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A summarization of the study from the Carbone Clinic:

Increasing Vocalizations of Children with Autism Using Sign Language and Mand Training

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Background:

Manual sign language has been shown to support the development of vocal verbal behavior in some individuals with autism and developmental disabilities (Mirenda & Erickson, 2000; Mirenda, 2003; Tincani, 2004). However there is a subset of children with autism for whom sign language may not facilitate vocal production (Mirenda, 2003). In those cases it may be necessary to add other behavioral interventions to increase the development of vocal responding. Language training programs that manipulate motivative variables to teach manding have been shown to increase spontaneity (Shafer, 1994) and vocalizations (Charlop-Christy, Carpenter, LeBlanc & Kellett, 2002).

Skinner (1957) defined the mand as a verbal response which is evoked by some conditions of deprivation, satiation, or aversion and which is reinforced by a consequence specific to the motivational variable.

A time delay or prompt delay procedure following the presentation of a vocal model to increase vocal spontaneity and production, has been shown to be effective. (Halle, Marshall, & Spradlin, 1979; Halle, Baer, & Spradlin, 1981; Carr & Kologinsky, 1983; Charlop, Schreibman, & Thibodeau, 1985; Bennett, Gast, Wolery, & Schuster, 1986; Matson, Sevin, Frideley, & Love, 1990; Ingenmey & Van Houten, 1991; Charlop & Trasowech, 1991; Matson, Sevin, Box, & Francis, 1993).

The time delay procedures implemented in these studies had been shown to be effective with participants who had a vocal repertoire that was dependent upon prompting. The time delay procedure had not been previously tested for its value initiating new vocal responses in children with autism who used sign language as their primary form of communication instead of vocalizations, or had few vocalizations.

The purpose of the research:

The purpose of this study was to determine the effects of sign mand training combined with a time delay, vocal prompt and differential reinforcement procedure on the development of vocalizations in children with autism for whom sign language mand training alone had not produced vocal responding.

Method:

Participants:

Three male participants were used in this study. Two of the participants were age four (Tony) and six (Nick) and both diagnosed with autism. The third participant was age four, diagnosed with Down Syndrome (Ralph). All participants had limited receptive, tact and intraverbal repertoires.



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Tony manded via American Sign Language (ASL) for 15 items, those were present and highly motivating. The Kaufman Assessment (Kaufman Speech Praxis Assessment, 1995) found that Tony had a weak echoic repertoire which involved approximations to consonant - vowel - consonant combinations (CVC words for example, "oh no" and "oboe.").

Nick required partial physical prompts or full physical prompts to produce his manual sign mands. However his manding repertoire was considered as weak. During the modified Kaufman Speech Praxis Assessment, Nick did not echo any vocal responses.

Ralph used manual sign language to mand for 10 items that were present and highly motivating.

Setting:

The study was conducted in each of the participant's classroom. Each room had six to eight children with at least three (3) adults.

Defining Responses:

This study measured the occurrence of vocalizations during sign manding, either following a time delay or after the presentation of a vocal prompt. Any sound made by the participant was identified and recorded as a vocalization. A word approximation was defined as a vowel-consonant (VC) or consonant-vowel (CV) combination that were in the name of the item presented.

Recording Procedure:

Baseline:

Vocalizations and approximations were recorded by the participant's instructor. Instructors sat next to the child at a table with their data sheets. Six potential reinforcers, which included edibles, movies and toys, were placed in a random rotation throughout the session approximately one foot away from the learner. Instructors recorded vocalizations or word approximations by writing the phonetic spelling of each vocal response with the prompt level necessary to evoke the vocal response. Inter-observer agreement was conducted for 30% of all sessions. Inter-observer agreement ranged between 96%-100% with an average of 99% percent agreement.

Time Delay and Vocal Prompt:

During the intervention phase, the examiner sat at a table approximately two feet across from the participant in his classroom. The items the participant would potentially mand for were on the table next to the experimenter. All participants had six different reinforcers present at every session. There were two sessions per day each consisting of 50 trials. Each trial began with the experimenter holding the item at eye level as a signal to the participant that reinforcement was available contingent on them signing for the item. When the participant signed, the reinforcer was not immediately delivered and



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instead a five second time delay was implemented. During the five second delay, any vocalization by the participant resulted in delivery of the reinforcer immediately.

If the participant did not vocalize during the time delay interval, the experimenter would say the name of the desired item as a vocal prompt and wait two seconds for a response. If a vocalization occurred within two seconds of the presentation of the vocal stimulus (prompt) the reinforcer was delivered immediately. If no vocalization occurred, the vocal prompt was re-presented two more times. The reinforcer was delivered immediately upon hearing any vocalization or word approximation from the participant following the vocal prompts. If no vocalization or word approximation occurred the reinforcer was delivered at the end of the sequence of presentations of the vocal prompts.

Maintenance:

Maintenance data was collected ten months following the completion of the experimental condition. Four sessions of maintenance data were conducted during which each targeted item was presented once. Each session consisted of six trials and there was one session a day for four consecutive days. Each trial began with the experimenter holding up the item to the participant's eye level in order to signal the availability of the reinforcer.

If the participant signed for the item correctly within five seconds of the presentation the item was delivered immediately. If the participant did not sign for the item immediately or signed incorrectly, the experimenter provided a manual or gestural prompt to evoke the response. Using the same response definition as in the experimental condition, the experimenter recorded the occurrence of any vocalization or word approximation that the participant produced when he signed. Inter-observer agreement was 100% across all participants.

Results:

When the experimental condition was introduced Tony's vocalizations or word approximations went from an average of about 20% during baseline to about 95% in treatment. Tony maintained an average of about 95% of vocalizations or word approximations while manding during maintenance sessions.

The frequency of vocalizations or word approximations for Ralph immediately increased to approximately 70% from a baseline percentage of near zero upon entering treatment and then stabilized with about 95% of trials containing vocal responses for the last few treatment sessions. 10 month follow-up data indicates that Ralph's vocalizations during sign manding were maintained at a level substantially higher than baseline.

Nick's vocalizations immediately increased to approximately 10% during treatment and steadily increased to 40% throughout treatments sessions as compared to a baseline percentage of near zero. The ten month follow-up data indicated that Nick's vocalizations while sign manding were maintained at a level substantially higher than baseline.

Discussion:



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The results of this study demonstrate that sign mand opportunities combined with a prompt delay procedure and vocal prompting with differential reinforcement for sound production can increase the frequency and variety of vocalizations in children with autism and other developmental disabilities.

Tony demonstrated the highest percentage of trials with vocalizations and word approximations and was the only participant to develop the production of the word "movie" as a mand to view a video. He entered the study with the strongest vocal repertoire in that he produced the greatest number and variety of sounds during the baseline sound inventory.

Maintenance data show that Tony and Ralph continued to vocalize at a high rate while sign manding despite no treatment for a ten month period. The fact that the time delay procedure produced a relatively higher rate of vocalizations as compared to the vocal prompt procedure implicates the role of extinction. It appears that failure to reinforce the sign mand immediately during treatment may have led to response variation in the form of vocal responses consistent with the side-effects frequently associated with extinction (Lerman and Iwata, 1996).

This article is a summary of the original paper which can be downloaded from www.carboneclinic.com/research.aspx

Please note the every effort has been made to condense and provide a broad overview of this research, however in order not to lose the key information some of the information in this summary has been copied directly form the original article. All credits of the summary whether directly worded or re-worded are solely given to the researchers.

Please contact your ABA/VB consultant before implementing any of the procedures conducted in the paper on your child.

For the permission to post this study we thank: Dr. Vincent Carbone, Ed.D., BCBA

For the summary great thanks to: Miss Georgiana Elizabeth Barzey.