

ESTABLISHING USE OF DESCRIPTIVE ADJECTIVES IN THE SPONTANEOUS SPEECH OF DISADVANTAGED PRESCHOOL CHILDREN¹

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From observer records, a count was made for each child, in a group of disadvantaged children in an experimental preschool, of usage and acquisition of descriptive adjectives, with and without noun referents. Procedures were sought which would effectively modify the low rates of adjective-noun combinations in the everyday language of all the children. Time in school, intermittent teacher praise, and social and intellectual stimulation were not effective in changing the low rates of using adjectives of size and shape. Group teaching effectively increased rates of using color- and number-noun combinations in the group-teaching situation, but was ineffective in changing rates of usage in the children's "spontaneous" vocabularies. By operating directly on the children's language in the free-play situation, making access to preschool materials contingent upon use of a color-noun combination, significant increases in such usage were effected in the spontaneous vocabularies of all the children. Preschool materials apparently functioned as powerful reinforcers. Though traditional teaching procedures were effective in generating adjective-noun combinations in that restricted situation, it was only through application of environmental contingencies that color names as descriptive adjectives were effectively and durably established in all the children's spontaneous vocabularies.

Reflected in the national concern for the scholastic retardation of culturally deprived children is the contemporary conviction that the sources of academic failure are primarily environmental rather than genetic (Bijou, 1963). That the environment of the culturally deprived child can, and should, be changed, is not an issue; rather the questions are ones of defining and producing those environmental changes which will generate academic success. The present consensus is that the behavior most correlated with public school success is verbal behavior, skill in language (Weikart, 1966). As opposed to the linguistically skillful and academically successful middle-class child, the culturally deprived child is characterized as having a language environment which is

both "restricted" in terms of range and detail of concept (Hess and Shipman, 1965), and rich in forms of expressive speech which are not used in middle-class-oriented school books and systems (Riessman, 1962). Thus, programs for the development of language skills, the core of all preschool programs for culturally deprived children, seek to give the children educationally appropriate forms of speech, and to enrich their descriptive vocabularies. In such programs the children are directly taught, for instance, the appropriate use of adjectives of color, number, size, shape, *etc.*, and the preschool environment is arranged so that they will use them in conversation and narration. That is, "knowing"—the ability to respond correctly when asked—is not considered sufficient; the criterion for "skill" is usage, spontaneous emission as functional language in everyday situations.

There is general agreement concerning what should be taught to culturally deprived children but considerably less agreement about how to teach it most effectively. Many methodologies have been employed, with varying degrees of success (Weikart, 1966). The urgency of the problem, and the need for practical solutions has led, however, for the first time in the long history of preschool education, to empirical evaluation of the effective-

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ness of traditional teaching procedures. Such evaluation has frequently resulted in pervasive restructuring of the preschool environment in order to achieve the behavioral goals set for the culturally deprived child (Bereiter and Engelmann, 1966). Most important, it has resulted in introducing into the time-honored preschool program those procedures which experimental research has demonstrated to be effective in teaching children.

Research has repeatedly demonstrated that a child's behavior can be modified by its consequences. Such demonstrations have been made in a multiplicity of settings: in the laboratory (Lindsley, 1966), in institutions (Wolf, Risley, and Mees, 1964; Lovaas, Freitag, Kinder, Rubenstein, Schaeffer, and Simmons, 1966), in preschools (Harris, Wolf, and Baer, 1964; Brown and Elliot, 1965), in the classroom (Zimmerman and Zimmerman, 1962), in the clinic (Wahler, Winkel, Peterson, and Morrison, 1965), and in the home (Allen and Harris, 1966). The behaviors so modified have included verbal (Risley and Wolf, 1967), motor (Johnston, Kelley, Harris, and Wolf, 1966), social (Allen, Hart, Buell, Harris, and Wolf, 1964), and academic behaviors (Wolf, Giles, and Hall, 1968; Birnbrauer, Wolf, Kidder, and Tague, 1965). The general principles of reinforcement, which were the basis of all of the above-mentioned studies, were also the basis of the present study. That is, the present investigation involved: defining an observable terminal behavior, the use of descriptive adjectives during free play; devising a method of recording and measuring important categories of spontaneous verbal behavior; and manipulating the consequences of the children's use of language, the presentation of social reinforcement and access to materials contingent on a specified form of verbal behavior. The effectiveness of these procedures is evaluated in terms of the behavioral goals defined, and compared to the effectiveness of traditional preschool procedures in the attainment of these goals. The implications of the study thus relate not only to the problem of cultural deprivation, but to preschool practice in general.

METHOD

Setting and Subjects

The study was conducted at the Turner House preschool of the Juniper Gardens Chil-

dren's Project in Kansas City, Kansas, and involved 15 children, all Negroes, from a lower class community, selected from large families with extremely low incomes. There were eight boys and seven girls in the group, all aged from 4 to 5 yr. The average IQ, as measured by the Peabody Picture Vocabulary Test, was 79.

The preschool sessions were 3 hr long, from 8:30 to 11:30 A.M., five days per week. The daily program was: breakfast, then free play indoors, then group time, then free play outdoors, followed by story time at the end of the morning. During indoor and outdoor free play the children could interact with materials and with other children in one or more of the unstructured activities normally provided in the preschool program, *e.g.*, blocks, painting, sand play, *etc.* Most, but not all, materials were available to the children during free play; items such as water and paint were dispensed by teachers.

Breakfast, story time, and group time were teacher-structured situations. At group time, eight or fewer children sat on a rug with a teacher who formally presented stimuli for identification and description. Children were called on individually by the teacher, and were presented with a food snack and teacher praise for correct responses. The classes of responses reinforced at group time were first, identification of pictures and objects, then description of objects in terms of color, and finally description of objects in terms of number. Stimuli for a given class of responses, such as identification, were presented daily at varying levels of difficulty for several months, until all children in the group had attained a certain criterion of response accuracy.

Procedures

Recording. At group time throughout the year an observer recorded on a check sheet whether each response of each child in the group was designated by teacher feedback to the child as "right" or "wrong".

During four periods within the school year, daily samples were taken of children's verbalizations during free play. A sample was recorded by one of four observers, who moved with the child being observed from one activity to another, and for 15 min wrote down in longhand "everything" the child said. Two observers recorded throughout the school

year; the third was replaced by the fourth observer for two months in mid-year (February and March).

Each child in the group was assigned for observation approximately every other day during the periods of sampling; roughly two observations were made indoors for every one made outdoors because of the sequence of the preschool program. Observation was discontinued whenever free play ended; therefore samples were occasionally of less than 15 min when, for example, outdoor play was curtailed by rain, or a child was removed from the group for a test. Usually a given child was assigned for observation to each of the observers in turn. This was done to minimize the development of any observer bias concerning a given child, and to distribute the writing load of high-rate verbalizers *versus* low-rate.

The sampling periods were:

- (1) 7 days (August 31-September 9; days 3 through 9 of school).
- (2) 18 days (October 3-October 26; days 25 through 42 of school).
- (3) 10 days (December 12-December 23; days 71 through 80 of school).
- (4) 99 days (January 17-June 9; days 91 through 189 of school).

From the samples were extracted for each child lists of vocabulary entries in the classes of nouns, verbs, and adjectives. Only certain categories of adjectives were counted: size, color, number, and shape, *i.e.*, the descriptive categories usually directly taught in preschool programs. Within each of the categories of descriptive adjectives (color, number, size, and shape) separate counts were made for:

- (1) All adjectives of that category. Every use of an adjective in each of the four categories was counted regardless of the context in which it appeared, *i.e.*, whether or not it was followed by a noun, or was used with a verb. The categories of descriptive adjectives thus counted were defined as:

All color adjectives: *e.g.*, "red", "red one", "red paint".

All number adjectives: *e.g.*, "one", "two blocks", "three billion" (counted as a single number), "one-two-three" (counted as three numbers).

All size adjectives: *e.g.*, "big", "little

one", "He is big", "long time".

All shape adjectives: *e.g.*, "round", "square one", "round circle".

- (2) All adjective-noun combinations of that category. Every use of an adjective in each of the four categories was counted *only* if it was followed by a noun. The categories of descriptive adjectives so counted were defined as:

All color-noun combinations, as "red paint".

All number-noun combinations, as "two blocks".

All size-noun combinations, as "long time".

All shape-noun combinations, as "round circle".

- (3) All new adjective-noun combinations of that category. Every use of an adjective in each of the four categories was counted for a given child *only* if it was followed by a noun and that combination of adjective and noun had never been recorded in any previous sample on that child. The categories of descriptive adjectives so counted were defined as:

New color-noun combinations.

New number-noun combinations.

New size-noun combinations.

New shape-noun combinations.

Thus, for example, if an observer recorded a child's having said, "I want red paint", and the adjective-noun combination *red paint* had never appeared in any prior sample on that child, it would be listed as a new color-noun combination (in addition to being counted as another use in all color adjectives and in all color-noun combinations).

Periodic reliability checks were taken among the three observers (the third and fourth observers were considered, over the year, as a single observer). Periodically, two or more observers were assigned to observe the same child at the same time, each observer recording independently all that child's verbalizations during a given 15-min period. In addition, a volunteer observer made once-weekly reliability checks, in the same manner, with one or more of the regular observers; this volunteer had almost no contact with either

the teachers, the other observers, or any changes in preschool conditions. From the two or more records obtained, all instances of adjective usage in any of the four categories of color, number, size, and shape, were totaled. The record of Observer 1 was always taken as standard, whenever she and any other observer recorded on the same child. When Observers 2 and 3 took reliability checks together the record of that observer who had taken the majority of samples on the given child was taken as standard. Product-moment correlations of the reliability of the total adjective usage over samples was calculated for the regular observers in relation to one another, and for the volunteer observer in relation to the three regular observers.

Baseline. From the beginning of the school year, teachers attended to children when they heard them use descriptive adjectives during free play. The appropriate use of such adjectives was thus followed intermittently by teacher approval, and incorrect use was followed intermittently by teacher correction. If the adjective used was part of a request for a material, the child almost always obtained the object requested; no differential attention was given for use of adjective-noun combinations. The observer samples of the children's verbalizations during free play, however, revealed continuously low rates of use of all descriptive adjectives, whether of color, number, size, or shape. Teachers hypothesized that the limited use of these adjectives might be due to limited repertoires of appropriate labels. Therefore it was decided to systematically teach adjectival labels, starting with colors.

Baseline: color naming at group time. Beginning on day 103 of school, colors were presented every day at group time. The number of colors presented simultaneously was gradually increased from the initial three up to nine, but the manner of presentation remained essentially the same. In presenting each color, the teacher first named each object of that color (*i.e.*, "The car is red"), and placed it with others of the same color. Then she indicated, or had a child indicate, one object in a group and name it and its color (*i.e.*, "The car is red"). Every time a child correctly identified both an object and its color, the teacher praised him and passed him a snack. A complete sentence was always required; if a child named the correct color

without naming the object, the teacher praised him and told him he was right, and then asked for the complete sentence before passing him a snack.

Thus, in the group-time situation, teachers prescribed the terminal form of the behavior which they hoped to see in the free-play situation, that is, color-noun combination. Only by requiring that the referent for an adjective be named can a teacher be (fairly) certain that a child has made an appropriate discrimination. Subsequently, a teacher can judge the extent to which a child is forming a concept of a given property (such as "redness") only on the basis of that child's verbal behavior of attributing that property ("red") to a variety of objects ("apple", "car", *etc.*). When a child merely names the property ("red") or names the property with an indefinite word such as "one" ("the red one"), the teacher must make an assumption concerning the referent, and thus guess both that the child is making a discrimination and that he is forming a concept.

At group time, while presenting colors in the general manner described above, the teacher employed various levels of prompts in order to ensure each child's giving a correct response each time he was called on to name an object and its color. The level of prompt was adjusted to each child's need for such prompts, and every time a new color was introduced, the teacher dropped back, for the whole group, to the more obvious levels of prompts. In the most obvious prompt, the teacher gave the child the correct response immediately before the question, *i.e.*, "The car is red. What color is the car?". In less obvious prompts, the teacher asked a child to name a color and then if he hesitated, mouthed the color word, or gave its initial sound; often, she asked a child to name the color of an object which another child had named correctly immediately before.

Throughout the period of naming colors at group time, any color naming during free play was attended to by teachers, whether the child specified a referent for the color named or not. The teacher praised the child who named a color and told him he was right if this were the case, or corrected him and then praised his repetition of the appropriate color name.

After two months (50 school days) of naming colors daily at group time, seven of the 15 children were reliably naming nine colors in

that situation (red, yellow, blue, green, purple, orange, brown, white, and black). The other eight children were being presented only six colors at group time (red, yellow, blue, green, purple, and orange).

During this time, the children's rate of using color adjectives in the free-play situation showed no general change; however, teachers did note on two occasions late in this period sudden and marked increases in color naming by several children in the free-play situation. Both of these occasions involved a teacher dispensing vari-colored pegboard materials to children who, in order to obtain a specific item, had to ask for it by color. This procedure, of a teacher withholding materials until they were requested by a color-noun combination, appeared effective, at least on these occasions, in generating use of such combinations by children in the free situation.

Materials contingent on color naming. It was decided to apply this procedure throughout the preschool situation, and have teachers withhold materials until children asked for them by a color-noun combination. Therefore, beginning on day 153 of school, all of the children in the group could obtain a snack outdoors and certain materials and equipment indoors and out only if they named the desired object and described it by its color. Outdoor items such as trikes, wagons, balls, and shovels were not placed outside the storage shed as usual; rather, a child wanting to use them had to ask a teacher for them and employ an appropriate color-noun combination. A child desiring a snack from the basket held by the teacher had to ask, not for a snack or a cookie, but for a "brown" cookie (if the cookies were of that color), or a "yellow" banana. Indoors, items such as dress-up clothes in the doll house, pegboard materials, parquet blocks, toy animals, and cars, *etc.*, all had to be named by a color-noun combination before a child was allowed to use them. These materials were not removed from the children's reach; rather, when a child approached one of these materials, a teacher put her hand on the material the child was reaching for. During the first three days of the procedure, the teacher prompted the desired behavior, asking the child, "What do you want?", and then, if the child named the object without naming its color, the teacher asked, "What color of a?", and supplied the color name if the child either did

not respond or responded incorrectly. After the third day teachers no longer prompted; if a child asked for an object without naming its color, or reached for certain objects, the teacher simply put her hand on the object and looked expectantly at the child until he named the object and its color.

Certain materials such as paint and water, which had never been freely available to children, were dispensed only when asked for by color-noun combination, the teacher being "too busy" to attend to requests stated in any other form. The water which children regularly used to "cook" in the doll house was colored with food coloring, so that children had to specify the color or colors of water they wanted to use.

This procedure was continued for 19 days. Throughout, teachers praised every use of color adjectives. Whenever a child asked for a material by naming its color, the teacher verbalized her approval simultaneously with either dispensing the material to him or removing her hand so that he could take the object he had asked for. Spontaneous use of color adjectives on occasions unrelated to the contingency (*i.e.*, occasions other than those when the child "wanted something") were also praised; praise for such usage was given whether or not the child named a noun referent for the color.

Five days after introducing the requirement for naming colors in free play, the naming of colors at group time was discontinued for those seven children reliably discriminating all nine colors, and naming objects by number (counting) was substituted. A second group of eight children continued to have colors presented at group time; children moved from this group into the number-naming group as soon as they had demonstrated mastery of all nine colors. At the end of the school year 10 children were naming objects by number at group time and four children were naming objects by color at group time. One child was sick for the last month of school.

Materials not contingent on color naming. When stable changes were noted in all of the children's spontaneous vocabularies of color adjectives, the contingency of naming colors to obtain materials in the free-play situation was removed. This was done in order to evaluate whether the use of color-noun combinations during free play was maintained solely

by the contingencies presented by teachers. Thus, from the 172nd to the 189th and final day of school, all requirements for color naming during free play were discontinued; children were given snack and materials whenever they asked for them either with a noun alone or with an adjective-noun combination. None of the materials ordinarily made available in the free-play situation were withheld by teachers. The consequences of color naming were essentially those which existed during the first baseline period. That is, correct color naming in the free situation was followed intermittently by teacher approval and usually by obtaining an object (if the color name was part of a request for a material). Incorrect naming of a color was followed intermittently by correction from a teacher, and often by obtaining an object (whatever object the teacher assumed the child to be requesting).

RESULTS

Recording

Reliability checks taken periodically over the year by having two observers simultaneously record the behavior of a given child yielded the following product-moment correlation coefficients between observers for the total number of descriptive adjectives of color, number, size, and shape used by all the children in the group:

Observer 1—Observer 2	0.96
Observer 1—Observer 3	0.99
Observer 2—Observer 3	0.86.

The correlation between the volunteer observer and all of the three regular observers was 0.89.

Since most of the children were rotated for observation among the three observers, the correspondence of observations taken by the different observers during each of the four conditions provides another assessment of reliability. Figure 1 (top) shows the correspondence of observations taken by the three observers on all children in the group during each experimental condition. In each of the conditions the total number of color adjectives used per sample hour, and the total number of color-noun combinations used per sample hour for all children, as recorded by each observer, is shown. The bottom of Fig. 1 shows the correspondence of observations of a single

child taken by the three observers on different days during each experimental condition. This child, whose individual data are plotted in Fig. 3, is the median child in the group (number 8 in Table 1) in terms of overall rate of using color adjectives across all conditions; he is representative of the group also in terms of correspondence between observers in each condition.

Baseline

Figure 2 shows the average rate of use of descriptive adjectives of color, number, and size per sample hour by all the children during each of the four experimental conditions of the study. In each case, the white bar (all adjectives) includes the black bar (adjective-noun combinations). Use of adjectives of shape was not graphed, since the total was only 19 instances over the whole year for the whole group.

During the first baseline (102 school days), the average use of all color adjectives was 0.5 per sample hour, with a range from 0 to 2.3 per sample hour. Table 1 presents the exact rates per sample hour for each child in the group. The average rate of all color-noun combinations was 0.2 per sample hour, the highest rate being one color-noun combination used per sample hour by one child, the lowest rate zero per sample hour by 10 children. The average rate of new color-noun combinations (those not previously recorded for the given child) was 0.1 per sample hour (range 0 to 0.7 per sample hour). Average use of all number adjectives was 3.4 per sample hour (range 0 to 8.8) with average use of all number-noun combinations at 0.5 per sample hour (range 0 to 1.4). All size adjectives were used at an average rate of two per sample hour (range 0.9 to 7.5); all size-noun combinations were used at an average rate of 1.5 per sample hour (range 0 to 7.1). Thus, the rates of using descriptive adjectives as a class were low, and rates of naming colors were considerably lower than rates of naming number and size attributes. For a third of the children, use of a color adjective had never been recorded during five months of school. No trend toward increased use of descriptive adjectives was observed for any of the children.

Figure 3 shows use of color adjectives by the child (child 8, Table 1) with the median overall rate across all experimental conditions. For

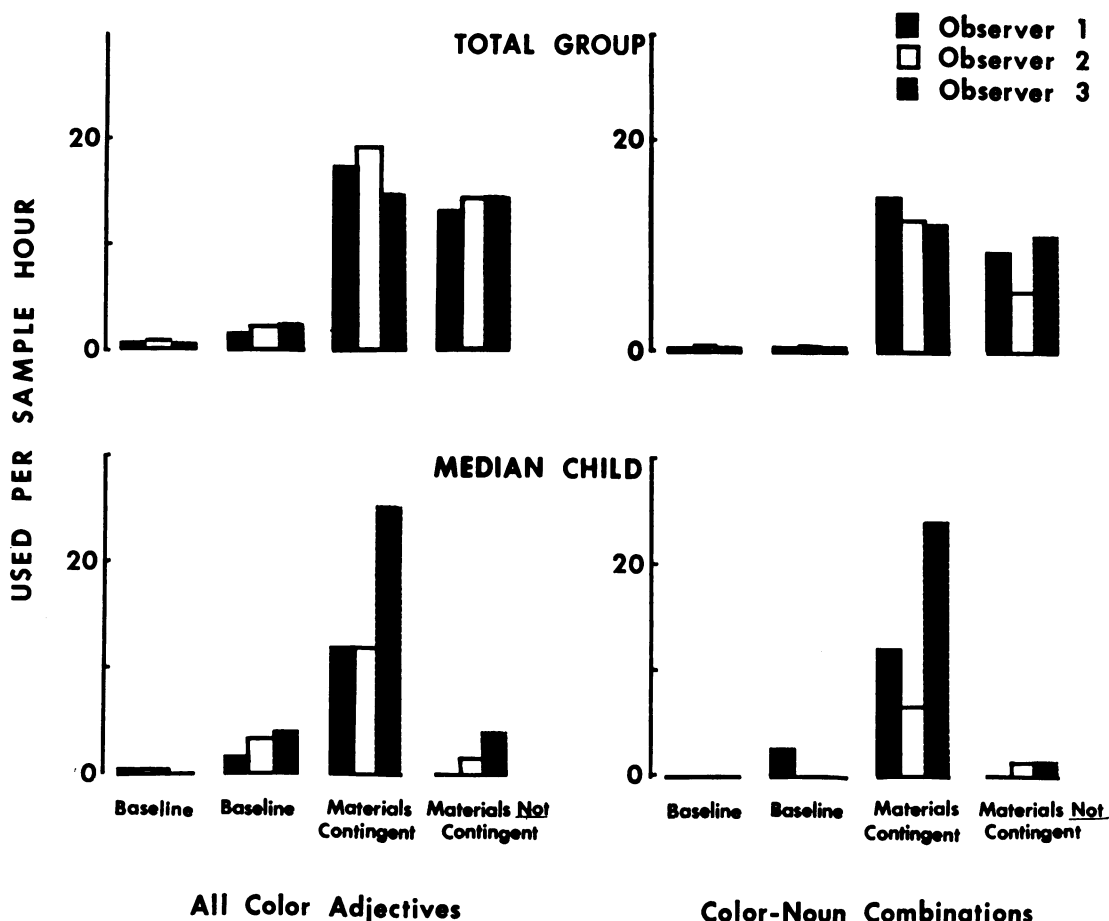


Fig. 1. Correspondence of observations by the three observers across conditions for the total group and for the representative median child. Top shows the correspondence of observations taken by each of the three observers on all the children in the group during each experimental condition. Bottom shows the correspondence of observations of a single child taken by the three observers on different days during each experimental condition.

this child only two instances of usage of a color adjective had been recorded during the first baseline period, and there were no instances of color adjectives used with a noun.

Baseline: Color Naming at Group Time

During the 50-school-day period of naming colors at group time, the group average for use of all color adjectives increased to 1.8 per sample hour. The range was from 0 (for two children) to 4.2 color adjectives used per sample hour. The average rate of using all color-noun combinations rose from 0.2 to 0.4 per sample hour; the range was from a low of zero comparable to the first baseline condition to a high of 1.2 as compared to the high of 1.0 per sample hour during the first baseline condition. New color-noun combinations were used at an average rate of 0.3 per sample hour

(range 0 to 0.9). The average rate of using all number adjectives rose from 3.4 to 4.9 per sample hour (range 0.5 to 14.7), and all number-noun combinations were used at an average rate of 0.9 per sample hour (range 0 to 3.2). These average increases in use of number adjectives, in which no training was given, were as great as the increases in use of color adjectives; the rate of using color adjectives during this period was most comparable to the average rate of using size adjectives (1.5 per sample hour, range 0 to 5.6) in which, like number adjectives, no training had been given. Thus, it is not demonstrated that the increased use of color adjectives during this condition was affected by the group time procedures.

Figure 3 shows an increased rate of spontaneous usage of color adjectives in the free-

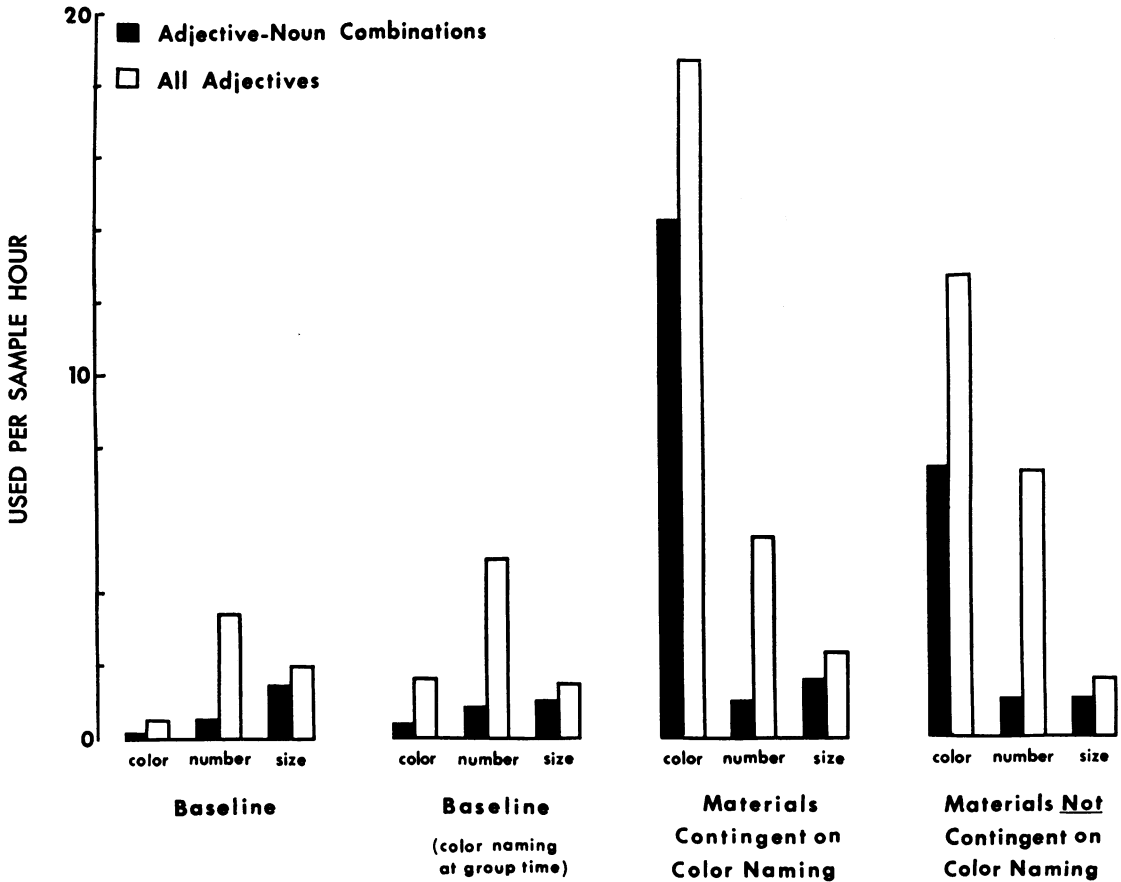


Fig. 2. Average use per sample hour of descriptive adjectives of color, number, and size for a group of 15 children. The first baseline was from the first to the 102nd day of school. The second baseline (color naming at group time) was from school days 103 through 152. The condition of access to materials contingent on color-naming was from school days 153 through 171. From school days 172 through 189 materials were no longer contingent on color naming. All samples were of approximately 15 min.

play situation by the child with the median rate. The increase however, was entirely in color adjectives used without a succeeding noun, a form which did not correspond to the behavioral goal (color-noun combinations) set by the teachers. This child was among the seven children who had demonstrated mastery of nine colors by the end of the second baseline condition. Table 1, however, shows that increased color naming was not restricted to those children (marked by asterisks) who had mastered naming of all nine colors at group time. It can be seen that the greatest increase in color naming was by a child (7) who was not yet correctly naming nine colors at group time. There seemed to be little continuity between “knowing” colors, as demonstrated at group time, and “using” them in the free situation.

Materials Contingent on Color Naming

During the 19 days when access to snack and materials was contingent upon use of a color-noun combination, there was a marked increase in such usage. As can be seen in Fig. 2, the average use of all color adjectives rose to 18.6 per sample hour (ranging from 2.1 to 56.7). The average rate of using all color-noun combinations was 14.2 per sample hour (range 2.1 to 30.5). In contrast, the use of number and size adjectives during this period showed little change from the preceding periods; average use of number adjectives was 5.5 per sample hour while size adjectives were used on an average of 2.1 per sample hour.

During the second baseline condition, only 22% of color adjectives were followed by noun referents. When obtaining an object required

Table 1
Use of Color Adjectives per Sample Hour

Child	Baseline			Baseline (Color Naming at Group Time)			Materials Contingent on Color Naming			Materials Not Contingent on Color Naming		
	All Color	All Color-Noun	New Color-Noun	All Color	All Color-Noun	New Color-Noun	All Color	All Color-Noun	New Color-Noun	All Color	All Color-Noun	New Color-Noun
* 1.	1.1	1.0	0.7	2.0	0.0	0.0	46.7	30.0	1.0	5.0	5.0	1.1
* 2.	1.3	0.0	0.0	2.2	0.4	0.4	8.2	5.4	2.9	54.5	33.1	6.8
3.	0.4	0.1	0.1	1.3	0.2	0.2	23.3	17.4	8.9	25.6	7.8	1.1
* 4.	0.0	0.0	0.0	3.0	0.3	0.3	33.5	30.5	13.0	13.0	12.0	1.0
5.	1.3	0.7	0.4	3.1	1.2	0.6	25.7	24.5	1.0	0.7	0.0	0.0
6.	0.2	0.0	0.0	0.8	0.2	0.2	31.2	15.9	7.7	15.0	15.0	4.5
7.	0.5	0.0	0.0	4.2	0.9	0.9	7.5	2.2	2.2	3.1	3.1	2.1
* 8.	0.3	0.0	0.0	3.1	0.4	0.2	18.2	15.3	7.7	2.2	1.1	1.1
* 9.	0.2	0.0	0.0	3.3	0.6	0.6	15.9	13.6	3.6	2.2	1.7	1.7
10.	0.1	0.1	0.1	0.0	0.0	0.0	29.2	25.0	12.3	11.8	3.2	1.4
*11.	0.0	0.0	0.0	0.6	0.0	0.0	8.9	8.4	3.2	21.6	16.3	4.5
*12.	0.0	0.0	0.0	0.5	0.5	0.5	11.1	11.1	4.8	10.8	3.8	2.3
13.	0.0	0.0	0.0	1.3	0.6	0.6	2.1	2.1	2.1	3.8	0.8	0.8
14.	0.0	0.0	0.0	0.0	0.0	0.0	2.5	2.5	2.5	8.7	1.3	0.7
*15.	2.3	0.5	0.4	1.1	0.3	0.3	14.5	9.3	3.1	Not in school		
Average	0.5	0.2	0.1	1.8	0.4	0.3	18.6	14.2	5.1	12.7	7.4	1.9
Range:												
High	2.3	1.0	0.7	4.2	1.2	0.9	46.7	30.5	13.0	54.5	33.1	6.8
Low	0.0	0.0	0.0	0.0	0.0	0.0	2.1	2.1	1.0	0.7	0.0	0.0

naming the object and its color, 75% of the color adjectives used were followed by a noun. The marked rise in new color-noun combinations (to an average of 5.1 per sample hour) can be seen in Fig. 4; more than a third of the objects named by color during the condition of making materials contingent on color-naming constituted new color-noun combinations.

Table 1 shows the changes in rate for individual children during this experimental condition. Though the magnitudes of the increases vary, the increase in use of color adjectives can be seen to be general across the group. The new color-noun combinations, as they appear in Fig. 3 for the representative median child, indicate usage of a variety of color names, applied to a variety of objects, in most cases appropriately. The onset of this behavior among the children during this experimental condition permitted an empirical assessment of the extent of their knowledge of the different colors.

Materials Not Contingent on Color Naming

During the 18 days after the contingencies for color naming were removed, the overall rate of using all color adjectives decreased to

an average of 12.7 per sample hour. The rate of using all color-noun combinations decreased to an average of 7.4 per sample hour; that is, 58% of colors named were followed by the name of an object referred to. Though both of these rates show declines from the condition of making materials contingent on color naming, they are well above the rates during either the first or second baseline conditions, indicating that once the behavior was generated in the free-play situation it tended to be maintained, at least in some children. Table 1 shows that there was more inter-subject variation when materials were no longer contingent on color naming, than in any prior condition. The highest rates of color naming, 54.5 per sample hour for all color adjectives used and 33.1 per sample hour for all color-noun combinations used, were higher than during the condition of making materials contingent on color naming; the lowest rate, zero per sample hour for all color-noun combinations, was at the level of the first baseline.

The overall rate of new color-noun combinations was 1.9 per sample hour (see Fig. 4), with the highest rate 6.8 per sample hour for one child and the lowest rate zero for one

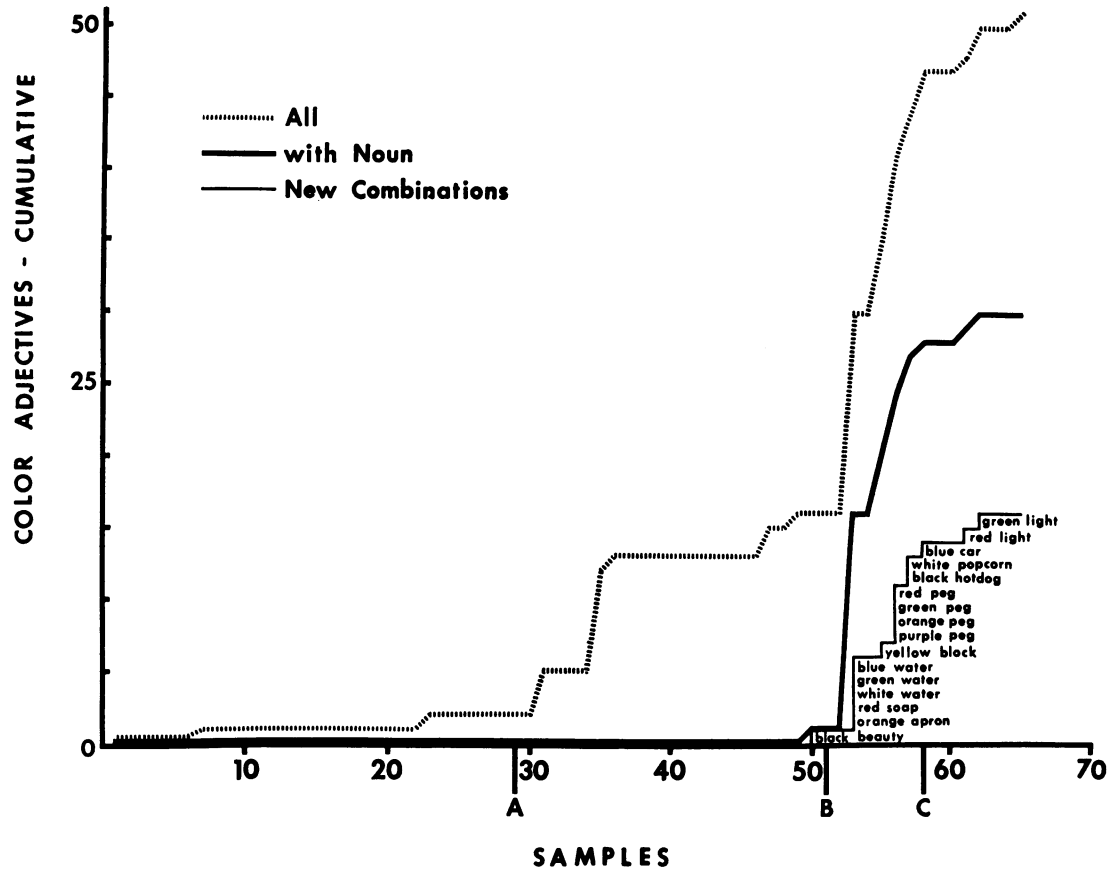


Fig. 3. Cumulative use of color adjectives by the child with the median rate. The dotted line shows use of all color adjectives; the solid line shows use of all color-noun combinations. New color-noun combinations are printed in above the samples in which they were first recorded. Samples 1-6 were taken during days 3-9 of school. Samples 7-21 were taken during days 25-42 of school. Samples 22-26 were taken during days 71-80 of school. Samples 27-65 were taken during days 91-189 of school. All samples were of approximately 15 min. Baseline is samples 1-29. At A the naming of colors at group time was begun. At B access to materials was contingent on use of color-noun combinations. At C materials were not contingent on color naming.

child. That is, even after the contingency was removed, one quarter of all the color-noun combinations employed were new combinations.

Figure 2 shows that even with an overall decrease the rates of using color adjectives were markedly higher than the rates of using adjectives of size and number. Average use of size adjectives continued at approximately the same rate as during the first baseline condition: 1.6 per sample hour. All number adjectives were used at an average rate of 7.3 per sample hour.

DISCUSSION

This study demonstrated that traditional preschool methods were ineffective in modify-

ing the children's spontaneous speech. These methods assume, as it was assumed by teachers in this study, that what is "known" will be "used", given the appropriate stimulus conditions. Thus, in the usual preschool during and after teaching a skill in a group situation, teachers arrange stimuli in the free situation—a variety of sizes, colors, and shapes of materials, for instance, and social attention and approval—so as to foster usage in that situation of the skill trained in the group situation. The present study gives evidence that, despite this usual arrangement, such usage in the free situation seldom occurred. An examination of the group and free-play stimulus situations, however, indicates that they may have been so dissimilar as to make transfer between them difficult and hence unlikely.

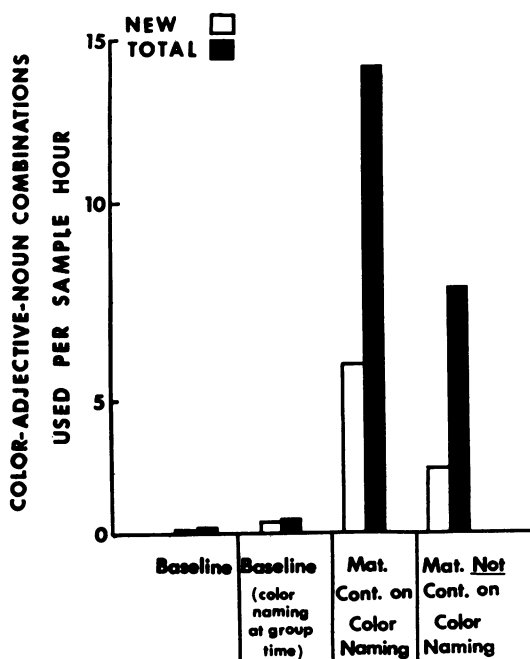


Fig. 4. Average new and all color-noun combinations used per sample hour for a group of 15 children. The conditions were: baseline, (color naming at group time), materials contingent on color naming, and materials no longer contingent on color naming.

The verbal behavior reinforced in the group situation was of the form: noun-verb-adjective ("the car is red"). This form, in which the adjective stands alone as predicate adjective rather than as a modifier, is the form called for by the stimulus question, "What color is this (car)?". There is no simple stimulus question in English which necessarily calls for a response form in which an adjective, such as a color name, modifies a noun: the question, "What is this?", calls for a noun response ("a car") rather than, necessarily, for a modified noun ("a red car"). In group teaching, prompting the response form of a modified noun concurrently with prompting color responses, while feasible, is rarely done in traditional preschool practice.

For descriptive speech to be "spontaneous", however, the stimulus situation controlling the behavior cannot be a direct question concerning an object. Rather, the stimulus situation must involve an object plus the necessity (not provoked by a question) of singling out that object from one or more other objects. This is the function of descriptive language. Most children come into contact with this

function casually, over time, both inside and outside of preschools, and often even before they "know" the precise meaning of the descriptive language used. Since the children in the present study were termed "culturally deprived", an appellation indicating that their environment was in some way deficient in the stimulus conditions conducive to the development and maintenance of complex language skills, it seemed contradictory to teach them a skill such as color naming and then rely on unsystematic environmental events to make that skill functional. Rather, the environment was deliberately structured so that the children would come into contact with the function of descriptive adjectives: the stimulus situation which hopefully would control some rate of the behavior outside of school was created on a massive scale inside of school when access to materials was made contingent on naming them by color.

That the behavior continued in some strength after the contingencies were removed seems to indicate that once color description was generated, there were enough "natural" contingencies in the preschool situation to maintain it. Even after removal of the contingency, children did obtain an object when they asked for it by color; though teachers discriminated the removal of the contingency, not all of the children may have done so. By the end of the contingency period teachers were rarely withholding materials in the obvious manner of the beginning of that period; rather, most of the children were spontaneously naming the color of the object whenever they requested an object from a teacher. This verbal topography was the one most regularly and promptly reinforced. Even after removal of the contingency for color naming this was probably often the case.

There are two implications of this study for preschool practice. The first is that of creating for children a functional environment where the contingencies for pre-academic behavior approximate those applied to such behavior in the "beyond-preschool" environment. The teachers in this study felt, in fact, that the whole process of teaching colors could have been more efficiently and painlessly done by making access to materials contingent on color naming even before the children knew the names of any colors. Prompting and reinforcing in the free situation was little different

than that done at group time, except that children did not have to wait for their "turn", and teachers were able to make use of reinforcers such as materials in the free-play situation. The generalization from free-situation naming to test-situation naming seemed more easily made, perhaps because the spontaneous response form is appropriate to both stimulus situations.

The second implication is that preschool materials may function as reinforcers for many children, and for some children may be even more powerful than the social reinforcement and/or food presented in the preschool situation. Some of the children in the present study appeared to teachers to have "really learned" colors only when required to name them in connection with objects they wanted to use; these were the children whose behavior in the group time situation was not well controlled by the praise and food presented there (for neither of which they were deprived, at least in the preschool environment). As reinforcers, materials are not only inherent in the preschool, but are uniquely appropriate to the development of descriptive vocabulary since they are the same class of reinforcers which maintain the behavior in everyday situations.

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