Reducing Palilalia by Presenting Tact Corrections to Young Children with Autism

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Palilalia, the delayed repetition of words or phrases, occurs frequently among individuals with autism and developmental disabilities. The current study used a combined multiple baseline and reversal design to investigate the effectiveness of presenting tacts as corrections for palilalia. During baseline, five preschoolers with autism emitted high rates of palilalia and low rates of mands and tacts during play and instructional activities. During treatment, when experimenters presented opportunities to echoically tact actions and objects following the emission of palilalia, its frequency decreased to low and stable levels and mands and tacts increased. Functional relationships between the tact corrections and emissions of palilalia, mands, and tacts were established during reversals to baseline and treatment conditions. Similar trends in responding were found for frequency of palilalia, mands, and tacts in non-treatment settings.

Key words. palilalia, delayed-echolalia, tact operant, autism.

Palilalia is the delayed repetition of words or phrases (Benke & Butterworth, 2001; Skinner, 1957) and is emitted by individuals with autism and other developmental disabilities. Behavioral research suggests that antecedent conditions can be manipulated to decrease the occurrence of palilalia and that it can be replaced with appropriate responses (Durand & Crimmins, 1987; Frea & Hughes, 1997). Consequently, a variety of interventions designed to train appropriate responses have been investigated including scripts (Charlop-Christy & Kelso, 2003; Ross, 2002), mand training (Durand & Crimmins, 1987; Frea & Hughes, 1997), and rule-governed or self-monitoring tactics (Clarke, Bray, Kehle, & Truscott, 2001; Dipipi, Jitendra, & Miller, 2001). The purpose of the current study was to test the effects of presenting tacts as corrections for palilalia emitted by children with autism.

Some research indicated that the control for palilalia was actually self-stimulatory, and, thus, reinforcing to the child as indicated by

its emission when students were alone or were without a listening audience (Greer, Saxe, & Mirabella, 1985). Research also showed that it was controlled by contextual conditions (i.e., audiences) that decreased palilalia when self-monitoring procedures resulted in the speaker avoiding emission of the behavior (Clarke et al., 2001). Still other research showed that palilalia was under the control of competing reinforcers (Ross, 2002).

Greer et al. (1985) suggested that palilalia may serve a function similar to stereotypy or self-stimulatory "behavior" for speakers. This finding was consistent with reports by Sundberg, Michael, Partington, and Sundberg (1996), who found that a stimulus-stimulus pairing procedure resulted in emission of repetitive speech sounds—a procedure replicated by Yoon (1998). Like babbling, a common response for typically developing infants, palilalia may have a similar automatic reinforcement function for some individuals.

In this study, we suggest that some types of palilalia are vocal forms of stereotypy that are functioning in place of appropriate, more functional verbal behavior due to an underdeveloped vocal verbal repertoire. Thus, palilalia may have the same function as tact responses and be reinforced by the same types of consequences. To evaluate this possibility, in the following study the experimenters provided tact corrections to the target children contingent

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upon the emission of palilalia. If the participants learned to emit high rates of tacts that were reinforced by an audience, then for these children automatic reinforcement could simply be replaced by the new reinforcement function of a tact. This function may then be obtainable by a verbal operant that controlled an audience—even in free play, where the audience may be a speaker as own listener.

METHOD

Participants

Five preschool and early elementary school students who met criteria for a diagnosis of autism/pervasive developmental disorder based on DSM-IV criteria (American Psychiatric Association, 1994) participated in this study. Student A and Student E were four-year-old boys who participated in separate pilot studies. Remaining participants were two 3- to 4-year-old boys (Students B and C) and one 3-year-old girl (Student D). Participants were evaluated by an independent behavior analyst prior to the study using norm-referenced assessments, direct observation, and parent interviews. Norm-referenced assessment results showed that all participants had language deficits. Systematic observation showed that all participants emitted high rates of palilalia in the form of “nonsensical” words and phrases (Students A, B, C, and E) or repetitive syllables such as “bababa” (Student D) during non-instructional activities such as playtime. Further, direct observation showed that all participants, except for Student D, who had low levels of vocal verbal behavior, were fluent speakers who emitted autoclitic mands and tacts. Parents reported that their children’s palilalia was related to children’s movies and songs previously watched or heard.

Setting

All sessions were conducted in multiple areas of participants’ home-based and/or school-based settings. For Students A, B, C, and D, treatment was implemented in the master bedroom of their homes where the participants received individualized applied behavior analysis instruction. Generalization effects were tested during the students’ breakfast at home (Student A), during lunch and free play ses-

sions within the school classroom in which five students and two instructors were present (Student A), and in the living room or playroom (free play) in which only the child and instructor were present (Students B, C, and D). For Student E, all data were collected in a self-contained special education classroom within a publicly funded, private day school for children with autism. Two staff and six students were present in the classroom. Instruction occurred at a group table or at a small desk. In each setting, various games, toys, books, and art materials were available in a free play area where treatment occurred. The free play area was located approximately three to five feet from the instructional area. During generalization measures, the instructor was present but did not provide tact corrections (the treatment procedure) to the participants.

Dependent Variables (Definition of Responses)

There were three dependent variables in this study: frequency (or duration) of palilalia, mands, and tacts. *Palilalia* was defined as a word (e.g., “Rhino”), phrase (e.g., “Oh, yes.”), or sentence (“I’m a pig.”) with no direct, observable relationship to any object present or event occurring in the immediate environment. Mands were defined as participants’ vocal responses emitted under nonverbal antecedent control and conditions of deprivation that specified a reinforcer. Tacts were defined as correct labels of salient stimuli in the immediate environment.

Data Collection

Data were collected by the experimenters on the frequency of palilalia, mands, and tacts during instruction (treatment setting) and non-instructional setting(s) (generalization settings). At the beginning of each data collection period, the experimenter started a digital timer. A mechanical counter was used to record the number of behaviors emitted by participants during the designated data collection period. One occurrence of an incidence of palilalia was defined by a pause (one-one thousand) between words or utterances (e.g., “Is that you?”/one occurrence, “Oh, dear”/second occurrence, “Your majesty”/third occurrence).

In the treatment setting, two 10-minute

samples of behavior were collected during the student's typical, daily two-hour instructional sessions—one at the beginning of instruction and one after an hour of instruction. In the generalization setting, data were collected for one 10-minute session that occurred in a different room after completion of the instructional session. For Student A, treatment data were collected at his home in the evening after school, and generalization data were collected at the school during the school day at breakfast, lunch, and in free play.

For Student B, all data were collected between 11 a.m. and 1 p.m. For Student C, all data were collected between 3 and 5 p.m. For Student D, all data were collected between 5 and 7 p.m. For Student E, no generalization data were collected, and treatment data were collected for a one-hour observational period that occurred between 10 and 11 a.m. This period was selected because it appeared to be the instructional time when palilalia occurred most often. While no generalization data were collected for Student E, duration of his palilalia was measured by having the experimenter start a stopwatch at the onset of the behavior and stop the stopwatch when the behavior ceased for five seconds.

Interobserver Agreement

A second observer collected interobserver agreement data during approximately 50% of all sessions conducted in the treatment setting. Interobserver agreement was calculated by dividing agreements by agreements plus disagreements and multiplying by 100%. Mean interobserver agreement was 97.3% (range, 90% to 100%).

Design

Variations of reversal and delayed multiple baseline designs were used. For Student A, an ABAB reversal design was used in the treatment setting (his home) and continuous baseline data on each dependent variable were collected in his home during breakfast, his school during lunch, and his school during free play to measure generalization. For Students B, C, and D, a delayed multiple baseline across participants with reversals and continuous baseline data were collected on each dependent variable in one additional setting (free

play) to measure generalization. For Student E, an ABAB reversal design was used and no continuous baseline data were collected in other settings.

Data Collection and Interobserver Agreement

Data were collected by the experimenters on the frequency of palilalia, mands, and tacts during free play or instruction. At the beginning of each data collection period, the experimenter started a digital timer. A mechanical counter was used to record the number of behaviors emitted by participants during the designated data collection period. One occurrence of an incidence of palilalia was defined by a pause (one-one thousand) between words or utterances (e.g., "Is that you?"/one occurrence, "Oh, dear"/second occurrence, "Your majesty"/third occurrence). With the exception of Student E, data were collected during two 10-minute observational periods at the beginning and end of a two-hour instructional session for all participants. For Student E, who emitted long durations of palilalia, a time dimension was added and the experimenter measured duration of palilalia by starting a stopwatch at the onset of the behavior and stopping the stopwatch when the behavior ceased for five seconds. For Student E, data were collected for one-hour observational periods between 10 and 11 a.m., which were the periods of instructional time when palilalia occurred most often.

Interobserver Agreement

A second observer collected interobserver agreement data during approximately 50% of all sessions. Interobserver agreement was calculated by dividing agreements by agreements plus disagreements and multiplying by 100%. Mean interobserver agreement was 97.3% (range, 90% to 100%).

Design

Variations of reversal and delayed multiple baseline designs were used. For Students A and E, experimenters used an ABAB reversal design in three settings at school to assess generalization: breakfast, lunch, and free play. For Students B, C, and D, a delayed multiple baseline across participants with reversals and

Table 1
*Mean Frequency and Range of Palilalia, Mands, and Tacts for
Participants A, B, C, and D in Generalization Settings.*

Variable	BL 1	TRT 1	BL 2	TRT 2
Student A ¹ (breakfast, lunch, and free play in school setting)				
Palilalia	55 (41 – 67)	14 (3 – 27)	——	——
Mands	0	2 (0 – 10)	——	——
Tacts	0	0.6 (0 – 4)	——	——
Student B (free play in home setting)				
Palilalia	76 (73 – 81)	25 (6 – 20)	49 (28 – 74)	11 (7 – 15)
Mands	3 (2 – 7)	12 (6 – 17)	0.6 (0 – 3)	31 (12- 49)
Tacts	1 (0 – 3)	17 (6 – 25)	1 (0 – 2)	6 (2 – 9)
Student C (free play in home setting)				
Palilalia	64 (51 – 72)	9 (3 – 15)	105 (88 – 116)	5 (0 – 7)
Mands	4 (2 – 5)	16 (12 – 23)	4 (3 – 5)	8 (4 – 15)
Tacts	8 (2 – 13)	24 (21 – 25)	6 (3 – 10)	22 (15 – 26)
Student D ¹ (free play in home setting)				
Palilalia	159 (174 – 205)	35 (14 – 60)	109 (77 – 146)	——
Mands	0	10 (7 – 13)	3 (0 – 14)	——
Tacts	0	1 (0 – 4)	0.2 (0 – 1)	——

¹No generalization data were collected during one or both reversal conditions.

continuous measures of palilalia, mands, and tacts was used in one additional setting (free play) to assess generalization.

Procedure

During all baseline sessions, Students A, B, C, and D were seated individually at a table containing materials used to engage in an activity such as coloring or building blocks, or on the floor in a free-play area where opportunities to engage in toy-play were present. Student E was seated at a table with a teacher and normal, academic instruction in the form of

learn units (Greer, 2002) was delivered. The instructor began each session by presenting the antecedent, “It’s time to [name of an activity]” and began timing the session. If palilalia was emitted, the instructor ignored the behavior. If correct tacts were emitted, the instructor delivered verbal praise to the student. If correct mands occurred, the instructor delivered the requested item to the student.

During treatment, when the participant emitted palilalia, the instructor immediately modeled a tact associated with the activity in which the student was engaged without stopping the student from engaging in the activity. For ex-

ample, if the student said, "Little wolf, little wolf, let me in," while coloring or during instruction, the instructor immediately said, "I am coloring," or pointed to an object (e.g., a book) and said, "That's a book," while the student continued to color. If the student echoed the teacher's tact, the experimenter gave the student verbal praise such as "That's right. That's a book." If the student did not echo the teacher's tact but stopped emitting palilalia, the teacher did not continue to model the tact, and the activity or instruction continued. When responding was stable, participants were returned to baseline and treatment conditions that were identical to initial baseline and treatment sessions.

RESULTS

Figure 1 displays the mean frequency of palilalia and combined mands and tacts in the treatment settings for Students B, C, and D. Table 1 displays the total number of palilalia, mands, and tacts emitted within each setting for all participants. For Student B, mean frequency of palilalia during the initial baseline was 82 (range, 70 to 98), during the initial treatment was 16 (range, 3 to 24), during reversal to baseline was 82 (range, 57 to 109), and during reversal to treatment was 87 (range, 3 to 131). Mean frequency of combined mands and tacts during baseline was 1.7 (range, 0 to 42), during treatment was 6035 (range, 22 to 9612 to 57), during reversal to baseline was 31 (range, 0 to 63), and during reversal to treatment was 5329 (range, 2412 to 11059). Similar results were observed in the generalization settings for frequency of palilalia, mands, and tacts (see Table 1).

For Student C, mean frequency of palilalia during initial baseline was 63 (range, 58 to 68), during initial treatment was 20 (range, 9 to 32), during reversal to baseline was 140 (range, 81 to 172), and during reversal to treatment was 161 (range, 9 to 26). Mean frequency of combined mands and tacts during baseline was 11 (range, 5 to 25), during treatment was 42 (range, 31 to 61), during reversal to baseline was 8 (range, 3 to 12), and during reversal to treatment was 329 (range, 18 to 42). Similar results were observed in the generalization settings for frequency of palilalia, mands, and tacts (see Table 1).

For Student D, mean frequency of palilalia

during initial baseline was 155 (range, 132 to 189), during initial treatment was 21 (range, 9 to 35), and during reversal to baseline was 109 (range, 77 to 146). Mean frequency of combined mands and tacts during initial baseline was 0, during initial treatment was 37 (range, 21 to 61), and during reversal to baseline was 3 (range, 0 to 12). Similar results were observed in the generalization settings for frequency of palilalia, mands, and tacts (see Table 1).

Figure 2 displays the mean frequency of palilalia and combined mands and tacts for Students A and E. Table 1 displays the total number of palilalia, mands, and tacts emitted within each setting for all participants. For Student A, mean frequency of palilalia during initial baseline was 135 (range, 90 to 217), during initial treatment was 9 (range, 2 to 20), during reversal to baseline was 89 (range, 40 to 123), and during reversal to treatment was 17 (range, 8 to 30). Mean frequency of combined mands and tacts during baseline was 0, during treatment was 24 (range, 3 to 42), during reversal to baseline was 6 (range, 2 to 9), and during reversal to treatment was 28 (range, 22 to 39). Similar results were observed in the generalization settings for frequency of palilalia, mands, and tacts (see Table 1).

Specifically, number of palilalic occurrences was slightly higher for continuous baseline data collected during breakfast at home (mean during baseline, 70; mean range, 67 to 72; mean during treatment, 23; mean range, 6 to 41) than during school lunch (mean during baseline, 28; mean range, 12 to 48; mean during treatment, 11; mean range, 2 to 20) or school free play (mean during baseline, 67; mean range, 45 to 80; mean during treatment, 8; mean range, 0 to 45).

For Student E, mean frequency of palilalia during initial baseline was 22 (range, 17 to 28), during initial treatment was 5 (range, 0 to 26), during reversal to baseline was 22 (range, 9 to 33), and during reversal to treatment was 4 (range, 0 to 11). Mean frequency of combined mands and tacts during baseline was 17 (range, 10 to 32), during initial treatment was 59 (range, 22 to 117), during reversal to baseline was 25 (range, 18 to 41), and during reversal to treatment was 55 (range, 33 to 67). Also for Student E, duration of palilalia during baseline was 28.8 min (range, 26.5 to 34.3), during initial treatment was 0.08 min (range, 0 to 0.43), during reversal to treatment was 8.4 min (range,

Figure 1. Total frequency of palilalia and combined mands and tacts emitted in treatment setting during baseline and intervention sessions for Participants B, C, and D.

2.5 to 13.5), and during reversal to baseline was 0.05 (range, 0 to 0.18). Similar results were observed for duration of palilalia as well as frequency of mands and tacts in the generalization setting (see Table 1).

In summary, this study tested the effects of presenting a tact correction contingent upon emission of palilalia, the delayed repetition of phrases or words, for five preschool children

diagnosed with autism. During the initial baseline, frequency of palilalia was high and stable, and frequency of mands and tacts was low for most participants. During the initial treatment when tact corrections were contingently presented, frequency of palilalia descended to low and stable levels while frequency of mands increased for all participants. Similar trends were observed again during re-

Figure 2. Total frequency of palilalia and combined mands and tacts emitted in treatment setting during baseline and intervention sessions for Participants A and E.

versals to baseline and treatment. Thus, the aforementioned data showed that the palilalia of all the participants decreased to low and stable levels as a result of the contingent tact presentations by the experimenters following the target children's emitting palilalia.

DISCUSSION

In this study, students who emitted the highest instances of palilalia during baseline conditions were also those who had a history of emitting the fewest independent verbal operants. During treatment, tact opportunities by instructors were provided contingent upon the students' palilalia. Data showed a clear-cut sig-

nificant decrease in the students' palilalia and a corresponding increase in the number of mands and tacts they independently emitted. Reversals to baseline and treatment procedures showed a functional relationship between the contingent tact instruction and concurrent decreases in palilalia and increases in mands and tacts. Reinforcement for verbal operants acted to displace the emission of palilalia. This does not mean, however, that the source of reinforcement for the two responses was necessarily the same. While it is possible, although unlikely, that the source of reinforcement for the palilalia was a generalized reinforcer such as attention, it is more likely that the generalized reinforcer for tacts or the specific reinforcement

for mands replaced the automatic reinforcement for palilalia.

The tact corrections could also be interpreted as punishers for emitting the palilalia resulting in decreases in that response and providing opportunities for reinforcement for tacts or mands, in which case the intervention phases provided contextual control for conditional responding. That is, given the conditions in effect, the child emitted tacts and mands and was reinforced, while emission of palilalia resulted in interruption of the automatic reinforcement function. The fact that the effects reversed readily during the baseline phases in the treatment and the "generalization sessions" suggests that this was the case. The conditional control was the audience, and the conditions of intervention made the audience salient while the baseline phase "signaled" that the audience was no longer available. In baseline phases the listener reinforcement for the speaker-as-own-listener function returned.

As the evidence accrues for the importance of the speaker as own listener capability in the evolution of children's verbal functions (Greer & Keohane, 2004; Lodhi & Greer, 1991), we need to consider whether the emission of palilalia by some children may be self-talk. Self-talk, as it may possibly be associated with the emergence of naming (Greer, Stolfi, Chavez-Brown, & Rivera-Valdez, 2004) or speaker as own listener during isolated play, is a critical step in the development of more complex verbal behavior. In such cases palilalia may be incipient-speaker-as-own-listener behavior, and while this repertoire needs to come under the relevant control of audiences, it is important to isolate determine whether the palilalia is incipient speaker as own listener responding.

There is some evidence that stereotypy functions accrue from palilalia just as do other types of repetitive behavior. For examples, Greer, Becker, Saxe, and Mirabella (1985) and Nuzzolo-Gomez, Leonard, Ortiz, Rivera, and Greer (2002) found that conditioning observing responses for books or toy manipulation as new reinforcers replaced stereotypy with behaviors resulting from the newly conditioned stimulus control. It is quite possible that paucity of reinforcers, in particular, results in the emission of stereotypy. The prevalence of repetitive behavior is common in waiting rooms when individuals do not read, talk or send text

messages on cell phones, perform crossword puzzles, play with computer games, or listen to music on earphones, or watch television on monitors. Children engaging in frequent stereotypy may do so because of a paucity of conditioned reinforcers or the lack of access to them (Greer, 2002).

The human organism engages in continuous behavior that is selected out by their existing community of reinforcers. Unconditioned reinforcers are simply not adequate to fill the day and others are necessary. Given this theory, what does this suggest for palilalia? First we need to determine whether interrupting stereotypy is detrimental to the development of speaker as own listener repertoires. In the cases of the students we studied it is likely that the procedure we used did not interfere with this process since they simply reverted to the speaker as own listener reinforcement episodes when the contextual control of the audience was changed. The long-term change in palilalia will accrue as the students acquire more conditioned reinforcers. Moreover, the speaker-as-own-listener repertoire may acquire naming functions or covert self-talk functions that all of us engage in when we speaker to ourselves *sotto voce* in what we might tact as thinking.

However, for those children who do not have true echoic repertoires but who engage in parroting as a form of stereotypy the situation may be different. Skinner distinguished between parroting and echoic responding. It would appear that parroting is simply the repetition of non-functional speaking. That is, its single function is automatic reinforcement. Once an adequate history of learning functions for the vocal utterances accrues, the echoic moves into verbal operant functions, such as mands, tacts, or later higher-order operants, such as naming. Thus, tactics like the one we introduced herein are particularly important for moving individuals from parroting to functional echoics. For children with functional echoics, expanding the reinforcing options for pure tacts is particularly important since it provides the means to expand their community of reinforcers. Thus, the instructional history and contextual control instructional history is the key to determining what interventions are needed.

Clearly, research informed by these distinctions is needed. Since reinforcers control all

operants, it is not enough to simply identify an existing reinforcer. Rather, it is incumbent on behavior analysis to identify what instructional interventions are needed to develop new reinforcers. Similarly the non-contingent delivery of preferred items simply masks the instructional problem. In addition, it is critical to identify the role of the palilalia in the evolution of new verbal capabilities such as speaker as own listener. The problem is not behavior, but rather changes in the controlling contingencies.

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