

*USING PRESCHOOL MATERIALS TO MODIFY THE
LANGUAGE OF DISADVANTAGED CHILDREN¹*

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Although language remediation programs have generally been conducted with the use of special materials in structured group settings, traditional preschool practice emphasizes "incidental teaching" incorporated into children's free play. To determine if incidental teaching practices could be effective in improving children's speech, this study investigated the spontaneous speech of 12 disadvantaged children during free-play periods over eight months of a preschool program. Whenever the children selected a preschool play material, they were prompted and required to ask for it, first by name (noun), then by name plus a word that described the material (adjective-noun combination), then by use of a color adjective-noun combination, and finally by requesting the material and describing how they were going to use it (compound sentence). As each requirement was made, the children's general use of that aspect of language markedly increased, but little change was noted in the amount or nature of the children's interactions with teachers or their use of a set of materials to which they had free access. This study demonstrates that preschool free-play periods can be powerful "incidental teaching" periods by capitalizing on moments when children seek new play materials.

Recent years have witnessed the inception of a great number and variety of compensatory programs for language remediation of the "disadvantaged" child (see Brotzman, 1968). Almost all of this work has emphasized the teacher-structured "curricular" periods, where language

information is imparted and language practice is conducted with the use of special materials in structured group settings. However, preschool practices traditionally have emphasized children's learning through more "incidental teaching" incorporated into the children's free play while they are engaged in normal childhood activities with toys and other children. The major questions to be investigated in the present study were first, whether important and lasting modifications could be made in the spontaneous "working" speech of disadvantaged children, and second, whether the materials that are a normal part of every preschool free-play environment could be used to effect significant changes such as these in children's behavior.

A preliminary study by Hart and Risley (1968) found that using occasions when children requested materials to prompt and require children to use a specific speech form appeared to be effective in establishing this speech form in the children's spontaneous vocabularies. The present study reports a follow-up investiga-

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tion that sought to establish the generality of that procedure by both replicating the procedure with a second group of children of similar age and socio-economic status, and extending the procedure to more varied and complex speech forms. The isolation and measurement of possible language deficits of these children was undertaken in an associated study (Hart, *unpublished*); in the present study, the speech categories selected for manipulation were chosen solely on the basis that they encompassed a range of language complexity, and each category could be defined simply enough to be promptly and unequivocally responded to by a teacher.

Hart and Risley (1968) also showed that formal language teaching in a lesson-like setting might have little effect on children's spontaneous "working" language, whereas teaching "in context", using the natural opportunities of the preschool environment, could be extremely effective in producing large and durable changes in the children's spontaneous language. Therefore, the second aim of the present investigation was to demonstrate use of the rich preschool environment as an experimental setting for teaching and remediation, and to examine both the efficiency and the effects of so using the preschool. Experimenters have long recognized that the manipulation of a child's behavior subtly or grossly changes the total stimulus situation, both for that child and for all other children within the environment. Only recently, however (Allen, Henke, Harris, Baer, and Reynolds, 1967; Buell, Stoddard, Harris, and Baer, 1968; Reynolds and Risley, 1968) has measurement of possible collateral changes in behaviors other than the behaviors under study been undertaken; *i.e.*, measurement of possible "side-effects" of an experimental manipulation. Since the present study involved manipulation of the behavior of every child in the preschool group and major changes in the physical and affective environment, the "side-effects" of such stimulus changes on the children's interactions with teachers and materials were also evaluated.

METHOD

Subjects and Setting

Twelve black children, five girls and seven boys, who lived in an urban poverty area of Kansas City, Kansas, were selected on the basis of coming from large families with low incomes. Their average chronological age was 4 yr, five months at the beginning of the school year. The average mental age in the group, as tested on the Peabody Picture Vocabulary Test, was 3 yr, four months (range = 2 yr, one month to 5 yr, nine months) at the beginning of the school year, and 5 yr, two months (range = 2 yr, three months to 10 yr, zero months) at the end of the school year.

The children attended the Turner House Preschool from 9:30 a.m. to 12:30 p.m. five days a week for nine months. The daily schedule was: breakfast, a half-hour of free play indoors, music and rhythms, story, a half-hour of free play outdoors, and a group session indoors. The data were collected during indoor and outdoor free play. During these half-hour periods, teachers structured the children's play in terms of group rules (for example, the necessity of cleaning up before leaving an area) and differentially attended to desirable ongoing activities, but the children were free to leave an area or material, to devise their own play, to interact with materials, and to converse with each other and with the teachers on any subject.

Recording

A daily 15-min sample was taken of each child's verbalizations during free play. The sample was recorded by one of three observers who moved with the child from one activity to another with instructions to write down in long-hand everything the child said. Each of the three observers watched the same four children every day throughout the year, rotating them systematically through the four 15-min daily blocks so that a regular sequence of early and late, indoor and outdoor observations was obtained on each child. Whenever a child was absent, the

observer assigned to that child recorded a reliability sample with one of the other observers, each observer recording independently "everything said" by the prime observer's child.

When each 15-min verbalization sample was punched on IBM cards, each noun, each adjective-noun combination, and each compound sentence was separately coded, such that when each day's data were run through the computer, a count was made for that day of: (1) the total number of compound sentences recorded for each child, (2) the total number of adjective-noun combinations recorded for each child, (3) the total number of adjective-noun combinations that were "new" on that day for each child, (4) the total number of nouns recorded for each child, and (5) the total number of nouns that were "new" on that day for each child. A "new" noun or a "new" adjective-noun combination was one that had never appeared previously in that child's data. An adjective-noun combination consisted of any word coded as an adjective (except "some", "more", and "another") that stood immediately before a word coded as a noun in the verbalization data. A compound sentence was defined as two phrases, each containing a verb, that were joined by a conjunction.

The data taken by the second observers were processed through the computer in the same way as the data taken by the prime observer. A total of 158 verbalization samples were simultaneously recorded by two observers, with each child and each experimental condition being proportionately represented. Product-moment correlations calculated between the data collected by the prime observer and the second observers for these 158 samples yielded the following coefficients:

- Number of nouns per sample: 0.97
- Number of adjective-noun combinations per sample: 0.97
- Number of compound sentences per sample: 0.83

A detailed discussion of inter-observer agreement on a word-by-word basis is available else-

where (Hart, *unpublished*). Briefly, reliability, computed by dividing the number of words that matched both lexically and sequentially (agreements) by agreements plus disagreements, averaged approximately 0.70 per session.

Procedures

Baseline (Days 1 to 34). At the beginning of school, all materials normally provided in the preschool were available to the children during free play. Blocks and manipulative toys were placed on open shelves, paint was placed in cups with brushes and paper at the easel, sand play materials were placed in the sandbox ready for use, tricycles were lined up outside the storage shed, *etc.* Teachers praised children for helping themselves to a variety of these materials, for using them appropriately, and for talking to teachers and children. They responded to the children's verbalizations by conversing with the children, by providing objects, or by providing help.

Contingent materials (Days 35 to 148). After 34 days of school, procedures similar to those described by Hart and Risley (1968) were instituted. Toys and materials were organized into "shelf toys" to which the children had free access, and into a group of toys that the children had to request. Most of the preschool materials were available to children only on request. Blocks, most manipulative toys, and dollhouse materials were placed in glass-fronted cabinets; paints and brushes remained on the "teacher's" counter; tricycles, wagons, sand play materials, and other outdoor equipment remained in the storage shed. Children wanting to use these materials had to request them from a teacher. Other materials, which included certain indoor manipulative toys (two pounding benches, pegs and pegboards, beads and string) and outdoor equipment such as climbing frames, the children did not have to request. These toys were referred to as "shelf toys". Other than the delivery of materials upon request, the prompting of requesting, and prompting the form of a request, teacher behavior remained the same as during

baseline (*i.e.*, teachers continued to praise children's appropriate use of materials and their talk to other children and teachers, and responded verbally and/or physically to the children's verbalizations).

Experimental procedures were introduced sequentially in a multiple baseline design (Baer, Wolf, and Risley, 1968; Risley, 1969; Risley and Wolf, 1972); receipt of materials was contingent on: (1) a child's use of a noun, (2) use of an adjective-noun combination, and (3) use of a compound sentence. In each experimental condition, teachers initially prompted the children's use of the required aspect of language. The specific prompts are listed in Table 1. In each experimental condition, prompts were used in descending order (from Level 1 to Level 4) until a response was obtained from a child. A response to a higher level of prompt obviated the use of a lower-level prompt. When a child responded to teacher behavior at Level 1, the child's behavior was considered unprompted.

Use of nouns (Days 35 to 65). When materials in the preschool were made available to the children only on request (Day 35), a child had to use the name of the object before he could obtain it. If necessary, children were prompted to ask for materials. A child who stood in an area saying nothing was asked by

the teacher in the area, "what do you want?". If the child made a general statement, such as "to paint", the teacher in the first two weeks of the procedure specified for him the materials he must then ask for, by saying, "then you need to ask for an apron, and brushes, and paint".

After the second week, teachers followed the rules for prompting listed in Table 1. If a child did not request an object, a Level-2 prompt (*i.e.*, "what do you need?") was given. Materials the child asked for were provided. If a child pointed or said "it", "that", or "one of those", the teacher asked, "what is that called?". If the child then named the material, he was simultaneously given the object and praised by the teacher for naming it. If the child did not respond, answered incorrectly, or said that he did not know, the teacher named the material and, when the child repeated the name, praised him and handed him the object. Often, the teacher prompted by asking another child to supply the requesting child with the name of the material and then praising the other child for doing so. Prompts were never formally discontinued, since new materials, the names of which some children did not know, were periodically added.

This procedure was continued for 30 school days, until all children were reliably requesting preschool materials by name without prompts.

Table 1
Levels of Teacher Behavior During Experimental Conditions

	<i>Materials Contingent On</i>		
	<i>Nouns</i>	<i>Adjective-Noun Combinations</i>	<i>Compound Sentences</i>
Level 1	Waiting for 30 sec	Waiting for 30 sec	Waiting for 30 sec
Level 2	"What do you want?" "What do you need?"	"What kind?"	"Why?" "What for?"
Level 3	"What is that called?"	Offering alternatives: "I have red cars and blue cars", <i>etc.</i>	"Say the whole thing."
Level 4	Imitation by child of teacher verbalization: "This is a car. Say 'car.'"	Imitation by child of teacher verbalization: "Say the whole thing, 'a red car.'"	Imitation by child of teacher verbalization: "You need to say, 'I want a car so I can play with it.'"

Use of adjective-noun combinations (Days 66 to 124). On Day 66, obtaining a material was made contingent on use of an adjective-noun combination. In order to obtain an object, a child had to name it with a noun and describe it with an adjective. A descriptive adjective was required; the modifiers "some", "more", and "another" did not satisfy the requirement. Teachers prompted according to the rules specified in Table 1. A child who requested a material, using only a noun, was asked "what kind of a . . . do you want?". If this failed, teachers prompted adjective use by offering alternatives, such as, "I have big cars and little cars, red cars and blue cars, old cars and new cars—what kind of a car do you want?". If the child responded with an adjective but no noun, as "a red one", the teacher prompted, "a red what?" and asked the child to "say the whole thing: 'a red car'". When the child emitted an adjective-noun combination, he was praised, his request was repeated by the teacher, and he was handed the material he had specified.

A child was given whatever material corresponded to his description. If the material of his description was unavailable, the teacher told him this and provided a Level-3 prompt by offering him alternatives among the materials that were available; e.g., "I don't have any green boats; all I have are red boats and yellow boats". (In naming materials for children, teachers always used an adjective-noun combination.) Similarly, a child who asked for a specific color of paint might, on receiving it, say that he had not wanted that color, he had wanted "that color" (pointing to orange). If necessary, the teacher provided a Level-4 prompt, telling him the name of "that color"; if possible, she pointed out another item of the same color, the color of which the child had already named, and said, for example, "it is the same color as your apron; what color is your apron?", holding the paint next to his apron. In addition, descriptions of materials were supplied in response to children's requests: a child who had already asked for and received big blocks and little blocks, for example, might

ask a teacher (or another child), "what kind of a block is that?", be told "a round block", and receive it after repeating the phrase.

This procedure was continued for 31 days. Then, the children were tested for their knowledge of color names. Each child was presented with a sheet of 3 by 3 in. (7.5 by 7.5 cm) pure-color paper swatches of nine colors. On the first trial, the teacher asked the child to point to and name all the colors; on the second trial, the teacher pointed and the child named the colors; on the third trial, the teacher named the colors and the child pointed. Only the correctness of the child's first response on each trial was counted. On two of three trials, seven of the 12 children named five or fewer of the nine colors correctly. Therefore, it was decided to make receipt of materials contingent on color adjective-noun combinations only. Beginning on Day 97 of school, teachers asked children "what kind of a . . . ?" material they wanted, and they supplied descriptions by naming alternatives between colors only. When necessary, color names were supplied by the teacher in the manner described previously. In practice, three children who had demonstrated knowledge of all nine colors were not strictly held to the color adjective-noun contingency. Also, a color description was not required of any child for a material of no definite color, such as water, although an adjective-noun combination was still always required (as "hot", "cold", "clean", or "dirty" water). This procedure was continued for 27 days. During the last few days of school (Days 145 to 148), the children were again tested for their knowledge of color names.

Use of compound sentences (Days 125 to 148). On Day 125 of school, materials were made contingent on use of a compound sentence. A compound sentence was defined as two phrases, each containing a verb, that were joined by a conjunction. Initially, teachers provided prompts at Level 2 (see Table 1): when a child requested a material, he was asked "why?" or "what for?". If he responded with a simple phrase such as, "so I can play with it", the teacher

provided a Level-3 prompt by asking him to "say the whole thing". If he hesitated, she then prompted him at Level 4 with as much of the terminal behavior as necessary. For example, she said "you need to say, 'I want a block so I can . . .,'" and then waited for the child to repeat "I want a block so I can . . . play with it". When having a child repeat after her, a teacher presented as simple a form of the behavior as possible in order to emphasize the compounding; *i.e.*, sentences that did not contain adjective-noun combinations. Neither nouns nor adjective-noun combinations were required as part of a compound sentence. However, when a teacher repeated a child's request while delivering the corresponding material, she always repeated the two clauses in the same form the child had said them, *i.e.*, she used an adjective-noun combination if the child had done so in his initial statement; otherwise, she did not.

Level-4 prompting was discontinued for an individual child as soon as he began responding to "why?" or "say the whole thing". Initially, any "reason" given by a child resulted in teacher repetition, praise, and delivery of a material. As soon as a child was reliably producing compound sentences when he requested materials, however, the appropriateness of the "reason" was additionally prompted. That is, a child who had previously been given a shovel when he stated, "I want a shovel because I don't have one" was told, "very good, but why do you really want it? what are you going to do with it?", and only a verbalization such as, "I want a shovel so I can dig with it" resulted in the delivery of the shovel.

This procedure was continued for 23 days, until the end of school.

Side Effects

To assess the effects of the experimental procedures on the children's play behavior, each observer, while recording the verbalization sample on each child, noted all the materials used and the duration of usage by that child during the 15 min of observation. To assess changes in the

direction of the children's spontaneous speech that might be correlated with experimental conditions, the observers also noted the direction of each of the observed child's statements: to a teacher, to a child, or directed to no specific individual(s).

RESULTS

Figure 1 shows the average number of nouns (broken line), adjective-noun combinations (solid line), and compound sentences (dotted line) used by all 12 children over the entire school year. Each point on the graph represents the average of four 15-min verbalization samples (*i.e.*, four consecutive days of observation). Note that the ordinate for nouns is twice that for the other two categories.

Figure 2 shows average use per 15-min sample of nouns (broken lines), adjective-noun combinations (solid lines), and compound sentences (dotted lines) by individual children in each experimental condition. Note the different scale on each of the ordinates. The solid portion of the noun graphs indicates the average number of "new" (never previously recorded) nouns per 15-min sample. The breaks in the solid lines for adjective-noun combinations represent the average number of "new" adjective-noun combinations per 15-min sample. In each condition shown in Figure 2, the succession of children is the same, with the children ranked on the basis of vocabulary content, from the child who exhibited the most different words (the largest vocabulary) over the school year on the left, to the child who exhibited the fewest different words on the right.

Use of nouns. As can be seen in Figure 1, use of nouns increased in the first 20 days of school from an initial average of four to an average of 11 per 15-min sample. Use of nouns remained at an average of 11 or fewer per child per 15-min sample during the next 12 days. The average use of nouns by individual children during this period (Days 1 to 34), as seen in Figure 2, ranged from 0.2 to 21.7 per 15-min sample.

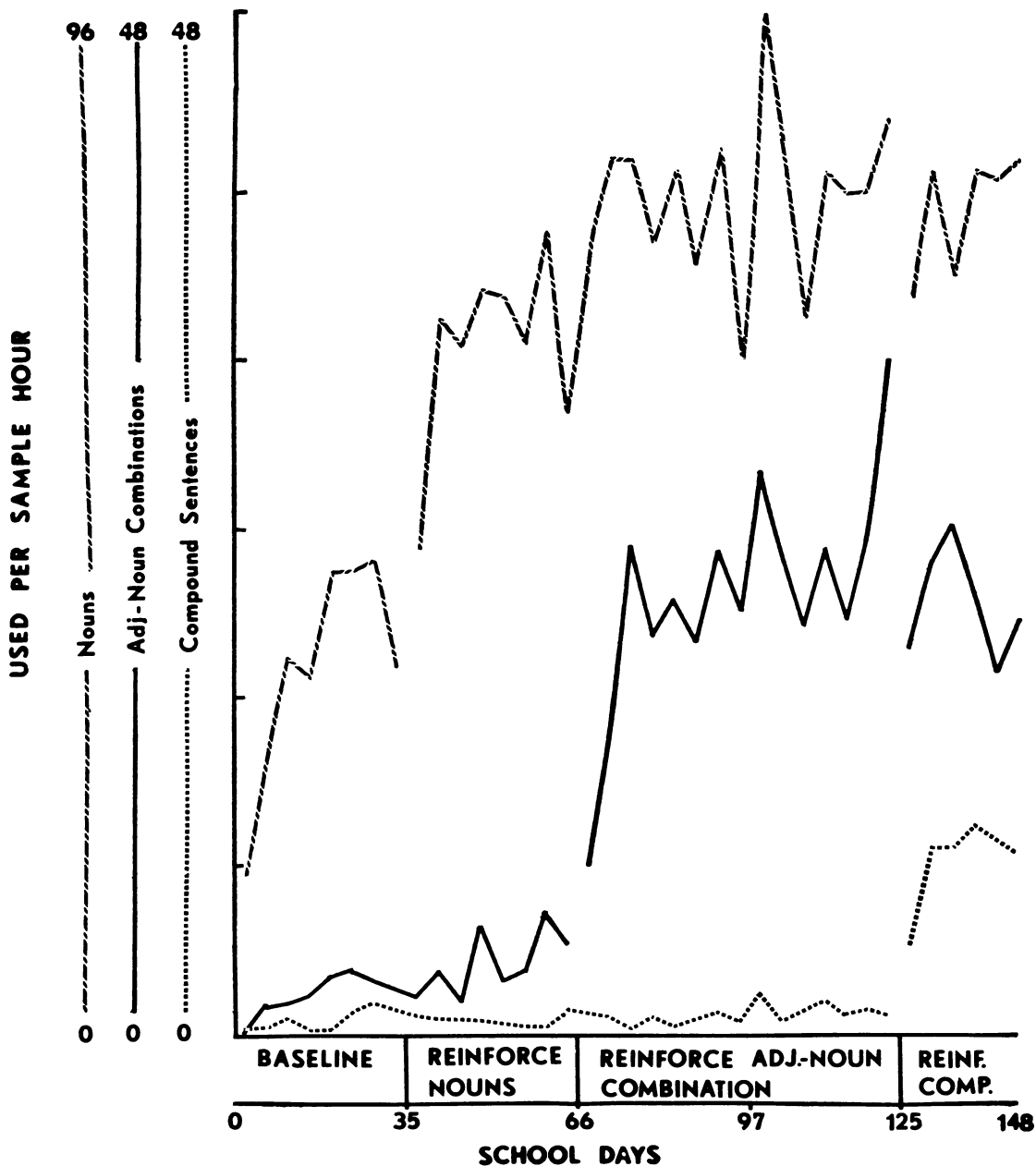


Fig. 1. Average use of nouns (broken line), adjective-noun combinations (solid line), and compound sentences (dotted line) per 15-min sample by all 12 children across experimental conditions. The experimental conditions were: baseline (Days 1 to 34), access to preschool materials contingent on use of a noun (Days 35 to 65), access to preschool materials contingent on use of an adjective-noun combination (Days 66 to 124), and access to preschool materials contingent on use of a compound sentence (Days 125 to 148). Note the different scale for nouns *versus* adjective-noun combinations and compound sentences.

“New” nouns (never previously recorded) appeared in the data of individual children from 0.2 to 7.1 times per sample. When obtaining a material was contingent upon the use of a noun

(Days 35 to 65 in Figure 1), average use of nouns increased from 11 during baseline to around 17 per 15-min sample. The increased use of nouns was general across all children: as

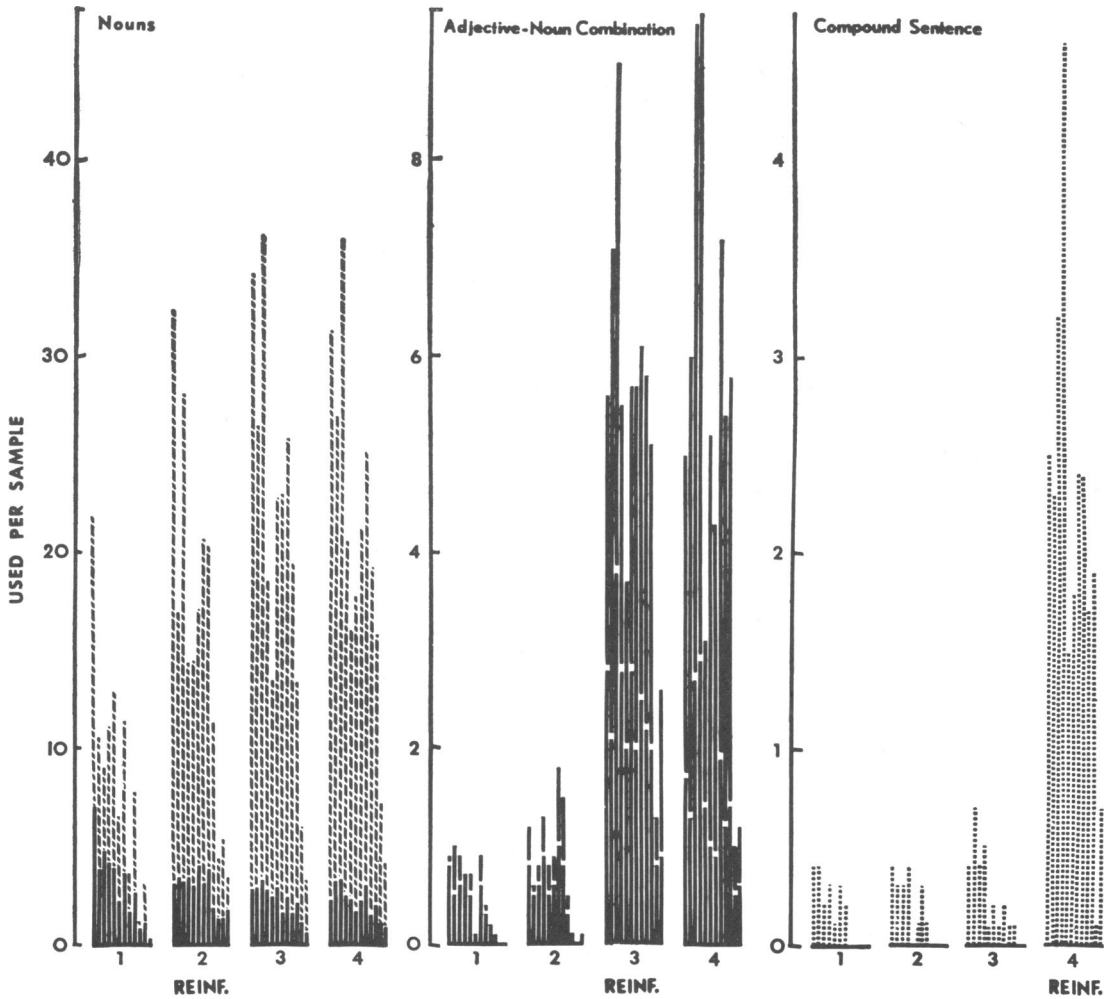


Fig. 2. Average use of nouns (broken lines) adjective-noun combinations (solid lines), and compound sentences (dotted lines) per 15-min sample by each of the 12 children during each experimental condition. The solid portion of the bars for nouns and the break in the bars for adjective-noun combinations indicate, respectively, the average number of "new" (never previously recorded) nouns and the adjective-noun combinations recorded for each child in each condition. In each set of 12 bars, the succession of children is the same, from the child who exhibited the most different words over the school year on the left (Child 1) to the child who exhibited the fewest different words over the school year on the right (Child 12). Note the different scale on each ordinate. Experimental conditions were the same as for Figure 1.

seen in Figure 2, use of nouns by individual children during this period ranged from 3.4 to 32.4. "New" nouns appeared in the data of individual children from 1.3 to 4.0 times per sample. When obtaining a material was contingent on use of an adjective-noun combination, average use of nouns increased still further to around 20 per 15-min sample. Use by individual children, as seen in Figure 2, ranged from 3.3 to 36.2; every child but two showed an overall

increase in noun usage. The appearance of "new" nouns, however, decreased slightly, to a range of 0.6 to 3.3.

Use of adjective-noun combinations. Figure 1 shows that the average use of adjective-noun combinations during the initial part of the baseline period was fewer than one per child per sample; when receipt of materials was contingent on use of a noun (Days 35 to 65), use of adjective-noun combinations increased to an

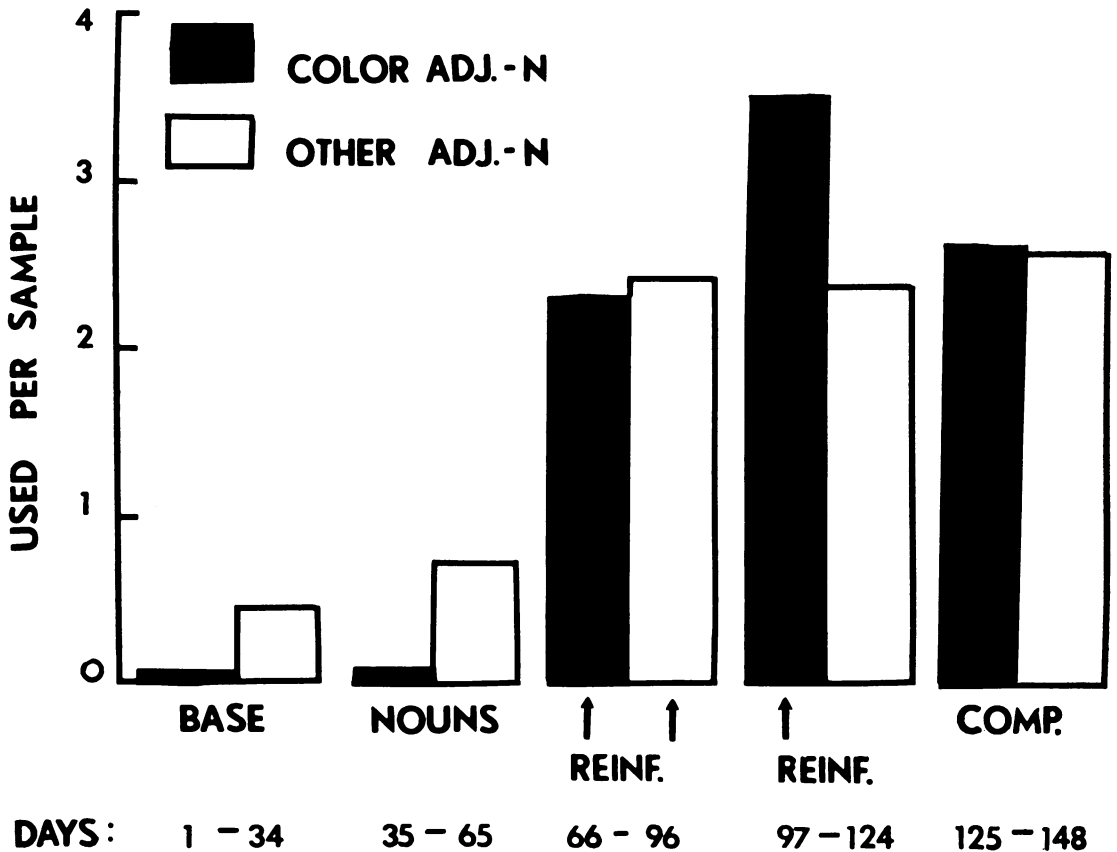


Fig. 3. Average use of color adjective-noun combinations and other adjective-noun combinations per 15-min sample by all 12 children during each experimental condition. During Days 66 to 96, receipt of preschool materials was contingent upon *any* adjective-noun combination. During Days 97 to 124, receipt of materials was contingent upon *only* color adjective-noun combinations. During Days 125 to 148, receipt of materials was contingent upon *neither* adjective-noun category, but rather upon compound sentences.

average of about one per child per sample. The total use by individual children during these two periods, as seen in Figure 2, ranged from zero to 1.8 per 15-min sample, with eight of the 12 children exhibiting fewer than one adjective-noun combination of any kind per 15-min sample. When obtaining a material was contingent on use of such an adjective-noun combination, the average use of such combinations rose to and stabilized at between five and six per child per sample. Individual use ranged from 1.3 to 9.0 per 15-min sample. "New" (never previously recorded) adjective-noun combinations increased from fewer than one per sample during the two previous conditions (range = 0 to 1.0) to two to three times per sample for most of the children (range = 0.8 to 3.8 per sample).

Figure 3 shows the average use of two categories of adjective-noun combinations: nouns with color adjectives, and nouns with other adjectives. When receipt of materials was made contingent on *any* adjective-noun combination (Days 66 to 96), both categories increased to approximately the same level: an average of approximately 2.4 per child per sample. When receipt of materials was then made contingent on *only* combinations that included an adjective of color (Days 97 to 124), color adjective-noun combinations increased further to an average of approximately 3.5, while other adjective-noun combinations remained at approximately 2.4 per child per sample. When receipt of materials was finally made contingent on neither category of adjective-noun combination, but rather on com-

pound sentences (Days 125 to 148), color adjective-noun combinations decreased to approximately the same level as other adjective-noun combinations: an average of approximately 2.6 per child per sample.

As previously mentioned, children were tested for their knowledge of color names just before Day 97 of school. During the test, only five children named seven or more of the nine colors correctly on two of three trials, and only two children named six or more colors correctly on all three trials. When the test was readministered on the last three days of school, nine children named seven or more of the nine colors correctly on two of three trials, and eight children named six or more colors correctly on all three trials. Teachers considered that the majority of the children had demonstrated adequate knowledge of color names.

Use of compound sentences. During these successive conditions, the continuing baseline data on use of compound sentences showed neither any changes nor any trend toward increased usage. The average use of compound sentences was about 0.2 per sample (Figure 1), with individual usage ranging from zero to 0.7 per 15-min sample (Figure 2). For two children, a compound sentence had never been recorded during 125 days of school. When obtaining a material was contingent upon use of a compound sentence, average use of compound sentences rose to and remained at around two per child per sample; individual use ranged from 0.1 to 4.6 per 15-min sample.

During this condition, when materials were contingent on use of compound sentences, use of nouns remained at an average of around 20 per 15-min sample, and use of adjective-noun combinations remained at an average of about five per child per sample. Individual use of nouns ranged from 4.2 to 36.0, and individual use of adjective-noun combinations ranged from one to 9.5 per 15-min sample. As compared to the prior condition, when obtaining materials was contingent on use of adjective-noun combinations, the total use of nouns and adjective-

noun combinations increased for half of the children and decreased for half. "New" adjective-noun combinations in the data decreased to between one and two per sample (range 0.5 to 2.9), while "new" nouns appeared from 0.9 to 3.3 times per 15-min sample.

Other Effects

To evaluate the effects of the requirement that materials be requested on the general nature of teacher-child interactions, the number of statements that the observer checked as made to teachers was counted each day for each child. Statements directed to teachers were further categorized and counted as either a "request" or a "comment". In so categorizing them, each statement was considered as though in isolation from any statement preceding or following it. Classed as requests were all statements containing phrases such as "give me", "I want", "can I have?", "look", "do this", all use of just a teacher's name or the word "teacher", plus all questions (including "huh?"). Classed as comments were statements containing phrases such as "I know", "I can", "I am", "I have", all negatives and affirmatives standing alone, plus all isolated noun or adjective-noun phrases, such as "a blue car". (To class such phrases as requests—though they, like other comment-categorized statements, may have functioned as such—would have required judgement on the basis of context lent by a prior statement in the data.) The categorization and counting of requests and comments to teachers was made by two teachers: reliability checks on the counts in each category were made at least twice in each experimental condition. The average agreement between categorizers, based on the number of agreements as to the category of each recorded statement per session divided by the number of agreements plus disagreements for that category, was 0.97 for requests and 0.99 for comments to teachers.

The per cent of verbalizations directed to teachers, as recorded for all children in the verbalization samples taken during free play, is shown in the top graph of Figure 4. The mid-

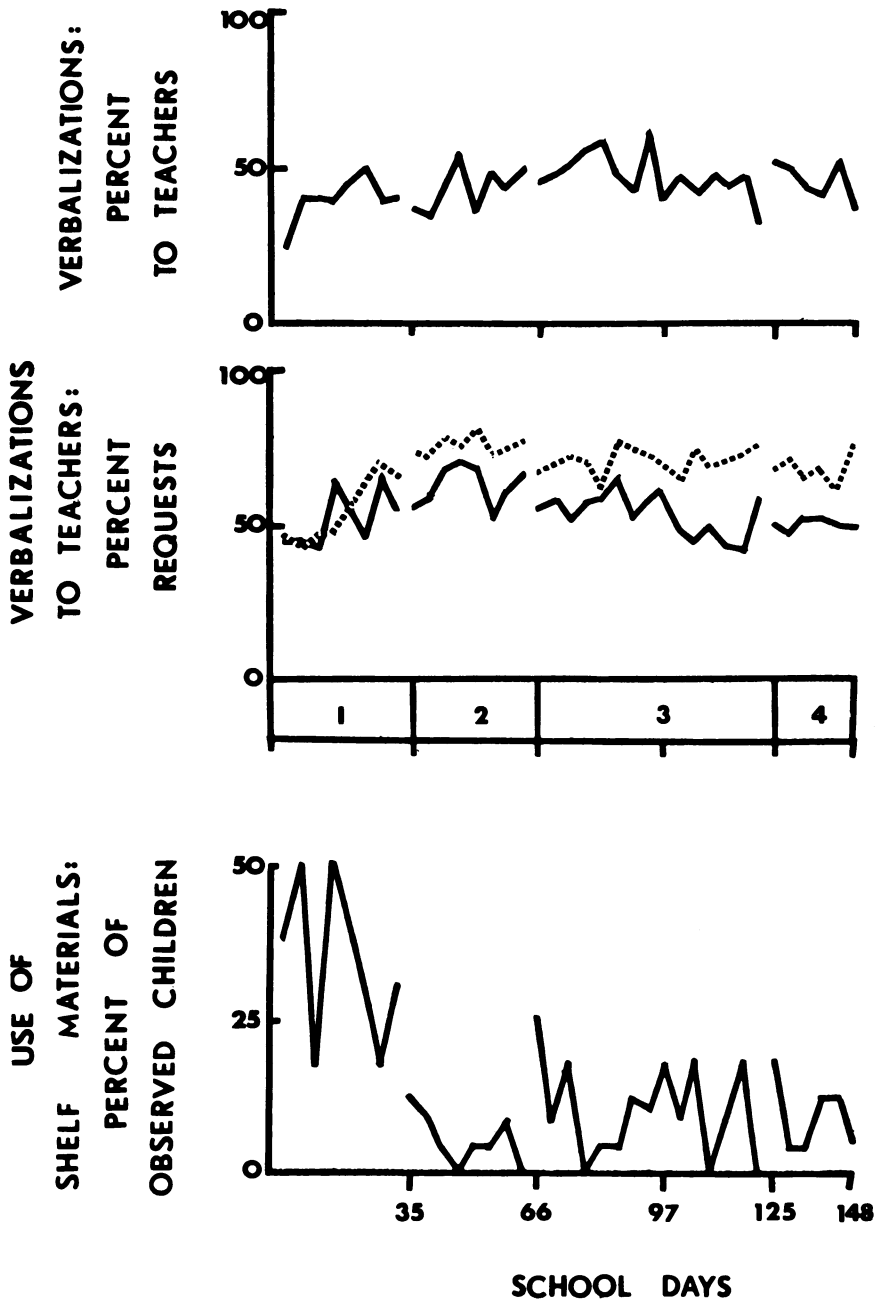


Fig. 4. Per cent of verbalizations to teachers and per cent of observed children who used the "free access" preschool materials. (Top)—per cent of total verbalization in all 15-min samples recorded for all 12 children as directed to teachers, across all experimental conditions. (Middle)—per cent of total verbalizations recorded as directed to teachers that were counted by teachers as requests (dotted line), and per cent of total verbalizations directed to teachers that were counted by teachers as requests (solid line), across all experimental conditions. (Bottom)—per cent of children observed during indoor free play (100% = six children) who used the "free access" preschool materials, across all experimental conditions. The experimental conditions were the same as in Figure 1.

dle graph of Figure 2 shows (solid line) the proportion of verbalizations to teachers categorized in the 15-min verbalization samples as requests by the method described above. The dotted line in this middle graph represents the proportion of requests to comments obtained during the entire free-play time each day by all three teachers who, during free play, each counted on pocket counters all requests and comments made to her by all the children in her area. Each point on these graphs represents the average for four school days, coinciding with the days in each experimental condition as shown in Figure 2. The lines are broken at changes in experimental conditions.

It can be seen that around 50% of the children's verbalizations were directed to teachers, and that there was little change in this overall ratio of verbalizations to teachers *versus* those to children across the entire study. Also, the roughly 50% ratio of requests and comments to teachers did not vary to any marked degree over the year. The teachers consistently recorded a higher proportion of requests (the dotted line) during all experimental conditions than the proportions obtained from the observer's verbalization samples (the solid line), perhaps indicative of the teachers' differential attentiveness to requests from children.

The bottom graph in Figure 4 shows the per cent of children observed during indoor free play whom an observer recorded as using any of the "free" shelf materials. During baseline, approximately four children used the shelf materials each day. When requirements were placed upon obtaining all other materials (Day 35), the number of children using these "free" materials declined to approximately one per day. The number of children using these materials remained at approximately one per day throughout the remaining conditions of the study.

DISCUSSION

It may be concluded that the incidental teaching procedure described is an effective one for

bringing about major changes in children's verbal behavior. The procedure was effective in markedly increasing each of the separate aspects of verbal behavior to which it was applied, and it was effective in increasing the usage of each of these aspects in all 12 of the children in the preschool group. Additional support for the effectiveness of the procedure is the fact that, in terms of procedure, the present study replicated the Hart and Risley (1968) study, which was conducted by the same teachers but with a different group of children.

In the present study, the general maintenance of using adjective-noun combinations when they were no longer required (that is, when access to materials was contingent only on use of compound sentences) also replicates a finding of the Hart and Risley (1968) study that, although overall use of color adjective-noun combinations decreased when the requirement for use was removed, it did not return to the baseline level. It was suggested in that study that other variables may maintain use of a given aspect of language once such use is at a certain rate; the present study lends support to this suggestion, both with the replication of the continued use of adjective-noun combinations and with the additional support of data showing maintenance of noun usage.

This incidental teaching procedure involved both contingent delivery of materials and (contingent) instruction. Teacher prompts (contingent instruction), which ensured that all the children mastered the form of response required to obtain materials, were never formally discontinued. This raises the question of the degree to which the children's usage of the successive aspects of language was maintained within and across conditions by such teacher cues, as opposed to consequent events such as obtaining materials. In the course of the study, a belated attempt was made to analyze the role of each of these sub-components of the incidental teaching procedure. A small and unreliable set of data were collected that suggested support for the teachers' estimates that, after the first two weeks of

each condition, considerably fewer than one prompt per child was occurring per day. In addition, during the final condition, when neither nouns nor adjective-noun combinations were prompted, the continuing level of these behaviors indicates that prompting was not necessary to maintain them.

The question of generalization of this incidentally taught language to stimulus situations other than those involving requests for materials also cannot be completely resolved on the basis of the present data. However, informal measures indicate that the children requested new materials approximately twice per 15-min sample—slightly below the frequency of using compound sentences in the final condition of this study, and well below the frequency of using noun and adjective-noun combinations. Thus, the magnitude of increased usage of nouns and adjective-noun combinations strongly suggests that the majority of this language usage was occurring at times other than incidental teaching episodes.

It appeared possible that incidental teaching procedures might be aversive for children, such that they might avoid requesting materials and instead play only with freely available items. In this study, children's preference for such freely available items abruptly *declined* when incidental teaching was instituted for requests to all other play materials. This implies that the children did not find the incidental teaching to be aversive, but rather they actually preferred items and areas associated with incidental teaching procedures.

This study replicates and extends the Hart and Risley (1968) study in demonstrating that the free-play periods of preschools can be used as powerful incidental teaching periods by capitalizing upon moments when children request new play materials to teach them systematically more elaborate language. It also demonstrates that, in accordance with the findings of previous research (Allen *et al.*, 1967; Buell *et al.*, 1968; Reynolds and Risley, 1968), the experimental manipulations in the present study had no ap-

parent adverse effects on related behaviors. The proportion or type of teacher-child interaction was not measurably affected by the experimental manipulations. Nor did the requirements for obtaining play materials result in the children's preferring to play with a set of materials that continued to be free of such requirements.

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