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Abstract

This study involved an investigation of the effectiveness of a programed method of beginning reading instruction in which the basic verbal unit was the whole phrase or sentence. The study also investigated the effect of prior word knowledge upon progress through the program. Twelve kindergarten children were randomly divided into three groups. Experimental Group 1 was taught to read the story, Goldilocks and the Three Bears, with a program which utilized supplementary cuing with echoic, pictorial, and intraverbal stimuli to overdetermine correct reading responses. The supplementary stimuli were gradually faded as the subjects progressed through the program until only the text remained. Experimental Group 2 was taught to read ten words from the story before progressing through the above described program. The subjects in the Control Group received no reading instruction. Rate of program completion and pre-, mid-, and posttests of reading ability indicated that the two experimental groups made significant and essentially identical improvement. The Control Group showed no improvement in reading ability. Several techniques for improving the program were discussed.

AN INVESTIGATION OF A PROGRAMMED METHOD OF BEGINNING READING INSTRUCTION
UTILIZING PHRASES AND SENTENCES AS BASIC VERBAL UNITS

by

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INTRODUCTION

Reading has long been recognized as the one skill basic to all other educational endeavors. Reading instruction occupies a position of primary importance in first grade curriculum and continues to receive only slightly less emphasis throughout the remainder of the primary years.

Reading instruction has been and continues to be a topic of much discussion, debate, theorizing, and investigation. Some major areas of investigation have included the following: (1) the optimum age for beginning reading instruction, (2) the relative effectiveness of various conventional techniques of reading instruction, and (3) other more experimental approaches to reading instruction.

Optimum Beginning Age

A mental age score of at least six years has been widely accepted as prerequisite for success in reading. Morphett and Washburne (1931) concluded that reading instruction should not be undertaken until a child has obtained a mental age score of 6-6. Keister (1941) found that, although children under six years of age could learn to read, the skills they attained at such an early age were lost over the summer vacation period.

Although reading instruction is traditionally reserved until the child enters first grade and is approximately six years of age, there are numerous instances in which reading instruction has been successfully pursued at earlier ages. Terman (1918) reported a study in

which two children received practice in recognizing large capital letters and entire words beginning at about nineteen months of age. The children learned to pronounce all the letters of the alphabet on sight and learned to read a number of words. Charles (1929) reported a case in which a two-year old boy was taught to read words, phrases, and sentences by means of a word method which employed charts and pictures. A case is reported by Cohan (1961) in which a two and one half year old girl was taught to read forty words through the use of picture cards.

It should be noted, however, that such anecdotal evidence as cited above often involved precocious children who had mental age scores of at least six years. There are, however, other studies in which the subjects definitely had mental age scores of less than six years. Davidson (1931) taught subjects with mental age scores of four years to read from 20 to 269 words in a period of four and one half months. Fowler (1965) has reported a study in which three-year-old subjects, all with mental age scores below six years, were taught to read at the preprimer level using an approach which emphasized the structure of the language at both word and sentence levels. Fowler did find, however, that subjects with mental age scores below four years had considerable difficulty with the program.

Conventional Techniques of Reading Instruction

Although many methods have been utilized in teaching reading, the two most frequently used are the phonics method and the look-and-say method. The phonics method is basically a system for translating written symbols into the sounds they represent. Although some authorities such as Flesch (1955) tout phonics as a panacea for all reading ills, most

reading experts hold that the usefulness of the phonics approach is limited by several factors. Among these are included the fact that the process of reading is ultimately a response to whole-word units, or even units consisting of several whole words. The phonics approach with its emphasis upon segments of words is somewhat artificial. Another important limitation of the phonics approach is the fact that English is, in many instances, a nonphonetic language.

Mosher (1928) characterized the look-and-say method as teaching reading so that the student immediately attaches meaning to graphic symbols. That is, the pupil reacts to a word or group of words as a unit. The look-and-say method de-emphasizes the use of analytic aids to the correct response and places much emphasis upon comprehension. Look-and-say training is behaviorally more like adult reading than that resulting from phonics training.

Much research has been conducted on the relative merits of the phonics approach and the look-and-say method of reading instruction. Most of this research indicates that look-and-say training is more effective in establishing the ultimately desired behavior. Tate (1937) found that look-and-say instruction was superior to phonics instruction in developing ability to comprehend sentences and paragraphs, and concluded that over-emphasis on phonics hinders rapidity and thoroughness of comprehension. Sexton and Herron (1928) found that phonics instruction has very little utility for reading during the first five months of first grade. Garrison and Head (1931) found that children taught by nonphonetic methods made smoother and better readers in the lower grades and recommended postponing phonics training to the latter

part of the primary grades. Mosher and Newhall (1930) found no essential differences in the effects of the two teaching methods, and concluded that phonics training is not especially to be recommended as a technique for increasing reading skill. Smith (1955) concluded that phonics instruction is most effective at the second or third grade level, and when taught in relation to the children's reading needs.

Such studies as those cited above indicate that the look-and-say method is superior to the phonics method in the teaching of beginning reading. However, some authorities such as Gates (1927) have found considerable merit in phonics training, particularly when such training is initiated in response to the children's needs for decoding new words. Gates also recommended that phonics training utilize the pupils' previously acquired sight words. Betts (1955) recommended phonic analysis as a useful tool in securing independence in word identification. Betts, however, emphasized the need for research related to such questions as how and when phonics should be taught. Thus, a general conclusion might be that some combination of the two approaches--probably with look-and-say training preceding phonics training--is most effective.

Experimental Approaches to Beginning Reading Instruction

Various other methodological approaches to teaching beginning reading have been proposed. One such approach is the linguistic method which emphasizes the teaching of relationships between written and spoken language. Linguistic instruction begins with completely regular grapheme-phoneme correspondences and gradually introduces irregular correspondences only when the pupil has mastered the regular grapheme-phoneme correspondences (Bronstein and Bronstein, 1965). Sabaroff (1966)

has pointed out that this approach leads to an understanding of the system that is operating in the graphic representation of spoken language.

Another recent innovation consists of using systems of artificial orthography, of which the most well-known is Pitman's 44 Character initial teaching alphabet (ITA). ITA imposes grapheme-phoneme correspondence, and thus simplifies the acquisition of reading responses. Monson (1967) characterized ITA as a teaching medium which provides the learner with an immediately available key to reading and writing any word he wishes. Mazurkiewicz (1967), Fry (1967), Sebesta (1964), among others, have found no significant difficulties in the transition from artificial orthography, whether Pitman's or some other system, to traditional orthography.

Much recent work has been concerned with the effect of discrimination pretraining upon subsequent reading performance. Such training has ranged from various workbook activities involving geometric forms to sophisticated experimental techniques; but whatever the method, the results in general indicate that discrimination pretraining definitely facilitates early reading. Muehl (1960) reported a study in which kindergarten children who received discrimination pretraining with the test words performed significantly better on the task of learning a vocabulary list than did subjects who received discrimination pretraining with different words or geometric forms. Staats and Schutz (1962) in another study of discrimination pretraining with kindergarten children reported that subjects who were pretrained with the test words performed significantly better on the criterion task than those trained with the individual letters composing the words, or the control group

which received no pretraining.

One very important problem in beginning reading instruction is the maintenance of the child's interest during long and frequently difficult training. Thus, the motivational effects of various methods and schedules of positive reinforcement has been a primary topic of reading research.

Staats, Staats, Schutz, and Montrose (1962) found that extrinsic reinforcement in the form of edibles and trinkets resulted in better performance on word and sentence recognition tasks than did social reinforcement or no reinforcement. Whitlock (1966) found an intermittent schedule of reinforcement to be dramatically effective in increasing the reading ability of a reading-retarded, six-year-old boy. She concluded that such positive reinforcement is extremely effective in controlling the reading behavior of a child.

Staats, Minke, Finley, Wolf, and Brooks (1964) reported a study of the effects of a complicated system of reinforcement upon the acquisition of reading responses in four-year-olds. The subjects were reinforced with small plastic tokens. Upon receiving a token the subject could choose whether to cash it in immediately for a small trinket or to save it until he had accumulated enough tokens to purchase a larger toy. Staats concluded that such a system solved many of the motivational problems involved in maintaining children's behavior over long periods of training.

In addition to the problems of discrimination pretraining and the maintenance of a high level of motivation, the problem of the optimum method of stimulus presentation has received considerable

attention. Martin (1964) taught reading skills to a group of kindergarten subjects using a multi-sensory approach. He utilized the Edison Responsive Environment machine which accepts and responds to information, presents graphic or pictorial material, and comments or explains. His results indicated that such a multi-sensory approach is more effective in establishing basic reading skills than is the usual approach to beginning reading.

King and Muehl (1965) investigated the effectiveness of reading stimuli presented via various sensory modalities. Various experimental groups received singly and in combination auditory, pictorial, and echoic cues to the correct response to printed words. King and Muehl concluded that the addition of visual and auditory cues aided the discrimination which is necessary for the establishment of reading responses.

McDowell (1967) used a programmed method of beginning reading instruction in which the text plus additional stimuli such as echoic, pictorial and intraverbal stimuli were used to overdetermine correct reading responses from the beginning. (Echoic stimuli are verbal stimuli which increase the probability that the subject will emit a verbal response similar to the original stimuli; intraverbal stimuli increase the probability that the subject will emit other, different verbal responses because of the context created.) These supplementary stimuli were subsequently faded, thus bringing the response under the control of the printed symbol only. In this program the basic verbal unit was the individual word. Using this method, McDowell taught fifteen preschoolers to read approximately fourteen words from the story, Goldilocks and the Three Bears. After completion of this

program, eight of the subjects were given additional instruction utilizing the same basic techniques, with complete sentences substituted for individual words as the basic verbal units. These subjects learned new words four times as rapidly with this program as with the original program.

As McDowell (1967) noted, there are several possible explanations for these results. Perhaps the rate of learning for beginning readers is a positively-accelerated function, regardless of the form of instruction. Another possibility is that the subjects' previous experience in the individual word program facilitated their performance in the sentence program. Also, it is possible that the sentence method, with its increased contextual cuing, is the most effective approach to programming beginning reading instruction.

The purpose of the present study is to investigate the effectiveness of a programmed technique of beginning reading instruction in which the basic verbal unit consists of the entire phrase or sentence--not the individual word. This program will use supplementary stimuli similar to those used in the McDowell study cited above. The supplementary stimuli will be gradually deleted as instruction proceeds.

The study will utilize two experimental groups. Experimental Group 1 will receive only programmed instruction. Because of the possible effects of previous word knowledge, Experimental Group 2 will receive prior instruction with ten of the words included in the program. This group will then receive the same programmed instruction as that received by Experimental Group 1. There will also be a control group which will receive no reading instruction.

METHOD

Subjects

Twelve children from a local kindergarten were subjects in the experiment. There were three girls and nine boys, ranging in chronological age from 5-5 to 6-5. The Peabody Picture Vocabulary Test was administered to the subjects. Mental age scores determined from this test ranged from 4-10 to 10-8 with a mean of 6-7. The I.Q. scores ranged from 96 to 137 with a mean of 109.

The subjects were matched on the bases of age and sex, and were randomly assigned to three groups of four subjects each. There was one control group and two experimental groups.

Experimental Room and Apparatus

Reading instruction was conducted in a sound-proof chamber at the University of North Carolina at Greensboro. The training sessions were of approximately twenty minutes duration, and were conducted five days per week. An average of approximately three months was required for the subjects to complete the program.

The apparatus included (a) seventy line drawings sequentially arranged in a notebook to illustrate the story of Goldilocks and the Three Bears. On a border under each drawing was typed the phrase or sentence illustrated by that picture. (b) The borders were typed with an Underwood elementary typewriter with $\frac{1}{4}$ inch type. Upper and lower case letters and punctuation were used as appropriate. (c) A Wollensak tape recorder was used to play a recording of the story, Goldilocks and the Three Bears.

Experimental Group I: Programed Instruction

The four subjects in Experimental Group I were taught to read the story of Goldilocks and the Three Bears using the programed instructional technique described below. The program included five major stages.

(1) Echoic Training. The subject was seated before a notebook containing the seventy drawings illustrating the story of Goldilocks and the Three Bears and the appropriate text for each picture. The notebook was opened to the first picture by the experimenter, and the subject was directed to look at that picture while a recording of the phrase illustrated by the picture was played. As soon as the first phrase was completed the tape was stopped and the subject was instructed to echo the phrase he had just heard, while continuing to look at the associated picture. This procedure was repeated for each drawing until the entire story was completed. Echoic training was continued at each session until a criterion of one complete presentation of the story with no more than ten errors was met.

(2) Reading with Pictorial, Intraverbal, and Textual Stimuli. When the echoic stage was completed the subject was again presented the illustrations and text. Instead of echoing the text, the subject was directed to read each word of the text as the experimenter pointed to it. As soon as the phrase associated with an illustration was completed the recording of that phrase was played, thus indicating the correct responses. This procedure was repeated for each phrase in the proper story order. The story was presented in this manner at each training session until a criterion of one complete presentation of the story with no more than ten errors was met.

Upon reaching criterion the second step in this stage was introduced. The subject was instructed to point to each word for himself as he read it. The experimenter no longer pointed to the words as they were read. Self pointing was continued throughout the remainder of the program.

(3) Deletion of Pictorial Stimuli. In the session following establishment of criterion in the presence of all supplementary stimuli with the subject pointing to the words, the pictures were deleted. The procedure was exactly as described in the previous stage except that the phrases composing the story were presented at the bottoms of otherwise blank sheets of paper. Training was continued at each session until the criterion of one complete presentation of the story with no more than ten errors was met.

(4) Deletion of Tape-Produced Intraverbal Stimuli. Upon reaching the fourth stage of the program the subject again read the story, phrase by phrase, pointing to each word as he read it; however, the tape recording following each phrase was deleted. Again the criterion of one complete reading of the story with no more than ten errors had to be met before progressing to the next stage.

(5) Fading of Subject-Produced Intraverbal Stimuli. The first step in fading the subject-produced intraverbal stimuli was the presentation of each phrase of the story immediately followed by the last half of that same phrase and then the first half of that phrase. For example, the first phrase of the story is "The three bears". In this step this phrase was presented on three consecutive pages in the following manner:

page 1: The three bears
page 2: three bears
page 3: The

Each phrase composing the story was presented in this fashion until the entire story had been presented.

The above procedure represented a dramatic increment in the difficulty of the program. Thus it was necessary to lower the criterion for progressing to the next step. The new criterion required one complete presentation of the story with no more than twenty errors.

In the second step in the fading of subject-produced intraverbal stimuli only the reversed half phrases were presented. The immediately preceding whole phrases were deleted. For example, the first phrase of the story was presented as follows:

page 1: three bears
page 2: The

Every phrase was presented in this manner until the entire story had been presented. The criterion of one complete reading of the story with no more than twenty errors had to be met before the next step was introduced.

The third step in the fading of subject-produced intraverbal stimuli involved the presentation of the story in reverse order, beginning with the last phrase and working to the first phrase.

When the subject had met criterion in the above step, the fourth and final step in the fading of subject-produced intraverbal stimuli was introduced. The 140 half phrases composing the story were presented to the subject in random order, and he was directed to read

them. The difficulty of this step necessitated lowering the criterion to one complete presentation of the 140 phrases with no more than fifty errors. Upon meeting this criterion instruction was terminated.

Testing. Pre-, mid-, and posttests of reading ability for the words comprising the story of Goldilocks and the Three Bears were administered. The battery of tests was given: (1) at the beginning of the first session before the subject had any training, (2) upon completion of stage three of the program (Deletion of Pictorial Stimuli), and (3) upon completion of the entire program. The following tests comprised the battery.

(1) Word Recognition. The 92 individual words comprising the story, Goldilocks and the Three Bears, were presented singly and in random order. The subjects were directed to read each word.

(2) In-Context Comprehension - Completion. The subjects were instructed to read each of ten completion sentences, and to select the appropriate completion word for each sentence from three alternatives.

For example: Goldilocks broke the little _____.

chair
bed
bowl

The sentences comprising this test were composed of words from the story and were based upon events in the story.

(3) Out-of-Context Comprehension - Pictures. The subjects were directed to read each of ten simple sentences composed of words from the story, but unrelated to the

story in content. Upon completion of each sentence the subjects were shown three drawings and instructed to indicate the drawing which best illustrated the preceding sentence.

(4) Out-of-Context Comprehension - Completion. The ten sentences comprising this test were composed of words from the story, but were unrelated to the story in content. Again the subjects were instructed to read each of the ten items and select the appropriate completion word for each sentence from three alternatives,

Example: A bed is for _____.

eating
sitting
sleeping

Experimental Group 2: Program Preceded by Word Instruction

Prior to beginning the program the four subjects in Experimental Group 2 were given reading instruction with ten words from the story, Goldilocks and the Three Bears. The ten words used were: said, slept, ate, porridge, big, bear, chair, hot, cold, size.

The first five words were presented in fixed order, and the subject was instructed to read the words. The experimenter made corrections as necessary. This procedure was repeated until the subject could read the list of five words through twice with no errors. The same five words were then presented in random order and the subject was again instructed to read them. Training was continued until the subject read two consecutive random sets of the five words with no errors. The above described procedure was followed using the second

five words. The ten words were then combined into a single set and presented in random order until the subject could read two consecutive random sets of ten words with no errors.

Upon meeting the above criterion the subjects were given the same program as Experimental Group I. The same pre-, mid-, and posttests were administered at the same stages in the program.

Control Group

The four subjects in the control group received no reading instruction but were given the same pre-, mid-, and posttests as the two experimental groups.

RESULTS

Completion of Program

Two of the twelve subjects had to be dropped from the program because they did not respond to the training. These subjects were replaced by two children of comparable age who were recommended by the kindergarten teacher.

Table 1 presents the mean number of total trials and the mean number of trials and errors per step to complete the program for the two experimental groups. An analysis of variance as described in Lindquist (1953) showed no significant difference between the two experimental groups for the mean number of total trials required to complete the program ($F = .01$). It can be seen in Table 1 that the mean number of trials to meet criterion at each step of the program was essentially equivalent for the two groups. The only notable exception occurred on the Whole Phrases Followed by Half Phrases Reversed step and on the immediately following step, Half Phrases Reversed. It is notable that on both steps Experimental Group 2 which received prior word recognition instruction did not perform as well as Experimental Group 1 which received no prior instruction. It can also be seen in Table 1 that the mean number of errors per step parallels the data for trials to criterion.

Improvement in Reading Ability

Table 2 contains the pre-, mid-, and posttest mean scores and standard deviations for the tests of reading ability. These data are presented graphically in figures 1-4. The data were analyzed

Table 1

Mean Number of Total Trials and Mean Number of
Trials and Errors per Step to Complete the Program
for Experimental Groups 1 and 2

Steps of the Program	Group 1		Group 2	
	Trials	Errors	Trials	Errors
Echoic	3.00	23.58	2.50	19.40
Intraverbal-E. Pointing	4.25	21.24	4.00	27.25
Intraverbal-S. Pointing	3.00	27.58	2.75	24.27
Deletion of Pictorial Stimuli	2.25	16.11	1.75	13.71
Deletion of Tape Produced Intraverbal Stimuli	1.25	6.40	1.25	11.20
Whole Phrases Followed by Half Phrases Reversed	1.75	18.57	3.75	28.13
Half Phrases Reversed	1.25	11.80	2.50	23.40
Reversed Story Order	2.00	20.13	1.50	18.67
Random Half Phrases	2.00	40.63	1.25	46.80
Total	20.75		21.25	

Table 2

Pre-, Mid- and Posttest Means and Standard Deviations on
the Tests of Reading Ability for the Experimental and
Control Groups

Test	Instructional Procedure	Pretest		Midtest		Posttest	
		Mean	SD	Mean	SD	Mean	SD
	Program	1.25	1.26	20.25	16.99	46.50	20.47
Texting	Program-Words	.00	.00	13.00	5.48	32.75	6.60
	Control	.00	.00	.50	.58	3.50	7.00
In-Context	Program	.00	.00	.75	.95	3.75	5.72
Comprehension- Completion	Program-Words	.00	.00	1.00	1.41	3.50	1.91
	Control	.00	.00	.00	.00	.00	.00
Out-of-Context	Program	.00	.00	.25	.50	4.50	4.20
Comprehension-	Program-Words	.00	.00	.00	.00	.50	1.00
Pictures	Control	.00	.00	.00	.00	.00	.00
Out-of-Context	Program	.00	.00	.00	.00	3.25	3.77
Comprehension- Completion	Program-Words	.00	.00	.00	.00	.00	.00
	Control	.00	.00	.00	.00	.00	.00

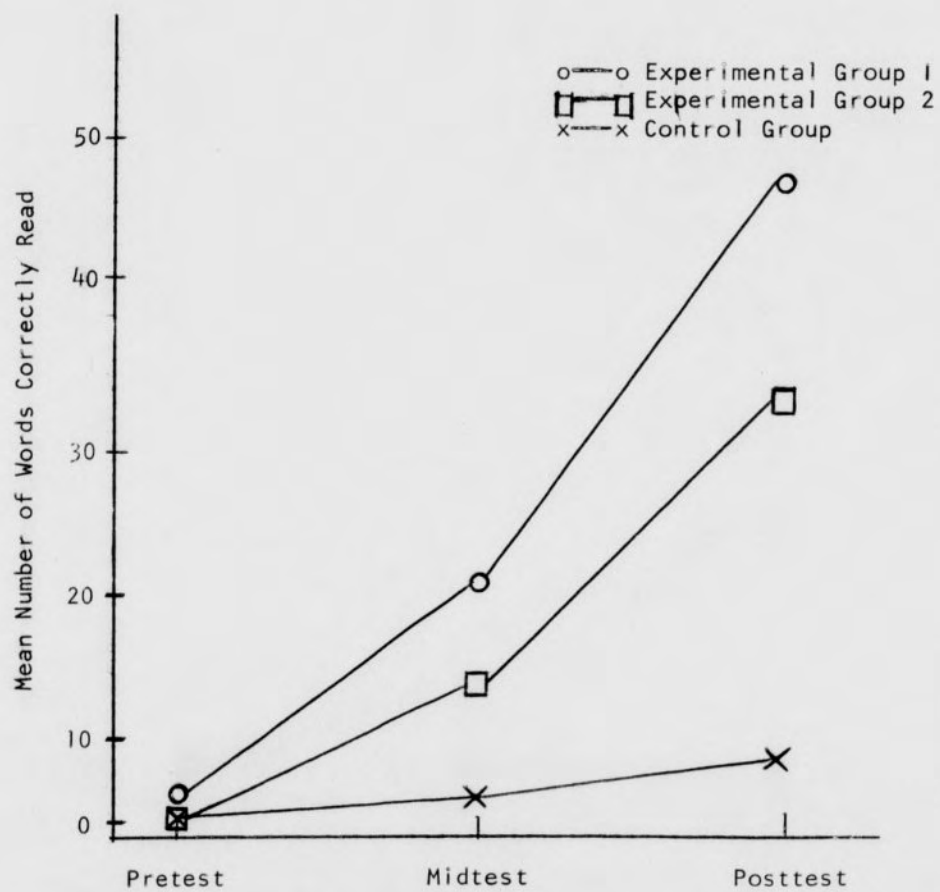


Fig. 1. Pre-, Mid-, and Posttest means on Word Recognition test for Experimental and Control Groups.

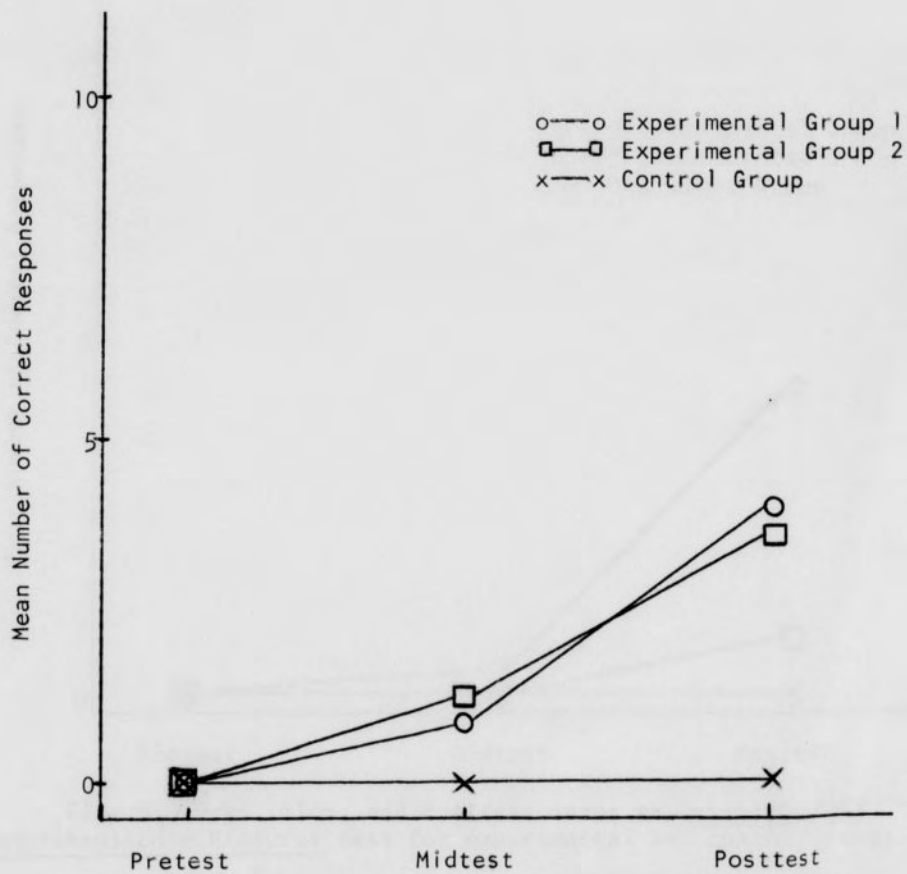


Fig. 2. Pre-, Mid-, and Posttest means on In-Context Comprehension - Completion test for experimental and control groups.

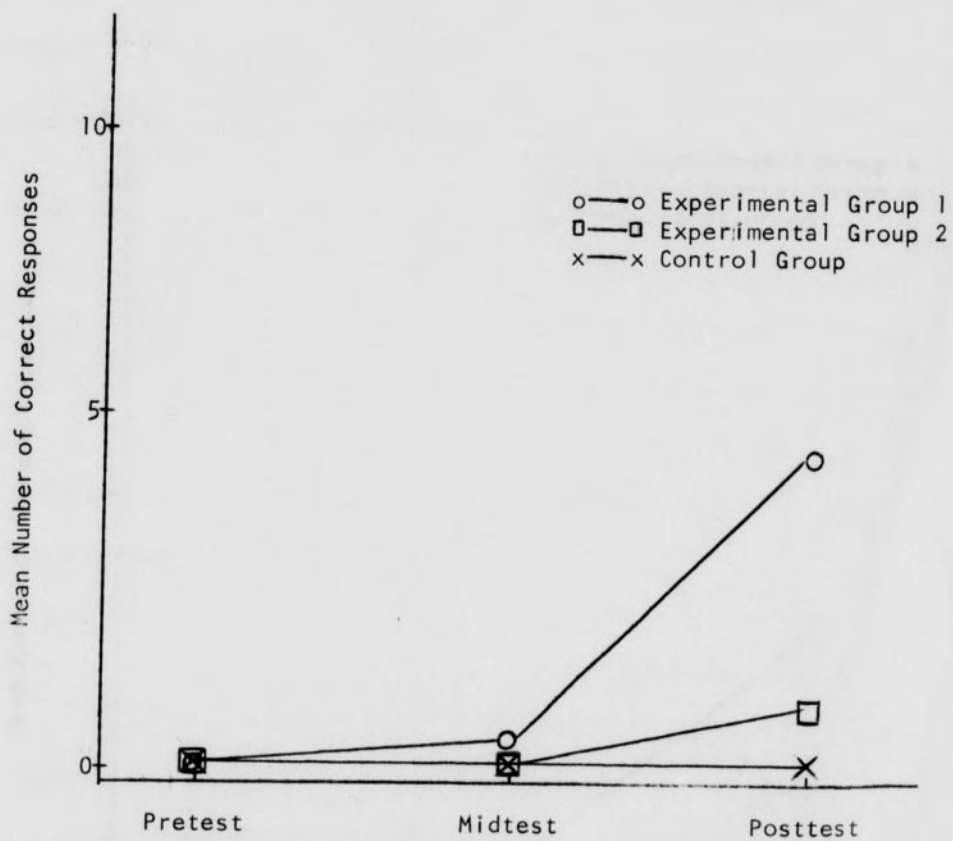


Fig. 3. Pre-, Mid-, and Posttest means on Out-of-Context Comprehension - Pictures test for experimental and control groups.

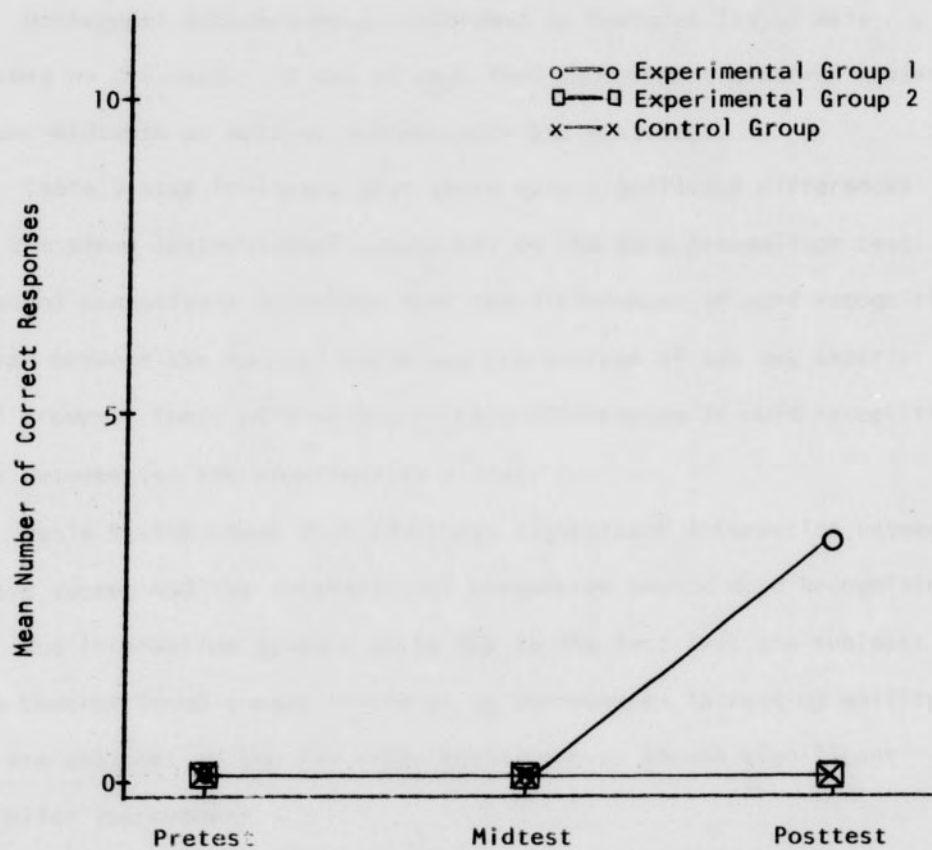


Fig. 4. Pre-, Mid-, and Posttest means on Out-of-Context Comprehension - Completion test for experimental and control groups.

according to a Lindquist Type I analysis of variance design as described in Lindquist (1953). The results of the analyses are presented in Table 3.

It can be seen in Table 3 that there were significant differences among the pre-, mid-, and posttest mean scores on the Word Recognition test. Orthogonal comparisons as described in Snedecor (1956) were performed on the data. It can be seen that improvement occurred between pre- and midtests as well as between mid- and posttests.

Table 3 also indicates that there were significant differences among the three instructional procedures on the Word Recognition test. Orthogonal comparisons indicated that the differences in word recognition occurred between the Control Group and the average of the two experimental groups. There were no significant differences in word recognition scores between the two experimental groups.

Table 3 also shows that there was significant interaction between the test scores and the instructional procedures on the Word Recognition test. The interaction appears to be due to the fact that the subjects in the Control Group showed little or no improvement in reading ability, while the subjects in the two experimental groups showed significant and similar improvement.

It can be seen in Table 3 that there were significant differences among the pre-, mid-, and posttest mean scores on the test of In-Context Comprehension - Completion. The orthogonal comparisons indicate improvement between pre- and midtests as well as between mid- and posttest.

The differences among the three instructional procedures on the In-Context Comprehension - Completion test were nonsignificant. However,

Table 3
Summaries of Analyses of Variance and Orthogonal
Comparisons for Four Tests of Reading Ability

Test	Source of Variation	df	SS	MS	F
Word Recognition	Pre-, Mid-, Posttest	2	4488.66	2244.33	48.15*
	Pre- X Mid-, Posttest	1	2888.00	2888.00	61.96*
	Mid- X Posttest	1	1600.66	1600.66	34.34*
	Interaction	4	1845.67	461.42	9.90*
	Error (W)	18	839.00	46.61	.00
	Instructional Techniques	2	2815.17	1407.58	7.64*
	Control X Program, Program Words	1	2485.13	2485.13	13.49*
	Program X, Program Words	1	330.04	330.04	1.79
	Error (B)	9	1658.25	184.25	.00
	In-Context Comprehension Completion	Pre-, Mid-, Posttest	2	38.17	19.08
Pre-, Mid-, Posttest		1	18.00	18.00	12.87*
Mid- X Posttest		1	20.17	20.17	14.42*
Interaction		4	19.33	4.83	3.46*
Error (W)		18	25.17	1.40	.00
Instructional Techniques		2	18.00	9.00	2.96
Control X Program, Program Words		1	18.00	18.00	5.93*
Program X Program Words		1	.00	.00	.00
Error (B)		9	27.33	3.04	.00
Out-of-Context Com- prehension - Pictures		Pre-, Mid, Posttest	2	21.17	10.58
	Pre- X Mid-, Posttest	1	6.13	6.13	3.17
	Mid- X Posttest	1	15.04	15.04	7.77*
	Interaction	4	30.67	7.67	3.96*
	Error (W)	18	34.83	1.94	.00
	Instructional Techniques	2	18.17	9.08	3.73
	Control X Program, Program Words	1	6.13	6.13	2.52
	Program X Program Words	1	12.04	12.04	4.95
	Error (B)	9	21.92	2.44	.00
	Out-of-Context Com- prehension - Completion	Pre-, Mid-, Posttest	2	9.39	4.69
Pre-X Mid-, Posttest		1	2.35	2.35	1.48
Mid-X Posttest		1	7.04	7.04	4.45*
Interaction		4	18.78	4.69	2.69
Error (W)		18	28.50	1.58	.00
Instructional Techniques		2	9.39	4.69	2.69
Control X Program, Program Words		1	2.35	2.35	1.48
Program X Program Words		1	7.04	7.04	4.45
Error (B)		9	14.25	1.58	.00

* $P < .05$

more specific comparisons indicated significant differences between the Control Group and the average of the two experimental groups but no differences between the two experimental groups.

Table 3 also shows that there was significant interaction between the pre-, mid-, and posttest mean scores and the instructional procedures on the In-Context Comprehension - Completion test. It can be seen in Figure 2 that the interaction effects are due primarily to the fact that the subjects in the Control Group showed no improvement on the mid- and posttests while the subjects in the two experimental groups showed significant and nearly identical improvement.

The data in Table 3 also indicate significant differences among the pre-, mid-, and posttest mean scores for the Out-of-Context Comprehension - Pictures test. Orthogonal Comparison indicated that improvement in performance occurred between mid- and posttests but not between pre- and midtests.

There were no significant differences among the three instructional procedures on the Out-of-Context Comprehension - Pictures test. There was, however, significant interaction between the pre-, mid-, and posttest scores and the instructional procedures. This interaction appears to be due to the fact that the subjects in the Control Group and in Experimental Group 2 showed little or no improvement on the pre-, mid-, and posttests, while the subjects in Experimental Groups 1 showed significant improvement between the mid- and posttests.

The data in Table 3 indicate no significant differences among the pre-, mid-, and posttest mean scores on the Out-of-Context Comprehension - Completion test with the single exception of the specific

comparisons between mid- and posttest scores. There were no significant differences among the three instructional groups on the test of Out-of-Context Comprehension - Completion. It can also be seen in Table 3 that there was no significant interaction between tests and instructional techniques.

The differences between the two experimental groups were not statistically significant on any test. However, it is noteworthy that Experimental Group 2 which received preliminary word instruction scored consistently lower on all tests of reading ability than Experimental Group 1 which received no such prior training. This result might be a function of the I.Q. differences among the three groups resulting from the small sample size and the random method of group assignment. Although the I.Q. differences among the three groups were not statistically significant ($F = 1.89$), the mean I.Q. for Experimental Group 1 was 116, while the mean I.Q.'s for Experimental Group 2 and the Control Group were 103 and 104 respectively. A Pearson product-moment correlation coefficient as described in Ferguson (1966) between the I.Q. scores and the number of words read on the Word Recognition posttest for the experimental subjects resulted in a coefficient of +.57. A test of significance as described in Myers (1966) indicated that this correlation coefficient was not significantly different from zero. However, with so small a sample size ($N = 8$), a very large sample coefficient would have been necessary to indicate significance in the population.

DISCUSSION

The pre-, mid-, and posttest mean scores indicate that the subjects did learn to read when taught by means of a program in which the basic verbal unit was the whole phrase, and which involved over-determining correct responses with supplementary stimuli which were subsequently faded. The tests administered indicate that the subjects developed considerable in-context and some out-of-context comprehension skills, as well as word recognition ability for the words used in the program. The control subjects who received no reading instruction demonstrated no improvement in reading skills. Significant differences between pre- and midtest scores as well as between mid- and posttest scores indicate that improvement in word recognition and in-context comprehension ability occurred throughout the entire program.

The results of specific comparisons for the two Out-of-Context Comprehension tests indicate that improvement occurred only during the midtest - posttest interval. One explanation for these findings is that prior to the posttesting the subjects may have been unable to read enough individual words to comprehend sentences which lacked contextual cues.

Although the results indicate significant differences between the two experimental groups and the control group, no differences were found between the two experimental groups. Thus, it would appear that the ability to read approximately ten words as was true of Experimental Group 2 was not a significant factor affecting performance on the program.

It is noteworthy, however, that Experimental Group 1 which received no prior training performed consistently better on all tests of reading ability. It was expected that the performance of Experimental Group 2 which received prior word training would be either comparable to or superior to that of Experimental Group 1.

Several factors became evident during the course of the study which have lead to considerable dissatisfaction with the program in its present form. As the study progressed it became evident that several of the first four stages of the program (Echoic Training; Reading with Pictorial, Intraverbal, and Textual Stimuli; Deletion of Pictorial Stimuli; Deletion of Tape-Produced Intraverbal Stimuli) were too elementary. It also became evident that the last stage (Fading of Subject-Produced Intraverbal Stimuli) was too difficult for the kindergarten-aged subjects.

The subjects were frequently bored during the first four stages of the program, and often performed poorly because they were reportedly "tired of the same old story again." Many subjects were quite vocal in their desire for new or different stories, and repeatedly asked when they were going to read a different story.

The fifth stage of the program (Fading of Subject-Produced Intraverbal Stimuli) presented more serious difficulties. The negative transfer effects of the subjects' extremely strong set for the story, Goldilocks and the Three Bears, was one such difficulty. When contextual cues were faded by re-arranging sentence order in the fifth stage, the subjects frequently misread sentences according to original context. For example, subjects often read the following two phrases,

"three chairs" followed by "There were" as "three chairs" followed by "A big chair". The contextual stimuli associated with reading the first phrase resulted in the erroneous reading of the second phrase.

The difficulties associated with the meaningless sentences of the fifth stage appeared to be very frustrating for the subjects. Their reactions varied from increasing playful activities during training to refusing to work any further. The experimenter found it necessary to be extremely supportive and verbally reinforcing, to cajole, and at times to demand that the subject continue working. Also it became necessary to lower the criterion for progressing to the next step twice during the fifth stage.

The above considerations indicate that the program would benefit from considerable restructuring. It is suggested that stages 3 and 4 (Deletion of Pictorial Stimuli and Deletion of Tape-Produced Intraverbal Stimuli) should be combined into a single stage. These two stages were exceedingly easy and probably could be accomplished simultaneously without difficulty. It is strongly indicated that the fifth stage (Fading of Subject-Produced Intraverbal Stimuli) needs considerable reprogramming. Perhaps revision of existing steps and/or inclusion of additional steps might render this stage less difficult and improve the over all results of the program.

Another consideration is that the program might be improved more by deleting the fifth stage entirely. One possibility is that the first four stages remain essentially intact and that the fading of subject-produced intraverbal stimuli be accomplished through the use of several shorter stories composed of the same basic vocabulary.

With such a program, the subject would progress with one story through the program until all supplementary stimuli except subject-produced intraverbal stimuli had been eliminated (through stage 4 in the program used in the present study). He would then repeat the program by reading another entirely different story which would be composed of the same vocabulary. Similar echoic, pictorial, and intraverbal cues could be used in stories; however, it is probable that progressively fewer cues of this sort would be necessary as the subject progressed to subsequent stories. This procedure could be repeated until the desired degree of in- and out-of-context comprehension ability was obtained for the words comprising the stories.

The above suggested procedure has several important advantages. It would exploit fully the positive reinforcement resulting from immediate feedback and lower error percentage which occurred during the first four stages of the program used in this study. Also, the suggested restructuring would permit fading of subject-produced intraverbal stimuli in an interesting and meaningful manner. It should be noted in this connection that, in the program used in the present study, several of the steps in the fifth stage involved relatively meaningless material, such as half sentences in random order. The meaningfulness of the material in combination with the subjects' increasing boredom might have been one of the factors having a debilitating effect upon the subjects' performance on the fifth stage.

The above suggested program is designed to give the subject much exposure to a controlled vocabulary. This exposure would be accomplished through an interesting variety of short stories, which would

reduce repetition and consequent disinterest. It is suggested that such a program should result in smoother acquisition of the desired reading responses and maintain the advantages of using the entire sentence as the basic verbal unit.

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APPENDIX

The Seventy Phrases Comprising the story,
Goldilocks and the Three Bears

1. The three bears
2. Papa bear
3. Mama bear
4. Baby bear
5. The three bears
6. lived in a house
7. at the end of a path in the woods.
8. Inside the house
9. were three beds.
10. A big bed,
11. a middle size bed,
12. and a little bed.
13. Papa bear slept in the big bed.
14. Mama bear slept in the middle size bed.
15. Baby bear slept in the little bed.
16. There were three chairs.
17. A big chair,
18. a middle size chair,
19. and a little chair.
20. Papa bear sat in the big chair.
21. Mama bear sat in the middle size chair.
22. Baby bear sat in the little chair.

23. There were three bowls.
24. A big bowl,
25. a middle size bowl,
26. and a little bowl.
27. Papa bear ate out of the big bowl.
28. Mama bear ate out of the middle size bowl.
29. Baby bear ate out of the little bowl.
30. Mama bear cooked some porridge on the stove,
31. but the porridge was too hot.
32. So the three bears went for a walk.
33. Soon a little girl came down the path.
34. Her name was Goldilocks.
35. Goldilocks knocked at the door and went inside.
36. Goldilocks saw the three bowls of porridge on the table.
37. She tasted the porridge in the big bowl but it was too hot.
38. She tasted the porridge in the middle size bowl but it was too cold.
39. She tasted the porridge in the little bowl and it was just right.
40. So Goldilocks ate all the porridge in the little bowl.
41. Then Goldilocks saw the three chairs.
42. She sat in the big chair but it was too hard.
43. She sat in the middle size chair but it was too soft.
44. She sat in the little chair and it was just right.
45. But soon the chair broke.
46. Then Goldilocks saw the stairs.

47. She ran up the stairs.
48. Upstairs she saw the three beds.
49. She sat on the big bed but it was too hard.
50. She sat on the middle size bed but it was too soft.
51. She sat on the little bed and it was just right.
52. So Goldilocks went to sleep in the little bed.
53. Soon the three bears came back home.
54. "Somebody has been eating my porridge," said Papa bear.
55. "Somebody has been eating my porridge," said Mama bear.
56. "Somebody has been eating my porridge and it is all gone," said Baby bear.
57. "Somebody has been sitting in my chair," said Papa bear.
58. "Somebody has been sitting in my chair," said Mama bear.
59. "Somebody has been sitting in my chair and it is all broken," said Baby bear.
60. The three bears went upstairs.
61. "Somebody has been sleeping in my bed," said Papa bear.
62. "Somebody has been sleeping in my bed," said Mama bear.
63. "Somebody has been sleeping in my bed, and here she is," said Baby bear.
64. Just then Goldilocks woke up.
65. She saw the three bears.
66. She jumped out of bed.
67. She ran down the stairs.
68. She ran out the door.
69. She ran up the path.
70. And the three bears never saw Goldilocks again.