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A FAILURE TO TEACH A SIGHT VOCABULARY BY VANISHING LITERAL PROMPTS.

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A STUDY BY TABER AND GLASER WHICH TAUGHT SIGHT VOCABULARY BY THE VANISHING LITERAL PROMPTS METHOD WAS REPLICATED IN AN EXPERIMENT WITH 14 PRESCHOOL, KINDERGARTEN, AND BEGINNING FIRST-GRADE CHILDREN. MATERIALS USED WERE EIGHT LOWER CASE COLOR WORDS PRINTED ON 3 BY 5 CARDS. AFTER PRETESTS TO IDENTIFY COLOR KNOWLEDGE AND CONFIRM LACK OF WORD KNOWLEDGE, EACH SUBJECT WAS INDIVIDUALLY GIVEN A TRAINING SEQUENCE OF NINE TRIALS BEGINNING WITH THE COLOR WORDS (CUES) ACCOMPANIED BY FOUR RADIATING LINES (PROMPTS) WHICH WERE THE COLOR NAMED BY THE WORD. THE COLOR PROMPTS WERE REDUCED IN EACH SUCCEEDING TRIAL UNTIL TRIAL NINE, WHEN THE WORD WAS PRESENTED ALONE. VERBAL REINFORCEMENTS WERE GIVEN BY THE EXPERIMENTER AFTER CORRECT RESPONSES BY THE SUBJECT. A POST-TEST WAS GIVEN TO DETERMINE IF THE SUBJECT HAD LEARNED THE WORD. TABOR AND GLASER'S FINDINGS WERE NOT CORROBORATED IN THE ANALYSIS OF RESULTS. IT WAS FOUND THAT THE DESIRED SHIFT IN STIMULUS CONTROL DID NOT TAKE PLACE. POSSIBLE REASONS FOR THE RESULTS ARE DISCUSSED. INDIVIDUAL TESTING SITUATIONS ARE EXPLAINED AND BEHAVIOR PATTERNS EXAMINED. TWO TABLES PRESENTING THE NINE-TRIAL VANISHING SCHEDULE AND A SUMMARY OF THE DATA FOR EACH SUBJECT ARE INCLUDED. REFERENCES ARE GIVEN. THIS PAPER WAS PRESENTED AT THE AMERICAN EDUCATIONAL RESEARCH ASSOCIATION CONFERENCE (NEW YORK, FEBRUARY 1967). (LS)

A Failure to Teach a Sight Vocabulary by Vanishing Literal Prompts[1]

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Prompting is the pairing of a cue, the stimulus that is to control a response when the training is completed, with a prompt, a second stimulus that already controls the response or controls it to some degree. The object of a training sequence using prompts is to shift the control of the response from the prompt to the cue. For example, the picture of a key which elicits the vocal response "key" might be paired with the printed form of the word. If when the training is completed the student says "key" in the presence of the printed word alone, a shift in stimulus control from the prompt, the picture, to the cue, the printed word, has taken place. A technique often recommended for obtaining this shift in stimulus control is the gradual removal or reduction in magnitude of the prompts, which is called "vanishing" or "fading."

In a widely-quoted paper reprinted in a popular book of readings (DeCecco, 1964), Taber and Glaser (1962) described a vanishing procedure which they suggested is a prototype for establishing discriminative stimulus control. They (1962, p. 508) indicated that the specifications for such a procedure are as follows: "it is simply required that the desired response be elicited in the presence of the stimulus which is

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[1]Paper read at the annual convention of the American Educational Research Association, New York, 1967.

to acquire discriminative properties, and that reinforcement be contingent upon such an occurrence." They designed a teaching sequence using prompting and vanishing which met these specifications. This sequence entailed the pairing of eight printed color words with four radiating lines which were of the color named by the word. Gradually the colored lines were shortened and finally removed over a series of nine training trials. The child was instructed to "read the word" so he overtly responded to each frame. He was liberally reinforced with such words as "right," "good," and repetition of the color name when he gave the correct response. Students were pretested on both colors and words and were posttested on the words. Taber and Glaser reported that this training sequence taught any kindergartener or first grader who correctly identified samples of the colors on the pretest to "read" the color names.

This paper reports an attempt to replicate the Taber and Glaser study.

Method

Sample. -- Ss were 14 preschool, kindergarten, and first grade children. Two additional Ss were not included in this report: one because the pretest revealed she could read the words, and one because he did not consistently identify the colors correctly.

Materials. -- The stimuli were presented on 3 x 5 in. cards. The lower case printed words were centered and the four colored lines

radiated from them. The lettering was done with Leroy template number 3240-290CL with pen number 2 and zero degrees of slant in black drawing ink. Letters not extending above or below the line were 3/16 in. high. The vanishing sequence was identical to that used by Taber and Glaser (1962), described in Table 1, except that the eighth training trial was removed (as was recommended by Taber and Glaser) for the first eight Ss. The eighth trial was included in the training sequence presented to the last six Ss. This study used the eight color words Taber and Glaser used -- brown, red, yellow, blue, purple, green, orange and black. Each word appeared once in each training trial and the words appeared in a different random order within each trial.

For the pretest and posttest Taber and Glaser (1962) used two pages with each containing all eight words. In this study each word was placed upon a separate 3 x 5 in. card and appeared once in each of two randomly ordered test trials for both the pretest and posttest. Instead of using colors appearing upon the cover of the programed materials the color pretest consisted of 3 x 5 in. cards containing four colored radiating lines, without the printed word, of course. Every color appeared once in each of two randomly ordered trials.

Procedure. -- The E, working with each child individually, administered the pretests for words and colors, the training sequence, and then the word posttest. Since it was assumed the sequence would teach, the procedure for the first few Ss was rather highly structured with time controlled by E; however, as more Ss were run various changes were

made in an attempt to improve the procedure. Finally, a standardized procedure was used with the last six Ss. These various changes in procedure will be described along with the results.

Results

Table 2 summarizes the data obtained from each student. The total number of items on the color pretest, word pretest, and word posttest in each instance was 16 since each color or word appeared twice. All students missing more than one item on the color pretest were included in the experiment provided they did not miss the same color both times it appeared or provided they correctly identified the missed color when it accompanied the written word during the first prompted training trial. One exception to this general rule was S5 who missed brown twice on the color pretest and on the first training trial. She was corrected on the first training trial and proceeded to complete the training sequence without making another error as long as the color prompts were present, so she was included in the sample.

With Ss 1 and 2 the task was approached as a game with color names. The cards forming the first word pretest trial and the first color pretest trial were merged and then randomized. The second trial of the pretests was treated in the same way. The students were instructed to "say the color name" if they could. The words were presented in the centered window of a Masonite panel which E sat behind. The child had five sec. to respond to each pretest presentation. The pretest

was followed by practice for the training sequence using cards containing a word paired with a picture which elicited the correct vocal response, for example the word pie paired with a picture of a pie. The student was instructed to "say the word before I say it." After four examples the student was told he would "begin to play the real game with the color words." The student had five sec. to respond before E said the correct response. Then the child had an additional five sec. to study the card. Learners were corrected on all training trials and the color pretest but not on the word pretest or posttest. Verbal reinforcement such as "good," "fine," and "excellent" was given during a 10 sec. intertrial interval. On the posttest five sec. were allowed per word and no feedback was given.

An observer who had watched Ss 1 and 2 through a one-way glass agreed that some of the errors obviously resulted from wandering attention. Because of this the Masonite panel separating E and the child was discarded and the time for each time interval was reduced for the next S to four sec. The E now sat beside the student and turned the cards while recording the student's responses. On the pretest S2 began calling the words black once she had seen a few of the color pretest cards; hence, the color and word pretests were separated for every subsequent S. The pretest for words followed the pretest for colors. In the color pretest Ss were asked to "name the color," and in the word pretest to "read the color word" if they could. The four examples of the training procedure seemed to add nothing so they were removed and the S was simply told to

"try to read the word before I do." The instructions were changed from "a game with colors" to "learning to read the color words." S3 was run under these conditions and the only change in procedure made after S3 was to reduce each time interval from four to three sec. since several errors still seemed to be more a function of too much time, and hence wandering attention, than inability to give the correct response.

After S4 was run with three sec. time intervals the timing was dropped and each subsequent child was self-paced. If the child could spell the word by pointing to the letters on the word pretest he was allowed to do so. The learner was now simply instructed to "read the word." Rather than repeat each response after the child, social reinforcers such as "good," "fine," "right," and "excellent" were mixed with repetitions of the word. No standardized reinforcement schedule was adopted at this time. The E tended to give continuous reinforcement early in training followed by a gradual reduction in the frequency of reinforcement. If the learner seemed to hesitate over a response, that response was always either reinforced or corrected. This procedure was used for Ss 5 through 8.

Ss 3 through 8 were members of a summer day school. They were run in mid July and all but one, S4, had been in the school during the preceding year. They had all learned to identify colors and had been given practice on such tasks as identifying the letters of the alphabet, their names, and some other words. The final six Ss were first graders who were run about a month after the beginning of school in the fall.

The following changes were made in the procedure. The color and word pretests were interchanged so that the word pretest appeared before the color pretest. This was done because the guessing behavior of previous Ss suggested that the color pretest acted as a prompt by narrowing the possible answers for the word pretest. Now the Ss were told their task was to learn to "read some words" rather than "color words." The students were not given the opportunity to show whether they could spell the words although some did identify a letter or two. This was done because (a) Taber and Glaser (1962) did not list letter discrimination as a prerequisite, and (b) previous Ss who did and did not spell the pretest words did not react differently to the training sequence. The Ss continued to be self-paced and social reinforcement was set up on a FR3 schedule for the color pretest, the training trials, and the posttest. No reinforcers giving information about the correctness of a response were used after the prompts were completely removed. If the child made an error the E said the correct response on the color pretest, and on all the prompted training trials. The eighth training trial was added to the sequence so that the training sequence was now identical to that used by Taber and Glaser. Ss 9 through 14 all received training under these conditions.

As Table 2 indicates error rates were low. The majority of the children made two or fewer total errors during the prompted trials, which required 56 responses from Ss 1 through 8 and 64 from Ss 9 through 14.

Taber and Glaser (1962) reported that the eighth training trial in which the first two letters of each word appeared in the color and the rest in black "confused the student," and they recommended that it be omitted. This training trial was included for Ss 9 through 14. For the first item in this trial one student gave the correct vocal response "green," two said "black," two said "green and black," and one had to be told the correct response. The response to this item was also characterized by an increased latency and decreased magnitude, that is the student hesitated and then whispered or mumbled his response. After the first item was corrected or reinforced the Ss had no problems giving the correct responses for the remainder of this training trial.

Two behavior patterns clearly emerged on the posttest despite the various changes made in the procedure as time progressed. On the first unprompted trial all of the students called the first two or three stimuli "black." At this point the response latency typically increased and the response magnitude decreased. By the fourth or fifth item the pattern of responses fell into one of the following categories and the response latency and magnitude returned to normal. The majority of the Ss (N=9) called all unprompted items "black." In Table 2 all of these Ss have a reported error rate of 88% on the posttest since they were correct both times the item "black" appeared. S9 was included in this group even though she stabilized on the response "brown" rather than "black." The rest of the children (N=5) guessed freely.

Discussion

Although the training sequence employed in this study met the specifications set forth by Taber and Glaser (1962), namely that the correct response was elicited in the presence of the cue and reinforcement was contingent upon the correct response. the children in this study did not learn the task set for them. When the training sequence was completed, the cues did not control the behavior of any of the children, indicating that the desired shift in stimulus control from the prompt to the cue had not taken place. Only one child, S13, correctly identified a word other than black (or brown in the case of S9) both times it appeared on the posttest and he correctly identified that one word, red, once on the pretest.

Some recent experiments (Anderson and Faust, in press; Faust and Anderson, in press) in programed instruction indicate that an important factor in an efficient training sequence using prompts is forcing the student to notice the cue while he is making the response. Frames designed to force the student to notice the cue while he copies the response term produced significantly more learning than frames which allowed the student to copy the response term without noticing the cue. An analysis of the observing behaviors required of the subject in order for him to respond correctly in this study, indicates that he had only to notice the color of the lines and dots. He never had to notice the shapes of the individual letters or the overall form of the printed word

in order to respond correctly. As a consequence the child failed to learn to "read" the color names even though he completed the training sequence with few errors.

Of course, the child could have studied the printed words as well as notice the colors, and thus perhaps he could have voluntarily associated his response with the cue. Obviously the children who participated in the study did not voluntarily make this hook-up. However, other data that we have collected with different stimulus materials indicate that by late in the fall semester (if not earlier) first graders, like adults, can and do voluntarily make such hook-ups while first-semester kindergarteners do not. This difference between kindergarteners and first graders could be the result of maturation but it could also be the result of additional learning. First graders get a great deal of experience with words. They have an opportunity to learn that groups of letters stand for words for which they know the vocal forms and they have experience associating vocal responses with the printed forms of words. Perhaps it is this familiarity with the task of "learning to read" words which turns the child who has not voluntarily associated the printed form of words with the vocal forms into one who does. Our best guess is that the vanishing procedure worked for Taber and Glaser and not for us because their children somehow were more sophisticated with respect to words and letters than ours.

Why didn't this sequence produce the desired shift in stimulus control when other sequences entailing the gradual removal of prompts

have? Moore and Goldiamond (1964), for example, taught four and five year old children a matching to sample task by gradually removing a brightness difference between the correct and incorrect choices, and Terrace (1963) taught pigeons a red-green discrimination by gradually removing a brightness and duration difference between the S^D and $S\triangle$. Terrace (1966, p. 315) indicates that the crucial period is just before the prompts are completely removed. In the fading sequences of Moore and Goldiamond, and Terrace as the prompts were removed it probably became increasingly difficult to make the discrimination on the basis of the prompt alone, since a small difference in brightness or duration is harder to detect than a larger one. Because it was more difficult to make the discrimination on the basis of the prompt alone, perhaps the S began to pay attention to the other stimuli available for making the discrimination and, as a result, the shift in stimulus control took place. On the other hand in the vanishing sequence used in this study the smallest prompt used -- for instance, a dot of red -- is just as discriminable as a line of red so the discrimination could still easily be made on the basis of the prompt alone. It may be that since the S was not forced to shift from the prompt to the cue he never did.

Table 1

Vanishing Schedule in the Taber and Glaser Training Sequence

Trial 1	colored 1 inch radiating lines
Trial 2	colored 1/2 inch radiating lines
Trial 3	colored 1/4 inch radiating lines
Trial 4	colored 1/8 inch radiating lines
Trial 5	four colored dots where the lines had originated next to the word
Trial 6	two colored dots, one at the beginning and one at the end of the word
Trial 7	each word printed in its color
Trial 8	two letters of each word in its color, the rest of the letters in black
Trial 9	all words in black

Table 2

Summary of the Data for Each Subject

Subject Number	Age	Pretest Percent Error		Program	Posttest	
		Words	Colors	Percent Errors on Prompted Training Trials	Percent Errors	Nature of Response
1	5 yr. 0 mo.	100%	19%	18%	100%	guessed freely
2	5 yr. 5 mo.	100	6	3	94	guessed freely
3*	4 yr. 5 mo.	100	19	16	88	all black
4	5 yr. 10 mo.	88	19	15	88	all black
5*	4 yr. 9 mo.	100	13	1	88	all black
6*	5 yr. 2 mo.	94	0	3	100	guessed freely
7*	4 yr. 10 mo.	100	13	1	88	guessed freely
8	3 yr. 2 mo.	100	0	18	88	all black
9	6 yr. 6 mo.	100	6	3	88	all brown
10	6 yr. 4 mo.	100	0	1	88	all black
11	5 yr. 11 mo.	100	0	1	88	all black
12	6 yr. 9 mo.	100	6	1	88	all black
13	6 yr. 0 mo.	94	0	3	88	guessed freely
14	6 yr. 0 mo.	100	13	0	88	all black
$\bar{X}$	5 yr. 5 mo.	98	8	5	89	

*Subjects who correctly spelled the words on the pretest while pointing to the letters.

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