to establish a repertoire of appropriate functional vocal verbal behavior in the participant. Overall, the results suggested the effectiveness of an intervention based on training various classes of verbal behavior in decreasing aberrant verbal behavior.

Key words: vocal verbal behavior, verbal operants, psychotic behavior, autism

Aberrant verbal responses have been labeled as stereotyped (repetitive words or phrases, or perseveration on the same subject), echolalic (persistent repetition of words or phrases of others), delusional (obviously false statements), psychotic (responses unrelated to ongoing environmental events) or hallucinatory (responses to unobservable stimuli) (Ewing, Magee, & Ellis, 2002; Wilder, Masuda, O'Connor, & Baham, 2001). Aberrant speech is often considered to be symptomatic of an underlying mental illness such as schizophrenia or other psychotic conditions. Nevertheless, behavioral research on aberrant verbal behavior has repeatedly demonstrated overt social operant features (Lancaster et al., 2004; Mace, Webb, Sharkey, Matson, & Rosen, 1988). A recent study with an adult with mental retardation suggested the effectiveness of establishing a verbal repertoire consisting of different verbal operants in order to reduce the duration and rate of aberrant verbal behavior (Arntzen, Ro Tønnessen, & Brouwer, 2006).

The main purpose of the present study was to replicate the study by Arntzen et al. (2006); that is, to train different classes of verbal behavior in order to reduce aberrant

verbal behavior. Second, we aimed to increase the participant's listening behavior by teaching her to react appropriately to verbal stimuli and reinforce her speaking behavior. We also wanted to establish a more consistent relationship between a variety of verbal responses and proper controlling variables (e.g., establish audience/listener as a controlling variable). Finally, we wanted to increase the participant's rational verbal behavior by establishing other people as sources of different types of reinforcement.

METHOD

Participant, Setting, and Materials

Marie, a 24-year-old woman diagnosed with autism, participated in the current study. She lived in a group home and 5 days a week she attended a day placement center for people with disabilities. Many of her verbalizations were words and phrases without any obvious “meaning.” Hence, her parents and staff members defined a relatively small part of Marie's repertoire of verbal behavior as adequate or rational, and a major part of her verbal repertoire was characterized as aberrant, “delusional,” or “psychotic” verbal responses. The lack of a rational and functional verbal behavior interfered with the ability to learn new skills and her ability to influence her surroundings in a proper way. However, she was able to imitate simple movements and sentences when instructed to

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do so. In addition, she could tact several items and mand spontaneously for a variety of activities or items. Marie showed weak listening behavior, that is, she rarely attended to speakers, nor did she demonstrate understanding of speakers' behavior (by doing requested activities or in other ways reinforcing others' verbal behavior). She was tested with WAIS-III and Leiter-R in 2003, and the test results showed a functioning level equivalent to that of a 5–6.5-year-old. Finally, incidents of destroying furniture and materials and physical attacks (or attempts) toward others occurred daily. Marie often displayed noncompliant behavior when sudden changes happened in daily routines, when staff members introduced demands or even just by their presence. Recordings from Motivation Assessment Scale (MAS; see Durand & Crimmins, 1988) indicated that aberrant vocal verbal behavior was probably maintained by automatic reinforcement and access to tangibles. Furthermore, undesirable behavior seemed to be maintained by access to tangible stimuli.

Marie was taught in a one-to-one format using discrete trial instruction. The training program lasted for 32 weeks with 8 to 12 sessions per day, Monday through Friday. Each session lasted for 10–15 min and consisted of 20 trials. The different verbal operants (tact, intraverbal, echoic, textual, dictation, and transcription) were presented in random order in each session, and were related to one of five topics (rotating between animals, body parts, cutlery/kitchen device, fruit/berries, and colors). A variety of items, the token economy system, worksheets with the training program and an alarm clock were placed in a plastic container at the table. A videotape recorder and two stopwatches were used for pretests and posttests, as well as for the supervised sessions. There was no direct mand training because the participant already manded spontaneously. No other programs focusing on verbal behavior were implemented during the course of the study.

Behavioral Definitions and Data Collection

Observers recorded both the duration and frequency of appropriate and aberrant verbal behavior and the duration of quiet time in pretests and posttests. All staff members were pretrained to record the target behaviors

and perform the data collection. Staff members practiced and recorded regularly with each other in pairs and all trainers had to meet the interobserver agreement (IOA) criterion (80% correct) prior to collecting data for the study.

In both pretests and posttests, recording of duration was conducted for 1 hour every day, at a different time each day (8:00–9:00 am on Monday, 9:00–10:00 am on Tuesday, etc.), over 2 weeks. One stopwatch was used for recording the duration of appropriate verbal behavior and another for recording the duration of aberrant behavior. Whenever Marie started a vocalization, the observer started the presumed representative stopwatch, and if needed, switched over and completed the measurement on the other stopwatch. Frequency of the target behaviors was measured (in separate sessions) by counting vocalizations from video recordings taken within the first 30 min after lunch for 3 consecutive days, both in pretest and posttest conditions.

Appropriate verbal behavior. Verbal behavior defined as appropriate (i.e., “meaningful” or “rational”) consisted of responses that appeared to be under environmental control consistent with the mand, tact, and intraverbal and were otherwise appropriate to the current situation. Examples include: “Can I get a fork for my dinner?” “I’d like to start training again,” “Is this the final training session for today?” and “Who is working night shift?” Other examples included answering “yes” or “no” to simple questions like “Do you want to have lunch now?” or giving rational or adequate answers to simple questions like “What is your last name?” “What is the capital of Norway?”

Aberrant verbal behavior. Aberrant verbal behavior was used as a label for verbal responses that were categorized as obviously false statements, sensational statements, repetitions of phrases and phrases unrelated to ongoing environmental events. Such behavior was sometimes accompanied by emotional behavior (e.g., sobbing, crying). Marie might claim that it was a different day than it was actually, that she was another person, or deny the existence of her parents (false statements). She could spend hours talking about terrorism, exorcism, or supernatural

events in a fragmented way (sensational statements). She could also assert events like "Yesterday I was in Spain. I was in Spain yesterday" or "The prime minister is coming for lunch; yes the prime minister is coming for lunch." These would serve as examples of both false and repetitive phrases (i.e., several repetitions within a minute). In addition, she could refer to, talk to, or point to invisible events, persons, or objects in a hallucinatory manner (verbalizations unrelated to environmental events). The verbalizations could vary from a normal tone of voice to mumbling and shouting or screaming. The aberrant verbal behavior could occur both when Marie was alone or with others.

Quiet time. Quiet time was defined as the duration of time Marie did not speak or make any sounds or vocalizations that the observers could hear. If she moved her lips and there was no sound, it was considered quiet time. Duration of quiet time was calculated as the difference between the 60 min of the hourly observation time and the sum of the duration of aberrant and appropriate verbal responses.

Procedure

Prior to the onset of the training program, the Assessment of Basic Language and Learning Skills (ABLLS; Partington & Sundberg, 1998) curriculum and the Verbal Behavior Milestones Assessment and Placement Program (VB-MAPP; Sundberg, 2008) were used to assess the participant's verbal repertoire. The use of the same assessment tools was repeated after 32 weeks of training.

An example of a training session is shown in Table 1. The session started when Marie chose one envelope out of an array of three to five envelopes, each containing the name of an activity, a secret task, or an edible. Preferred edibles could be sweets, chocolate, or a glass of soda. A secret task could be having a staff member counting loud from one to six, to receive or give a compliment or for her to take out the garbage, one of her most requested activities. These were all stimuli or activities that had been previously been found to be reinforcers for Marie's behavior. The trainer would then give instructions according to the current worksheet as shown in Table 1. Correct responses

were followed by verbal praise and a token. Marie had to earn 12 tokens in a training session to get the envelope, but she could earn a total of 20 tokens. It should be noted that Marie had experience with the token economy from previous training.

If Marie earned 13 or more tokens she also received a colored paper ball fitting in a transparent cell box, indicating that a bonus reinforcer had been earned. A picture of an item or activity previously requested by Marie was placed on top of this box. Bonus reinforcers could be to have chicken for lunch or to go to the shopping mall with a staff member. Incorrect responses were immediately followed by the correct answer modeled by the trainer. For example, if Marie was asked to name three different animals and answered "animal, dog, and cat," the trainer would say "the correct answer is mouse, dog, and cat." If she answered "dog, cat, and car," it would be considered incorrect, the trainer would state the correct answer immediately, and proceed with the next task without giving her a token. Progression through training steps was based on weekly summaries of daily recordings and evaluation videos.

A training session included 20 subtasks and there was a minimum of 5-min break between sessions. Participating in ordinary activities like horseback riding, swimming, or going for a walk outdoors sometimes resulted in longer breaks.

Training phases. During the introduction phase, Marie was trained to sit upright, with her hands on the table and looking toward the trainer. The subsequent phases differed in that the content of training gradually became more advanced. Imitation, matching, tacts, dictations, echoics, transcriptions, textuials, and intraverbals were trained in each session. Phase 1 started with training three different categories of familiar topics and was extended after a few weeks to include five different categories (e.g., animals, colors, fruits). The intraverbal targets were presented with a 2-s prompt delay. Other items were targeted in the format of Kim's game (i.e., Marie was shown a certain number of items. Then, the trainer covered the items with a cloth. After a specified number of seconds Marie is going say which items are under the cloth). In Phase 2, we introduced three sets of stimuli

Table 1

Example of a Session During Training Showing the Different Instructions, Materials, and Classes of Responses Late in the Treatment Program

Verbal operants	Trainers' instructions and materials	Correct responding of participant
1. Tact activity	"What am I doing?"	"You're touching your ears"
2. Matching	"Place each of the written words on correct picture" (3 stimuli)	Places each of the written words on correct picture
3. Echoic	"Green, black, yellow"	Says "green, black and yellow"
4. Imitation	"Do the same." Show a specific body position or movement	Performs the same body position or movement
5. Tacting object	"Which colors?" (1-5 stimuli)	Ex: "red, brown, black and blue"
6. Delayed imitation (3-10 s)	"When you get a signal, do like this"	Performs the same simple movement
7. Textual	"Read this," show a written word	Reads the written word
8. Intraverbal	"Name three different colors"	Says, Ex: "grey, blue and yellow"
9. Dictation	"Write it down"	Writes name of selected color
10. Tacting	"Name these objects/pictures" (3 samples on the table)	Says, Ex: "horse, knife, and sweater"
11. Instructions	"Put the yellow card on the sofa" (3 colored cards on the table)	Picks the yellow card and puts it on the sofa
12. Tacting prepositions	"Place the marker in front of the car" (two-dimensional pictures only)	Places the marker in front of the car
13. Imitation	"Do like this"	Perform the same body position or motion
14. Echoic	"Blue, green and orange"	Says: "blue, green and orange"
15. Intraverbal (counting)	"Count from 3 to 14" (1-18)	Says: "3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13 and 14"
16. Intraverbal (counting)	"What is the number that follows 16?" (1-18)	Says: "17"
17. Listener responding	"Point out green and black" (5 color-samples on the table)	Points out green and black
18. Tacting (Kim's game)	(3 colored objects on the table. Covers them with a towel) "What's under the towel?"	"It's brown, red and grey"
19. Intraverbal (Kim's game)	(Clears the table) "What did the towel cover?"	"Brown, red and grey"
20. Transcription	"Write the same." Shows word (color)	Writes correct name of color

for each stimulus material, increased the prompt delay to 3 s, increased the counting requirement to 16, and added imitation of simple words. In Phase 3, we increased the prompt delay to 4 s and divided longer words into two words for the imitation task. In Phase 4, we trained prepositions, longer sentences, and labeling more complex activities. In Phase 5 we included nonidentical matching, counting from 2 to 8, and "what comes after 1-2?" In Phase 6, we expanded categories (i.e., fruit and berries), introduced

delayed intraverbals with distracters, increased difficulties in intraverbal tasks, and counting was conducted with randomly determined initial and terminal numbers.

No programmed consequences followed the occurrence of aberrant verbal behavior; the trainer would simply continue the session as planned. Incidents of other undesirable behavior like attempts of destroying materials or attempts of physical attacks on others during training would lead to a temporary pause in the session and then a restart after a

Figure 1. Total duration in minutes for pretest- and posttest conditions for the three types of target behavior, i.e., appropriate verbal behavior (first panel), aberrant verbal behavior (second panel), and quiet time (third panel) from a total of 10 recording hours for each condition. The bottom panel shows the frequency of appropriate and aberrant verbal responses in the pretest and posttest conditions based on video recordings.

5-min break. This occurred a few times in the introductory part of the program.

Reliability and Treatment Integrity

Interobserver agreement (IOA) was calculated by dividing the number of agreements (e.g., two observers agreed on all scoring on a given trial) by the number of agreements plus disagreements and converting this ratio to a percentage. IOA was collected for 33% of all the training sessions by two indepen-

dent observers. Mean agreement was 98.94% (range, 85%–100%). Treatment integrity was evaluated for each trainer minimum once every fourth week by three different supervisors. Five areas were verified: (1) had prepared correct materials for the current phase, (2) gave the correct instructions for each task during the session, (3) gave the correct prompt, (4) gave token for correct responding, and (5) delivered the terminal reinforcement at the end of the training. Treatment integrity was calculated as correct

Figure 2. The percentage of correct verbal responses during all phases of training. Easter holiday and summer vacation breaks are also shown.

implementation divided by the sum of correct and incorrect implementation, multiplied by 100. The mean treatment integrity was 94.75% (range, 86%–100%).

RESULTS AND DISCUSSION

The top three panels in Figure 1 present the total duration in minutes of appropriate verbal behavior, aberrant verbal behavior, and quiet time, respectively. The bottom panel presents the frequency of verbal initiations of appropriate and aberrant verbal behavior. During 10 hours of recording under pretest conditions, the duration of appropriate verbal behavior was 24.95 min, and the duration in the posttest increased to 49.8 min (upper-most panel). The second panel shows a decrease in the duration of aberrant verbal behavior from 339 min in the pretest to 145.3 min in the posttest. This is more than a 50% reduction of aberrant verbal behavior and constitutes a decrease from approximately 6 hours of aberrant talking to 2.5 hours of aberrant talking from pretest to posttest. Quiet time increased from 167.7 min in the pretest to 392.7 min in the posttest (see third panel). The last panel display shows the results from the video recordings. The number of appropriate verbal responses increased from 33 to 68. In addition, there was a decrease in aberrant verbal behavior from 126 to 26.

Figure 2 summarizes the percentage of correct verbal responses per week during training. The figure shows an increasing proportion of correct responses through the various phases, from 53% in the introductory

phase to an average of about 80% in the later phases. Table 2 provides an overview of the improvements in the pretests and posttests according to the ABLIS. The scores range from 1 to 5 in level 1 (0–18 months), from 6 to 10 in level 2 (18–30 months), and 11 to 15 in level 3 (30–48 months). In the pretest, Marie had appropriate skills in some areas, like mands, and poorer skills in other areas (e.g., reading and writing). As can be seen in Table 2, the score for facts, visual perceptual skills and matching-to-sample, listener responding, intraverbals, reading and writing all increased substantially from pretest to posttest, whereas the change in score for listener responding by function, feature, and class was minimal. The score for social behavior and social play did not change, but these skill areas were not specifically targeted in the current study. The high level of manding skills was maintained throughout the study.

Results from the ABLIS posttest showed particular progress in the area of receptive language and intraverbals. This could be due to enhanced listening skills. In the pretest, Marie had problems listening to instructions and therefore failed on several trials. Her motivation to listen probably increased by the use of token economies in training sessions, and because her listening behavior was brought under control of a speaker (the trainer). Staff members may have become mediators of reinforcement for Marie's verbal behavior, and they might also have become "discriminative stimuli" for Marie's speech. This may be supported by the increase in duration of quiet time, and can

Table 2
Overview of the Results From "The Behavioral Language Assessment Form" of the ABLLS
(Partington and Sundberg, 1998)

Area	Level pretest	Specification	Level posttest	Specification
Mands	15	Mands for others to attend to her own intraverbal behavior	15	Mands for others to attend to her own intraverbal behavior
Tacts	6	Tacts 25 items when asked "what is that"	14	Tacts with complete sentences containing 4 or more words, 20 times
Listener responding	8	Perform ten specific motor actions on command	14	Follows 3-step directions for 10 different directions
Visual perceptual skills and matching-to-sample	4	Places 3 items in a container, stacks for 3 blocks, etc.	9	Matches non-identical objects or non-identical pictures in a messy array of 10
Social behavior/Social play	9	Spontaneously responds to the mands from peers 5 times	9	Spontaneously responds to the mands from peers 5 times
Listener responding by functioning, feature, and class	3	Looks, touches, or point to the correct family member, etc.	4	Perform 4 different motor actions on commands
Intraverbals/Con-versation	-	Not able to fill in any different phrases (songs, etc.)	15	Answers 4 different rotating WH questions about a single topic for 10 topics
Reading	-	Not able to recognize any letters or words	15	Matches 5 words to the corresponding pictures or items function/features/classes
Writing	-	Able to write her name	15	Copies all 29 upper and lower case letters legibly

be interpreted as an increase in listening behavior.

Through her participation in the training program, Marie improved her vocal verbal behavior across the different operants. The results showed that as the frequency of appropriate or rational verbal behavior increased, a substantial reduction in verbal behavior that could be characterized as inappropriate or aberrant occurred. These results are consistent with the findings of Arntzen et al. (2006). It appeared that production of verbal behavior that gave access to tangibles and social reinforcers competed with aberrant verbal behavior even though the latter probably produced automatic reinforcers. Furthermore, this is yet another example of verbal behavior often

categorized as psychotic, delusional, and hallucinatory that can be changed by environmental interventions (Arntzen et al., 2006; Lancaster et al., 2004). These findings underscore the point that aberrant verbal behavior can, at least in most aspects, be treated like any other aberrant behavior. Hence, it is possible that Marie will be more likely to be included in the community and be able to contribute to society in a more adequate way than prior to the study. Family and staff members have reported that Marie now appears less isolated and engages in social interactions for longer periods. After the treatment program started, there were no occurrences of violent and aggressive behavior during training sessions. Marie also improved in academic skills, probably due

to the amount of training she received and her previous lack of training in this area. She learned to read and write single words through the training program, and gradually she was able to make simple calculations. The staff members have experienced positive progress and they have reported improved and increased interaction with Marie both during and after training.

We used an AB design with pretests and posttests because the nature of the clinical intervention made the use of reversal and multiple baseline designs challenging. As in other case studies, there are several threats to internal validity. History and maturation are among those threats because the intervention lasted for 32 weeks (Shadish, Cook, & Campbell, 2002). However, Marie had engaged in aberrant verbal behavior on a daily basis for most of her life, and her parents expressed a growing concern about what they perceived to be a gradual increase of such talk, along with Marie's tendency to isolate herself more over the last few years.

Further research should focus on a functional analysis of defective verbal behavior. Such studies are likely to be essential for developing more effective and efficient language intervention programs for adults with aberrant verbal behavior. In addition, researchers could examine aberrant verbal behavior maintained independent of social consequences (e.g., automatic reinforcement or response products such as auditory or physical consequences).

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