DOCUMENT RESUME

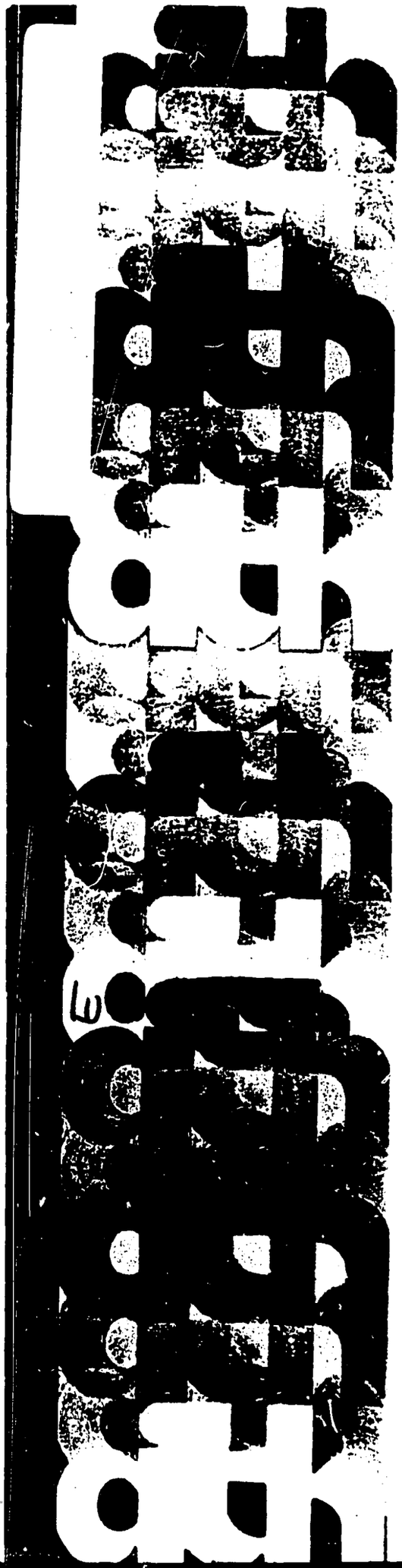
ED 069 053 EC 050 103

AUTHOR Sitko, Merrill C.; And Others
TITLE The Relationship of Word- and Sentence-Associations of EMR Children to Reading Performance. Final Report.
INSTITUTION Indiana Univ., Bloomington. Center for Innovation in Teaching the Handicapped.
SPONS AGENCY Bureau of Education for the Handicapped (DHEW/OE), Washington, D.C.
PUB DATE Jun 72
GRANT OEG-9-242178-4149-032
NOTE 233p.; Final Report 6.33

EDRS PRICE MF-$0.65 HC-$9.87
DESCRIPTORS *Educable Mentally Handicapped; *Exceptional Child Research; Mentally Handicapped; Primary Grades; Reading; *Reading Ability; *Sentence Structure; *Word Recognition

ABSTRACT

Reported was a two part study of 59 educable mentally retarded (EMR) primary grade children which examined the possibility of ascertaining continuous word-association norms, word-association norms, and sentence norms for EMR children, and of utilizing the high word and sentence associations to facilitate reading instruction. Collection of both word-association and sentence-association responses indicated that a substantial number of stimulus words and sentences yielded a high degree of response commonality. However, contrary to hypothesized results, data indicated that nonassociation word pairs may be read with greater accuracy than high association words. Data also failed to support any facilitative effect of high associations on pupils' gain in reading at either the sentence recognition level or the sentence comprehension level. Anecdotal records examined teaching styles and lessons for each class. Failure of the data to confirm the authors' hypothesis was thought to be due to the children's prior exposure to phonic/analytic methods of instruction and to their inability to organize verbal materials according to semantic or associative properties. Instructional materials were included in the appendix. (GW)



Center for Innovation in Teaching the Handicapped

School of Education, Indiana University, Bloomington

THE RELATIONSHIP OF WORD- AND SENTENCE-ASSOCIATIONS OF EMR CHILDREN TO READING PERFORMANCE

MERRILL C. SITKO, DOROTHY S. SEMMEL, GAIL WILCOVE, AND MELVYN I. SEMMEL

THE RELATIONSHIP OF WORD- AND SENTENCE-ASSOCIATIONS OF EMR CHILDREN TO READING PERFORMANCE[1]

Merrill C. Sitko, Dorothy S. Semmel,

Gail Wilcove, and Melvyn I. Semmel

June, 1972

Final Report 6.33

Center for Innovation in Teaching the Handicapped

Indiana University

[1]This research was partially supported by grant #OEG 9-242178-4149-032 from the U. S. Office of Education, Bureau of Education for the Handicapped to the Center for Innovation in Teaching the Handicapped.

TABLE OF CONTENTS

INTRODUCTION AND REVIEW OF RELATED LITERATURE

Reading Programs in the Special Class

One of the most persistent problems in the education of EMR children is that of effective reading instruction. Every diverse approach to the social, vocational and personal adjustment of the EMR recognizes the desirability of at least minimal literacy as a valid aspect of successful adjustment. Few would take issue with this goal, and most would argue for maximum development of reading skill as the measure of the success of any given program. Unfortunately, most EMR programs report failure in efforts to have pupils read at levels commensurate with ability. While most teachers of EMRs predicate their expectations of reading success on the MA level of their pupils, the general frustration of most special class teachers is that their pupils often lag behind the MA expectancy level. Achievement studies of EMR pupils have verified the pervasiveness and persistence of the reading problem in EMR classes (Dunn, 1954; Groelle, 1961).

Over the years, therefore, much attention has been focused on the search for a method of teaching reading that would be truly effective. Since special classes became a fact of modern, urban school life in the early 1920's, whole series of approaches have been proposed, developed, adapted or discarded. Over time existing methods have been modified or submerged by the latest solution to the problem of finding a better reading method.

Most often, innovations in reading instruction for EMRs have followed developments and philosophies current in regular elementary education. Thus, over successive waves of predominating phonic, sight-word,

and Language-Experience methods, special education reading programs have followed the prevailing educational mode.

There seems to be no definitive support for asserting the superiority of one method over another. Woodcock and Dunn (1966) investigated six different approaches to the teaching of beginning reading to EMRs. The techniques compared were Language-Experience, basal reader, programmed text, traditional vs. ITA (initial teaching alphabet) othography and basal readers using rebus symbols. Their analysis yielded no indication of the superiority of one technique over another. In his review of the National First-Grade Reading Studies, Dykstra (1968) found that no one method proved superior. Studies by Schneyer (1969), Fry (1969), Hayes and Wuest (1969), Sheldon, Stinson and Peebles (1969) are similarly inconclusive.

While it is true that evaluation of the effectiveness of reading instruction for the EMR is often confounded by variables unrelated to a particular instructional method (e.g., frequent history of educational failure and consequent negative set toward reading) and the many techniques overlap, the search for improved methods continues.

The major methodological approach to EMR reading instruction which emphasizes semantic and syntactic language structures, rather than phonemic correspondences and perceptual features of written language, is the "Language-Experience" (L.E.) method. In their influential text on methods of teaching EMR children, Kirk and Johnson (1940) advocated the L.E. method as appropriate for pupils in special education. The L.E. method and its variations (Lee and Allen, 1963; San Diego County, 1961; Ashton-Warner, 1963) approximate the approach recommended for EMRs by Schard (1959), Schard, Holtz, et al., (1948), and Bhussry (1960), and

adapted in various curriculum guides for EMR instruction, i.e., New York City and Montgomery Co., Maryland. Its pivotal feature is the use of teacher-written, high-interest, simple vocabulary, functional materials.

The Ashton-Warner method encourages pupils to narrate experiences and feelings, and generates motivation to read by transcription of the pupils' own stories, including high-arousal, emotionally charged words. By contrast, the special education orientation to the functional reading approach typically centers on teacher-selected topics where pupil interest is assumed. The stories are constructed from functional vocabulary lists (i.e., vocational, consumer, safety words) and short, high-frequency words corresponding to the basal reader level of the pupil. The difficulty in applying the method is that it requires great expenditure of time both in and out of the classroom, and requires much resourcefulness and creativity for teachers to write their own materials. Also, most teachers are wary of the lack of systematization of the approach, a need that basal readers adequately fulfill. There is a great need for methods that will assist teachers in constructing their own materials, a method that is both systematic, efficient, and based on the best theoretical and empirical research in the reading process.

Psycholinguistic Studies and Implications

Initiated by the presentation of the theory of transformational grammar (Chomsky, 1965), the great surge of interest in studying both developmental language processes and psycholinguistic principles has generated its counterpart in the field of reading. Ryan and Semmel (1969), in a review of the results of numerous language studies, have evaluated

the implications for reading instruction. They conclude that "reading, like speaking and listening, can be considered a language process." They reject the notion that reading is essentially a matter of sequentially pairing visual forms, which are in turn interpreted like speech.

One of the earliest expositions of a language-based approach to reading instruction is by Lefevre (1964). He emphasized the importance of the sentence as a meaning-bearing unit and suggested that in the teaching of reading, words should be regarded as a minor linguistic unit, while the importance of intonation and stress patterns, and of clauses and sentences be emphasized. Neisser (1967) has described reading as externally guided thought in which the stimulus, rather than determining perception, serves as a prompter for an ongoing language process. Similarly, Kohlers (1970) hypothesizes two aspects in the perceptual identification of items: initial schematization and subsequent impletion or filling-in. Goodman's (1967) hypothesis-testing view of the reading process assumes that the ultimate goal of reading is direct passage from print to meaning, without going through surface speech processes in between.

In summarizing the various models for reading based on the active participation of the reader, Ryan and Semmel (1969) have shown that considerable evidence exists that reading is a cue-sampling process, rather than one requiring absolute discrimination of detail. They conclude that children's reading material should be written so as to maximize the child's opportunity to develop efficient habits of forming and testing hypotheses.

Beginning reading materials traditionally contain the shortest, most frequently occurring words, with little attention given to controlling

syntax and semantic associations within a sentence or passage. Reading instruction based upon language structures rather than perceptual features requires reading materials that control syntactic patterns, contain highly associated words, and show strong continuity between sentences.

To realize such an approach to the writing of reading materials, a data base of words, sentence, and inter-sentence associations is required. In addition, an efficient method for obtaining associative commonalities within classes or other instructional units is necessary.

The present project seeks to lay the groundwork for a psycholinguistically based reading program that can be used by the classroom teacher in writing reading materials for EMR classes. It will attempt to demonstrate the practicality of gathering several types of linguistic data and using the normative results as a basis for: (a) a thesaurus of words, sentences and connected discourse derived from the associational habits of a given EMR class or group of classes, (b) demonstrating the facilitative effect of reading materials that reflect the associational proclivities of the students, (c) training teachers in the use of normative associations for the construction of reading materials, and (d) the development of activities and games that encourage pupils to attend to and to use relevant linguistic organizational strategies which take advantage of the familiar structure of reading materials.

The present study will be concerned with the first two goals cited above. Positive results in a pilot study would indicate that development of the third and fourth objectives are warranted.

In order to realize the primary objectives of the study, several questions were posited and explored. First, can it be established that

EMR pupils respond with enough common responses to a free word-association task, so that norms for small groups (classes, schools) can be derived? W-A Norms of EMRs have been established in several previous studies. Gerjuoy (1969) studied an institutional population and employed the 200-word stimulus list used by Palermo and Jenkins in their 1966 study. This list consisted of 100 Kent-Rosanoff (1910) words plus 100 others. Gallagher, Baumeister and Patterson (1970) used only the Kent-Rosanoff list. Group EMR norms have also been reported by Semmel, Sitko, and Semmel (1969) and Horan (1956). A review of these and similar studies of nonretarded children, i.e., Entwisle (1966) and Palermo and Jenkins (1966), indicated sufficient reason to expect normative responses from small groups of EMRs.

A related question studied was: would collecting continuous responses to a set of stimulus words yield reliable responses from the subject population? The technique of "continuous association" has been described by Cofer (1958) as the method of eliciting successive responses to a stimulus word which is presented only once. Since the stimulus word is not repeated, the S may be responding as much to his own previous response as to the original stimulus. Noble (1952) utilized the "continued association" technique, where the same stimulus was repetitively presented in the elicitation of responses. It was expected that through a combination of these techniques, one could derive the strongest (most popular/frequent) associates of the stimulus, and also measure the lexical range of EMR children. The concept of lexical range here approximates Noble's (1952) measure of "meaningfulness." It is expected that the collection of unrestricted associations would, in addition to

showing the associative strength of stimulus words, also indicate the lexical range of EMRs and thus serve as an index of level of word difficulty for the subject population.

Also to be considered in the present study is the issue of word-associations in sentences. Rosenberg (1966) has developed a procedure for generating sentences varying in associative strength, involving the use of sentence frames. The results are a series of norms that represent the associations generated by sequencing responses to content words occurring successively within a sentence.

Experimental studies of the effects of associative strength in reading have focused on the word-level (Samuels, 1969), and at the level of connected discourse (Shima, 1970; Rosenberg, 1966; Samuels & Wittrock, 1969; and Samuels, 1968). The primary technique employed in the latter studies has been the embedding of high-, low- or nonassociated content words within paragraphs. It was assumed that restricting the use of associations to the sentence level would result in the same facilitative effects of high-association words that were found in all of the studies cited above, with the exception of Shima.

The present study is divided into two distinct stages: the first stage involves the collection of normative language responses discussed above; the second stage is devoted to an empirical study of the effect of word-associations on reading performance of EMR pupils. It was expected that the outcome of this study would lead to development of methods for practical utilization of norms in the writing of reading materials for EMR classes.

PART I

A NORMATIVE STUDY OF WORD- AND SENTENCE-ASSOCIATIONS OF EMR CHILDREN

Part I of the present project consists of three sub-studies:

1. Continuous word-association norms.
2. Word-association norms.
3. Sentence-association norms.

These series of studies comprise the normative substrate for the second phase of the project: determination of the facilitative effects of utilizing high word- and sentence-associations in reading instruction for EMR pupils.

The study was initiated with the collection of continuous responses to a list of single-word stimuli. The subjects were children enrolled in primary classes for EMR.

Continuous Word-Association Norms

The purpose of this sub-study was twofold; to determine whether the continuous responses of EMR pupils to a single stimulus word results in reliable associational responses, and to determine which stimulus words generate a high degree of response commonality. It was expected that those stimulus words paired with the responses which occurred most frequently, would serve as the high-association pairs to be used in sight vocabulary lessons.

Subjects

The subjects in the present study were 59 pupils from five primary EMR classes in the Monroe County Community Schools, Monroe County, Indiana. Characteristics of the subjects are described in Table 1.

Table 1

Characteristics of Classes in W-A Study

School	Number of Pupils	Boys	Girls	CA $\bar{X}$	CA SD	MA $\bar{X}$	MA SD	IQ $\bar{X}$	IQ SD
Broadview									
Class A	12	10	2	114.50	9.57	79.30	11.12	69.40	6.88
Class B	13	9	4	100.07	13.79	71.83	11.67	70.50	5.90
Templeton									
Class C	13	8	5	110.92	11.74	77.58	9.24	69.75	6.60
Arlington									
Class D	12	6	6	111.91	15.24	77.45	15.24	68.54	6.36
Class E	9	4	5	109.77	11.44	80.11	14.71	73.00	11.74
TOTAL	59	37		109.28	13.19	77.01	12.30	70.14	7.40

Materials

The stimulus words that were employed to elicit associative responses were partially selected from lists of words used in previous studies of children's word-associations. The criterion for inclusion of a word was that it yield at least 25% response commonality in one or more of the previous W-A studies. In addition, words from the NYC Curriculum for Children with Retarded Mental Development (Borreca et al., 1953) were included in the original 100-word stimulus list. These were added to the basic list so as to have available a wider range of words on which to base an instructional program. The W-A studies utilized as a source of words (Palermo and Jenkins, 1966; Entwisle, 1966; Semmel, Sitko & Semmel, 1969; Gerjuoy, 1969; Gallagher, Baumeister & Patterson, 1970) were written by workers primarily interested in verbal learning. There was, therefore, much overlap in the lists used in each study. With the exception of Semmel, Sitko and Semmel, each utilized the Kent-Rosanoff list (1910) as part of the stimulus list.

Method

The 100 stimulus words selected were arranged into four lists of 25 words each (Appendix, p. 157). Each of the four lists was then randomly arranged into three different orders of presentation (forms). Each list consisted of approximately 15 nouns, 5 verbs, and 5 words of other form classes. Intra-list associative strength was controlled. Each subject was randomly assigned two of the four lists. List order and form were also randomized across subjects.

Subjects were individually interviewed in a separate room in each school. Responses were hand recorded on data sheets by the interviewer. The administration format (Appendix, p. 159) describes the procedure used to elicit responses.

The same list was given twice to each class. There were 25 responses to each stimulus word. Retest reliability was expressed as the percentage of response identity between the first and second lists.

Results

Data were tabulated for three out of five classes only. The omission of results from two classes was necessitated when it was determined that the interviewer for those classes deviated from the task administration format and as a result only single responses to the stimuli were elicited. For the remaining three classes, the results were as follows:

For the 100 stimulus words presented, only 24 elicited homogeneous responses of 20% or greater. All identical response words were tabulated, regardless of the position of the word in the response chain. The stimulus words and the most frequent response to each are shown in Table 2.

Since there was no evidence that the continuous association elicited stable results, it seemed reasonable to abandon it as a method of obtaining associated word pairs (see Table 3).

The lack of retest reliability suggested that further work on the associations elicited in this manner was unwarranted. Exploration of the semantic range of EMR pupils requires further refinement in methodology before such an analysis can yield reliable results. This

Table 2

Multiple W-A Response Commonality

Stimulus	Most frequent response*	Total number responses to stimuli[1]	% Commonality response
sheep	lamb	11	27
gun	shoot	14	22
coke	pepsi	15	20
in	out	13	31
up	down	14	29
stop	go	15	33
bird	fly	16	25
look	-at me	15	20
cry	sad	14	21
rabbit	dog	15	20
sister	brother	13	31
bed	sleep	15	33
dog	cat	14	29
moon	sun	15	27
doctor	nurse	14	43
candy	eat	18	28
build	building	17	24
run	ran	16	25
off	on	15	20
cat	dogs	15	33
take	bake	15	20
television	watch it	15	20
mother	father	14	36
sell	bell	12	25

*Regardless of order of appearance in response chain.

[1]Data is based on responses of 26 Subjects to word list.

need for methodological refinement is particularly acute in studying the verbal behavior of young educable mentally retarded children.

Table 3

Stability of Responses in Multiple W-A's

Pupil No.	No. of Ident. Resp. between List 1 & 2	Total No. of Responses	% age Ident. Responses
Class A			
1	6	25	24%
2	9	25	36
3	3	15	20
4	2	13	15
5	7	25	28
7	5	25	20
8	10	25	40
9	1	25	04
10	9	14	64
12	4	25	16
Class E			
1	7	25	28%
2	9	25	36
4	11	25	44
5	7	25	28
6	4	25	16
8	0	*both lists clangs	
9	8	25	32
10	10	25	40
11	0	0	00
Class D			
1	2	25	08%
4	9	25	36
6	9	25	36
8	8	25	32
9	6	25	24
10	8	25	32
11	11	25	44

Word Association Norms

Since the continuous association technique did not yield reliable responses from the EMR subjects of the study, the more commonly employed free word-association task was used. The objective was to obtain a sample of high-association word-pairs which represented the associational tendencies of the subjects of the study.

Subjects

Subjects were the same as those in the continuous W-A study. Table 1, p. 9, describes the characteristics of the pupils in each of the five classes in the present study.

Method

Materials. Fifty stimulus words were selected from the original list of 100 words (Appendix, p. 156). The list consisted of the 50 words that showed the highest associational strength in previous (continuous) W-A study. The list used is shown in the Appendix, p. 159. There were 32 nouns, 12 verbs, three adjectives, and three prepositions. Twenty-five of the words had appeared in previous W-A studies and had yielded normative associations of 20% or more.

Procedure. Pupils' responses were collected in the same manner as in the previous study. The administration procedure is shown in the instruction sheet for interviewers (Appendix, p. 160). The responses to each list of 25 words were gathered in two separate sessions with each pupil.

Results

Table 4 summarizes the responses to stimulus words for each class. The number of stimulus words showing associative commonality over 25% varied by class. Class A produced 21 such associations, Class C, 28; Class E, 21; Class D, 20; and Class B, 20.

Forty-four of the 50 stimulus words (88%) yielded associational consensuality of over 25%. Twenty of the 44 high-association responses were classified as syntagmatic, 18 were classified as paradigmatic, five responses were ambiguous and could not be classified, and in one case the response (to stimulus word "television") was syntagmatic in four classes and paradigmatic in the other.

When the responses of the five classes were combined, 26 stimulus words emerged with associative responses of over 20% identity. The number of subjects in the combined classes was 59. See Table 5.

Retest Reliability. Two of the five classes in the population were selected for retesting. The first two lists (50 words) were administered during the week of Feb. 15-19, 1971. The retests were administered during the week of March 8-12, 1971, a three week interval. The results for each class are shown in Table 6 and in Table 7.

Class B produced 17 high-association pairs for the 50 stimulus words administered in the first testing. On replication, 14 of the 17 high W-A pairs were again high W-A pairs. In addition, 16 other high W-A pairs emerged on the replication trial, for a total of 30 high W-A pairs on the second trial. In one case the response word changed between trials, (boy, girl, to boy, sister). In two cases, the words "cat" and "rocket" produced high W-A in the first trials and failed to norm in the second trial.

In Class E, 21 high-association pairs were produced in the initial trial. On replication, 16 of the 21 W-A pairs were again high W-A pairs. In addition 20 other high W-A pairs emerged on the replication trial, for a total of 36 high W-A pairs. In two cases the response word changed between trials, (coke-pop, coke-drink; sit-chair, sit-stand). In two cases the words "boy-girl, man-woman" produced high W-A in the first trial and failed to norm in the second trial. In one case, the stimulus word "cold" evoked two high W-A responses, "freeze" and "hot" in the first trial. On retest, only the pair "cold-hot" normed.

The stimulus word "television" evoked a single, normable response word, "watch," in the first trial. On retest the word "television" evoked two high W-A responses: "watch" and "T.V." Similarly the stimulus word "hard" evoked a single high W-A response "soft" on the first trial; on replication it evoked two high W-A responses: "rock" and "soft."

Table 7 shows the number and percent of response commonality in trials one and two for each stimulus word. In Class B there were 17 high-association (commonality > 25%) responses in the first trial, 30 high-association responses on replication. In Class E, 21 pairs normed (> 25%) in the first trial, 36 pairs in the second trial.

Discussion

It is apparent that the free word-association technique elicited common responses from the EMR subjects and that these responses reflected the associational tendencies of the group. Although the magnitude of associational strength varied with each stimulus, 88% of the total number of stimulus words produced associations of over 25% commonality.

Also of interest is the increase in the number of common responses in the second (replication) trial. It is likely that the tendency to give common responses increases as pupils become more familiar with the test situation. Support for this contention may be inferred from Entwisle's (1966, p. 35) discussion of the effect of administration procedures on the tendency to give common responses. Citing the research of Jenkins (1959), Jenkins and Russell (1960), and Horton, et al. (1963), Entwisle concluded that social sensitivity is related to commonality, the need for social approval (under relaxed rather than speed conditions) is related to commonality, and that the need for social approval is related to instructional set. The increased opportunity to understand the test instructions which retrial afforded, together with the conditions suggested in Entwisle's discussion probably operated to generate increased response commonality in the subjects.

The word-association pairs obtained in the first trial constituted the data base for the selection of word pairs used in teaching sight words. It is probable that these norms represent an underestimation of the tendency of EMRs to emit common responses.

Table 4

Summary of Word-Association Norms for Each Class

Class	A (n=12)		B (n=13)		C (n=13)		D (n=12)		E (n=9)	
Stimulus	Response	%	Response	%	Response	%	Response	%	Response	%
apple	eat	25	eat	62	eat	62	eat	25		
ask										
baby					cry	46	cry	46		
bed			sleep	33	sleep	31				
bird			fly	62	fly	38	fly	25		
book	read	42	read	38	read	54	read	41	read	33
boy			girl	33					girl	44
bread			eat	38			eat	25		
build	building	42			building	31				
bus					ride	31				
candy	eat	42	eat	53	eat	46	eat	41		
cat			dog	31	dog	31	dog	25	dog	33
clock									watch	33
coke	drink	25	drink	38	drink	31	drink	33	pop	33
cold	hot	25							freeze	33
									hot	33
come							here	25		
cry					baby	46				
doctor					nurse	46				
dog					barks	46				
fruit	eat	25			eat	31	eat	41		
gun	shoot	33	shoot	38	shoot	31	shoot	25	shoot	33
hard									soft	33
hate					like	31			like	33
in	out	42	out	46					o	33
king					queen	31				

Table 4 (Cont'd)

Summary of Word-Association Norms for Each Class

Class	A (n=12)		B (n=13)		C (n=13)		D (n=12)		E (n=9)	
Stimulus	Response	%	Response	%	Response	%	Response	%	Response	%
leader	follow	25								
letter					mail	31				
long									short	44
man									woman	33
monkey										
moon										
mother					father	46	father	25		
ocean										
off	on	25	on	46					on	44
pizza	eat	50	eat	69	eat	46	eat	33	eat	33
rabbit	run	25	hops	31						
rocket			blast off	31						
run	ran	33			fast	33				
salt			pepper	31	pepper	46	pepper	25		
sell										
sheep									lamb	44
sing										
sister	brother	42			brother	54	brother	33	brother	44
sit	down	33	down	31	down	62	down	50	chair	33
stand	up	33					up	25		
stop	go	33	go	38	go	38			go	44
street					car	46	car	25		
take	away	25								
television	turn on	33	watch	61	TV	38	watch	33	watch	33
up	down	42	down	53	down	54	down	25	down	78

Table 5

Cumulative Word-Association Response Commonality (n=59)

Class		A	B	C	D	E		Total %
Stimulus	Response	freq.	freq.	freq.	freq.	freq.	freq.	
apple	eat (it)	3	8	8	3	2	24	40
ask		go-2		me-2				
baby	cry(s)	1 boy-2	1	6	4	2	14	20
bed	sleep	2	4	4	2	1	13	21
bird	fly(s)	2	8	5	3	2	20	33
book	read (it)	5	5	7	5	3	25	42
boy	girl	2	4	3	1	4	10	17
bread	eat (it)	3 milk-2	5	3 toast-3	3	2	16	27
build	building	5	---	4	1	1	11	18
bus	ride	1 go-2	2	4	---	---	7	11
candy	eat (it)	5 cake-2	7	6	5	2	25	42
cat	dog	2 meow-2	4	4	3	3	16	27
clock	tick/time	tick-2 time-1	tick-8 time-7	tick-3 time-3	tick-2 time-1	watch-3* time-3	15 15	25 25
coke	drink (it)	3	5	4	4 pop-1	pop-3	16	27
cold	hot	3	3	2 freeze-1	freeze-2	3 freeze-3	11	18
come	here	came-2	2	3	3	2 came-2	10	17
cry	baby	---	3	6	1	1	11	18
doctor	nurse	2 dog-2	3	6	1	2	14	23
dog	barks(ing)	1 cat-2	barks-2 cat-3	6	2	2	13	21
fruit	eat (it)	3	3	4	5	---	15	25
gun	shoot	4	5	4	3	3	19	32
hard	soft	2	3	table-2 easy-2	1	3	9	15
hate	like	---	1	4	---	3	8	13
in	out	5 inside-2	6	3 side-3	1	3	18	30
king	queen	cake-2	3	4	---	2	9	15

*Noun

Table 5 (Cont'd)

Cumulative Word-Association Response Commonality (n=59)

Class		A	B	C	D	E		Total %
Stimulus	Response	freq.	freq.	freq.	freq.	freq.	freq.	
leader		follow-3 little-2		father-2				
letter	mail	little-2 like-2 mail-1	1	4	2	1	9	15
long	short	1	3	3	1	4	12	20
man	woman	walk-2 moon-2	mother-3 woman-1	3	2	3	9	15
monkey	ape	swings-2	climb(s)-3	3	1	2	6	10
moon	sun	1	1	2 star-2	2	star-2	6	10
mother	father	2	1	6	3	2	14	23
ocean	river	1	3	boats-3	1 boat-1	---	5	9
off	on	3	6	2	1	4	16	27
pizza	eat (it)	6	9	6	4	3	28	46
rabbit	hop	1 run-3	4-hops	3 run-1	1	1	10	17
rocket	blast off	1	4	2 blast-2	1	---	8	13
run	fast	ran-4	2 ride-2 slow-2	5	1	walk-2 ran-1 stop-2	7	11
salt	pepper	2	4	6	3	2	17	28
sell			stuff-2					
sheep	lamb	1	1	1	---	4	7	11
sing	music	---	2 piano-2	3	2 song-2	song-2	7	11
sister	brother	5	3	7	4	4	23	38
sit	down	4 up-2	4	8	6	1 chair-3	23	38
stand	up	4	1 sit down-2	3 sit-2	3	1 sit-2 down-2	12	20
stop	go	4 sign-2	5	5 car-4	2	4	20	33
street	car(s)	2 meet-2	3	6	3	1	15	25
take	away	3	---	2 give-2	1	2	8	13
television	watch (it)	watch-1 turn on-4	8	TV-5 watch-4	watch-4	3 TV-2	20	33
up	down	5	7	7	3	7	29	47

Table 6

Replication of Word-Association Lists

Class B (n=13)

Trial I				Trial II (Replication)		
Stimulus	response	frequency	%	response	frequency	%
apple	eat	5	38	eat	5	38
ask						
baby						
bed				sleep	5	38
bird	flys	8	62	flys	5	38
book	read	4	31	read	6	46
boy*	girl	4	31	sister	4	31
bread				eat	7	54
build				houses	7	54
bus				school	4	31
candy	eat	4	31	eat	7	54
cat	dog	4	31			
clock						
coke				drink	6	46
cold				hot	4	31
come						
cry				baby	5	38
doctor				nurse	5	38
dog				bark	4	31
fruit				eat	5	38
gun	shoot	5	38	shoot	6	46
hard				soft	4	31
hate						
in	out	6	46	out	6	46
king				queen	4	31

*The response word changed in one case (boy-girl, boy-sister); word pairs identical in rest.

Table 6 (Cont'd)

Replication of Word-Association Lists

Class B (n=13)

Trial I				Trial II (Replication)		
Stimulus	response	frequency	%	response	frequency	%
leader						
letter						
long						
man						
monkey						
moon						
mother						
ocean						
off	on	6	46	on	6	46
pizza	eat	6	46	eat	6	46
rabbit	hops	4	31	hops	7	54
rocket	blast off	4	31			
run						
salt	pepper	4	31	pepper	5	38
sell						
sheep						
sing						
sister				brother	7	54
sit	down	4	31	down	4	31
stand				up	4	31
stop	go	5	38	go	6	46
street				cars	6	46
take						
television	watch	5	38	watch	5	38
up	down	6	46	down	9	69
number > 25%		17				

Fourteen high-associate pairs (of 17 high W-A pairs) were high W-A on replication trial. There were 16 new high W-A pairs on replication trial.

Table 7

Replication of Word-Association Lists

Class E (n=9)

Trial I				Trial II (Replication)*		
Stimulus	Response	frequency	%	Response	frequency*	%
apple				eat	3	33
ask						
baby				cry	2	25
bed				sleep	2	25
bird				fly	3	37
book	read	3	33	read	2	25
boy	girl	4	44			
bread				eat	3	37
build						
bus						
candy				eat	3	37
cat	dog	3	33	dog	2	25
clock	watch	3	33	watch	2	25
coke	pop	3	33	drink	2	25
cold	freeze	3	33			
	hot	3	33	hot	3	37
come				came	2	25
cry				sad	2	25
doctor				nurse	3	37
dog				cat	4	50
fruit				eat	2	25
gun	shoot	3	33	shoot	2	25
hard	soft	3	33	soft	2	25
				rock	2	25
hate	like	3	33	like	3	37
in	out	3	33	out	4	50
king						

*Trial II, n=8

Table 7 (Cont'd)

Replication of Word-Association Lists

Class E (n=9)

Trial I				Trial II (Replication)		
Stimulus	Response	frequency	%	Response	frequency	%
leader						
letter						
long	short	4	44	short	3	37
man	woman	3	33			
monkey						
moon						
mother						
ocean						
off	on	4	44	on	5	63
pizza	eat	3	33	eat	4	50
rabbit						
rocket						
run				stop	2	25
salt				pepper	2	25
sell						
sheep	lamb	4	44	lamb	2	25
sing				song	2	25
sister	brother	4	44	brother	2	25
sit	chair	3	33	stand	2	25
stand				jump	2	25
stop	go	4	44	go	4	50
street				stop	2	25
take						
television	watch	3	33	TV	2	25
				watch	2	25
up	down	7	78	down	6	75
Number > 25%	21			36		

Sixteen high-associate pairs (of 21 high W-A pairs) were high W-A on replication trials. There were 20 new high W-A pairs on replication trials.

Sentence-Association Norms

Intra-sentence Associations

In order to test the facilitative effect of high-associations on pupils' gains in sentence reading, a set of sentences representing the most common responses of the subjects was collected. The sentences are regarded as high-association when each succeeding content word in the sentence is a high-frequency response to the word preceding it.

The procedure used in the collection of these sentence norms follows the technique described by Rosenberg (1966). In that study, a simple declarative sentence (e.g., The man hit the ball.) was used as the stimulus frame. Each frame contained two articles, a subject noun, and blank spaces for a verb and another noun. These stimuli were employed to elicit a chain of sequential, associative dependencies. The resulting norms (high-frequency verb and object noun responses) constituted a pool of high-association sentences used in sentence instruction.

Subjects. Ss were the same as those in the previous word-association study. See Table 1 (p. 9) for a resume of pupil characteristics.

Method. Following the technique described above, 50 animate nouns were selected and placed in a sentence frame that contained two articles (the) and blank spaces for a verb and object. For example, "The dog _____ the _____." The Appendix (p. 161) shows the 50 sentence

frames utilized in data collection. Each pupil in the study was interviewed individually and oral responses were recorded by hand. The instructions for administering the sentence-association task are shown in the Appendix (p. 164). There were two task administration sessions, and responses to 25 sentences were taken at one time. Data collection sheets are also shown in the Appendix (pp. 162, 163).

Results. The Verb Responses (V.R.) and Object Responses (O.R.) to each stimulus noun are shown in Table 8 (pp. 28, 29). Only those responses showing an associative strength (percent common response) of 25% or greater are given.

The results suggest that it is feasible to derive normative associational data from pupils in EMR classes.

Reliability. Two classes were selected for retesting. The first two lists were administered during the week of February 22-26, 1971. The retests were administered during the week of March 8-12, 1971. The results for each class are shown in Tables 9 and 10 (pp. 30, 31).

The mean percent replicability for the Verb Response in Class B is .39, SD .10. The mean O.R. replicability is .34, SD .08. For Class E the mean for V.R. is .30, SD .08, and mean for O.R. is .24, SD .10.

Tables 11 and 12 (pp. 32, 33) show the percent reliability where both V.R. and O.R. were the same for any one stimulus.

Table 8

Sentence-Association Norms (Responses Over 25% Commonality)

	Class A n=12		Class C n=13		Class E n=9	Class D n=12		Class B n=13	
	V.R.	O.R.	V.R.	O.R.	V.R.	O.R.	V.R.	O.R.	V.R.	O.R.
1. The sister	plays .33				went .33 plays .44		plays .42	game .25	plays .70	
2. The fish	swims .50 eats .33	water .42 worms .25	swims .54	water .69	swims .55	water .55	swims .50	water .58	swims .38	water .62
3. The bear	eats .25				lives .33					
4. The milkman	brings .25	milk .83	deliv- .46 ers	milk .85		milk .33	delivers .33 gives .25	milk .92	deliver- .31 gives .31	milk .92
5. The bug	flies .25				crawls .44		bites .25 walks .25	ground .25	flies .31	
6. The teacher			teaches .38	kids .31				kids .25		kids .31
7. The king		crown .25							eats .38	
8. The pig	oinks .25					hole .55				cheese .31
9. The mouse	eats .50	cheese .58								
10. The elephant	eats .25						plays .25		plays .46	
11. The girl	goes .25					cage .33	growls .33	people .25		
12. The lion										
13. The baker	bakes .33	cakes .50	bakes .69	cake .46	bakes .33	cake .33	cooks .42 bakes .42		cooks .38 bakes .38	
14. The horse							runs .33		runs .38	
15. The queen										
16. The banker	takes .25 gives .25	money .66		money .46	robs .33	money .55		money .75		money .62
17. The father	works .33				is .33		works .25			
18. The mother	cooks .33 works .42	house .33					cooks .33 works .25	house	cooks .31	
19. The pilot	flies .25	airplane .42		air- .38 plane		airplane .33			flies .31	
20. The goat	eats .42	grass .25								
21. The sailor	drives .25 rides .25	boat .66	sails .31	boat .62		boat .44		boat .25		
22. The man	works .42						works .58			
23. The worker	works .50		works .54				works .50		works .54	
24. The sheep										
25. The clown	does .42	tricks .42	does .31	tricks .31	does .33	tricks .33	does .42 makes .25	tricks .42	does .38	

V.R. = Verb Response
O.R. = Object Response

Table 8 (Con't.)

Sentence-Association Norms (Responses Over 25% Commonality)

	Class A n=12				Class C n=13				Class E n=9				Class D n=12				Class B n=13			
	V.R.		O.R.		V.R.		O.R.		V.R.		O.R.		V.R.		O.R.		V.R.		O.R.	
26. The farmer	plows	.33	garden	.33									works	.42	cows	.33	works	.38	cows	.31
27. The tailor																				
28. The bee	stings	.33	honey	.25	stings	.31			stings	.33			stings	.75			stings	.46		
29. The dentist	pulls	.50	teeth	.83	pulls	.77	teeth (tooth)	.92	pulls works	.44 .33	teeth	.77	pulls	.58	teeth	.78	pulls	.92	teeth (tooth)	.92
30. The dog	barks	.42			barks	.31			barks	.55			barks	.58	cat	.25				
31. The wife	cooks	.33											works cooks	.25 .33					house	.38
32. The fireman	puts out	.58	fire	.58	puts out	.62	fire	.85	puts out	.55	fire	.66	puts out	.58	fire	.66	puts out	.54	fire	.85
33. The bird	flies	.42			flies	.54			fly(s)	.66	tree	.33	flies	.58	air	.33	flies	.62	air	.31
34. The cow			milk	.25			milk	.38									eats	.31	grass	.31
35. The rabbit	hop(s) (ed)	.50			hops	.54							hops	.33			hops eats	.38 .31		
36. The baby	cries	.50			cries	.46			cries plays	.33 .33			cries	.58	bottle	.33	cries plays	.31 .31		
37. The butcher	cuts	.25			cuts	.31	meat	.46												
38. The brother	plays	.25									meat	.33	cuts helps	.42 .33	meat	.25	cuts plays	.31 .54		
39. The eagle	flies eats	.50 .25	air	.25	flies	.77	air	.31	flies	.44			flies	.50			flies	.54		
40. The cat	chased	.25																		
41. The nurse	helps works	.33 .25	people	.25	helps	.38			meows	.33			meows	.25	meows	.25				
42. The boy					plays	.31			plays	.33			helps	.33			gives	.38	shots	.31
43. The monkey	eats	.50	bananas	.42			bananas	.31	climbs	.33			helps	.25			plays	.54		
44. The woman	works	.25											jumps	.25	tree	.25	climbs eats	.38 .31		
45. The frog	hops jumped	.42 .42	grass water	.33 .50	jumps	.31	water	.38	hops	.44	water	.44	cleans	.25	house	.25				
46. The doctor	helps	.25	teeth	.25													jumps	.31	water	.31
47. The boy	plays	.25																		
48. The grocer	gives	.25	groceries	.42			corn	.31	plays	.44							plays	.46		
49. The chicken	eats lays	.33 .25	food eggs	.33 .25											food	.25				
50. The farmer	plows	.25	garden	.33									laid	.33	eggs	.33				
													works milks	.33 .33	cows	.33				

Table 9

Replication of Sentence-Association Norms

Class E.

Pupil No.	No. of Identical Responses		% Identical Responses	
	V. R.	O. R.	V. R.	O. R.
1	21	13	42	26
2	14	10	28	20
4	16	18	32	36
5	20	20	40	40
6	8	5	16	10
8	15	14	30	28
9	11	7	22	14
10	15	10	30	20
11	15	11	30	22
n=9	$\bar{X}$ 15.00	12.00	30	24
	SD 4.33	4.83	8	10

Note: Each subject responded to 50 stimulus nouns.

V.R. = verb response

O.R. = object response

Table 10

Replication of Sentence-Association Norms

Class B

Pupil No.	No. of Identical Responses		% Identical Responses	
	V. R.	O. R.	V. R.	O. R.
1	27	24	54	48
2	14	9	28	18
3	17	12	34	24
4	14	14	28	28
5	15	14	30	28
6	21	14	42	28
7	26	21	52	42
8	16	22	32	44
9	25	24	50	48
10	17	15	34	30
11	20	14	40	28
12	26	19	52	38
13	15	20	30	40
n=13	$\bar{X}$ 19.46 SD 4.30	17.07 4.84	39 10	34 8

Note: Each subject responded to 50 stimulus nouns.

V.R. = verb response

O.R. = object response

Table 11

Replication of Sentence-Associations
(Number of V.R. and O.R.s replicated in same sentence)

Class B

Pupil No.	Number of Identical Responses	Percent of Identical Responses
1	19	38
2	13	26
3	7	14
4	10	20
5	11	22
6	8	16
7	15	30
8	14	28
9	20	40
10	9	18
11	12	24
12	10	20
n=12	$\bar{X}$ 12.23 SD 3.94	25 8

Table 12

Replication of Sentence-Associations
(Number of V.R. and O.R.s replicated in same sentence)
Class E

Pupil No.	Number of Identical Responses	Percent of Identical Responses
1	8	16
2	8	16
4	13	26
5	14	28
6	2	4
8	7	14
9	5	10
10	6	12
11	8	16
n=9	$\bar{X}$ 7.89 SD 3.72	16 8

There is considerable variability in the tendency to give common responses between classes. The number of sentence units where both the V.R. and O.R. are greater than 25% is shown in Table 13.

Table 13

Number of Sentences with both Verb Response (V.R.) and Object Response (O.R.) greater than 25%.

Class	Number of Sentences (of 50) with both V.R. & O.R. 25%
A	22
B	9
C	10
D	19
E	8

The variability between classes is greater when the V.R. and O.R.'s are considered separately. As may reasonably be expected, there are a greater number of common associations to the V.R. than to O.R. This is shown in Table 14.

Table 14

Number of Common Responses (> 25%) to 50 Stimulus Words.

Class	Number of V.R.'s	Number of O.R.'s
A	41	24
B	28	13
C	19	16
D	32	23
E	20	14

Discussion. There was a sufficient number of sentences that showed strong, commonly held associations (greater than 25%) to demonstrate the feasibility of collecting normative sentence responses from EMR children. The stability of these responses needs to be further explored. However, it seems reasonable that the responses represent an adequately normative base of high-association sentences.

The verb responses to the subject noun showed more commonality than the object response to the verb stimulus. The final data base consisted of those sentences which showed the highest associations for all content words.

Sentence-Association Norms

Inter-sentence Associations

The tendency of children to give common responses to certain verbal stimuli (e.g., words and words in sentence context) suggested the possibility that they would likewise respond with common sentence responses to sentence stimuli. An exploratory study of whether EMR pupils would respond in a normative manner was undertaken. If norms could be developed which represented the strongest associational bond between two sentences, these could be used in teaching reading at the level of connected discourse. Such reading material would be consistent with the theory of reading as a constructive language process (Ryan & Semmel, 1969), where high-association or high probability of occurrence of a given word facilitates a process of hypothesis testing and accurate impletion or "filling in." The outcome should be better reading through active involvement of the reader in attending to meaning of whole sentence units rather than to perceptual configuration of words.

Subjects. Subjects were the same as those in the previous normative studies. Table 1 (p. 9) describes the characteristics of the pupils in each of the classes in the study.

Method. Twenty-five high-association sentences drawn from the previous study of associations in sentences, were used as stimuli in the present study. The list used is shown in the Appendix (pp. 165-166).

All were high-association, simple declarative sentences. Pupils' responses were collected in the same manner as in previous word-association studies. Instructions for administration are shown in the Appendix (p. 167). Most Ss were able to "play" the verbal game of "finishing the story" after a few learning trials.

Results. Either through lack of technical refinement of the data collection method, or because the task is essentially untenable, the range of responses was great. Even when the tense or word order of the response sentence was disregarded (e.g., only root form of the content words considered), the diverse range of responses was so great as to make norming impractical. It is on this basis that further consideration of this procedure was terminated.

PART II

THE RELATIONSHIP OF HIGH- AND NONASSOCIATED WORD PAIRS AND SENTENCES TO READING PERFORMANCE OF EMR CHILDREN

The results of the collection of both word-association and sentence-association responses indicated that a substantial number of the stimulus words and sentences yielded a high degree of response commonality. This group of high-frequency associations became the basis of the second phase of the present study which deals with the utilization of high-association pairs in sight vocabulary lessons and with high sentence-associations for sentence reading instruction.

The purpose of the training phase of the study was to verify the expectation that the use of high-association reading material derived from oral responses of a given population will facilitate reading by that group. When reading materials are based on a sample of the oral language habits (associations) of a group of children, then reading performance should be superior than when reading instruction is based on nonassociated reading materials.

All of the responses to the stimulus words were derived from the oral responses of the same groups (classes) that were the subjects in the word and sentence training study. Each group was taught to read those word pairs and sentences that were the most frequently given oral responses for that group. What follows is a description of both sections of the training study; first sight word reading and then sentence reading lessons.

Sight Word Instruction Utilizing High- And Nonassociated Word Pairs

The development of a technique for the construction of reading materials consistent with the linguistic theory discussed in the introduction depends largely on the demonstration of the effectiveness of associational bonds in facilitating the acquisition of reading skills.

The study of the effectiveness of highly associated word pairs in sight vocabulary acquisition was undertaken to demonstrate the value of associational bonding to this aspect of reading. Although the fact that words are apprehended in isolation appears to contradict the theory of reading as a constructive language process, the associational approach to reading instruction is consistent with the theory at this level.

Oaken, Wiener, and Cromer (1969) have described poor sight vocabulary as a frequent precursor of poor reading comprehension. However, they hold that good word identification is not necessarily related to good comprehension for all readers. The key to successful reading is the ability to organize reading matter. The present study examines the effectiveness of pairing words by strength of association and anticipates that more of the constituent words of high-associational pairs will be recalled on a sight vocabulary test than will be words originally part of a nonassociated word pair.

Subjects

Subjects in the study were pupils in the same five primary EMR classes from which the high-association pairs were obtained. One pupil each from Classes A, B, and C who participated in the norm study did not take part in the training phase. Two children who were not in the norm study were added to the training phase. Both were in Class E. Metropolitan Reading Tests, administered by classroom teachers in May, 1971, were obtained for all pupils in the study. The four subscales of the Metropolitan Reading Test were subsequently correlated with the results of the training phase.

Materials

1. Training words. Lists of ten word pairs were prepared for each class. Each list contained the five pairs which showed the greatest associational strength for that class, and in addition, five nonassociated pairs. The nonassociated word pairs were derived from the five next highest W-A's given in each class, and then re-ordered so that there was no associational relationship between the words. See Table 15 for the word pairs taught in each class. The pupils were pretested for ability to read the component words in each pair. Those pairs which could be read by more than 30% of the class were discarded.

2. Evaluation. A forty-word reading test was assembled which listed serially all 20 words taught (ten high- and ten nonassociated words), plus 20 additional nontraining words.

Procedure

In order to obtain a base-line performance measure a sight vocabulary reading test was individually administered to each pupil. The same test was employed as a posttest following the instruction period.

The instructional phase of the study was conducted by the regular classroom teacher in four classes and by a regularly assigned student teacher in a fifth class. Teachers were given a written set of instructions (see Appendix, p. 169). The only restriction stipulated as to organization and teaching method was the requirement of paired presentation of the words. Teachers were given the list of word pairs to be taught four days prior to the beginning of the lessons. All teachers conducted three consecutive half-hour lessons, beginning on a Monday or Tuesday of the week. The posttest was administered on the day following the last (third) lesson. All lessons began at the same time each day. An observer was present at each instructional session and wrote a description of the lesson, using a structured, anecdotal recording technique.

Results

The total number of words correctly read on the pre- and posttests was computed and scores were classified into training and nontraining words. Training words were further divided into two groups; high-associational and nonassociational strength. The maximum total score for each test was 40; training words, 20; nontraining words,

Table 15

High-association and Nonassociation Word Pairs

Taught to Each Class

Class	High-association	Nonassociation
A	build - building	salt - watch
	cold - hot	television - car
	book - read	baby - pepper
	gun - shoot	street - sleep
	sister - brother	bed - fly
B	bird - fly	street - brother
	television - watch	cold - building
	salt - pepper	build - sleep
	gun - shoot	baby - hot
	book - read	bed - car
C	sister - brother	cold - fly
	gun - shoot	book - hot
	street - car	television - building
	salt - pepper	build - sleep
	baby - cry	bed - watch
D	street - car	gun - cry
	bird - fly	television - building
	salt - pepper	build - sleep
	sister - brother	baby - hot
	book - read	bed - watch
E	gun - shoot	salt - building
	television - watch	build - sleep
	cold - hot	bird - car
	book - read	street - pepper
	sister - brother	bed - fly

20. high-association, 10; nonassociation, 10. Difference scores between pretest and posttest were generated by subtracting the latter from the former and these scores were classified in the same manner as the raw scores, (i.e., training or nontraining, high-association or nonassociation).

Product-moment correlations were computed between the subjects' four subscores on the Metropolitan Reading Achievement Test and the subjects' pre- and posttest scores. All correlations were highly significant and above $r = .64$ ($p < .001$). Table 16 (p. 44) summarizes these results.

Table 16

Correlation Matrix of Metropolitan Reading

Scores and Pre- and Posttest Word Scores

Number of words read correctly	Metropolitan Reading Test Subdivisions			
	Met. word knowledge	Met. word analysis	Met. reading	Met. word knowledge & reading
	n=53	n=52	n=52	n=52
Total pretest	.81	.80	.75	.87
Total posttest	.80	.77	.71	.85
Training pretest	.75	.77	.74	.83
Training posttest	.77	.74	.71	.85
Nontraining pretest	.79	.76	.68	.82
Nontraining posttest	.78	.76	.68	.81
High-association pretest	.71	.75	.74	.81
High-association posttest	.78	.73	.74	.86
Nonassociation pretest	.75	.76	.71	.81
Nonassociation posttest	.72	.71	.64	.78

Correlations were also computed between chronological age and the subjects' difference scores between the pre- and posttests. These results can be found in Table 17.

Table 17

Correlation Matrix Between CA and Difference Scores Between Pre- and Posttest Word Scores

(n = 60)

Difference scores of words correctly read	CA
Total difference	.51**
Training difference	.50**
Nontraining difference	.12 (n.s.)
High-association difference	.51**
Nonassociation difference	.37**

**p .01

Subjects' test scores, both pre- and post-, with the breakdowns of training and nontraining words and high- and nonassociation words, were intercorrelated. These intercorrelations are all highly significant (p .001). These results are presented in Table 18.

Table 18

Inter-Correlation Matrix of Word Reading Scores

(n = 60)

	total pretest	total posttest	training pretest	training posttest	nontraining pretest	nontraining posttest	high-association pretest	high-association posttest	nonassociation pretest	nonassociation posttest
total pretest	1.00									
total posttest	0.96	1.00								
training pretest	0.94	0.85	1.00							
training posttest	0.93	0.98	0.86	1.00						
nontraining pretest	0.96	0.96	0.82	0.91	1.00					
nontraining posttest	0.95	0.98	0.81	0.91	0.98	1.00				
high-assoc. pretest	0.90	0.80	0.98	0.81	0.77	0.76	1.00			
high-assoc. posttest	0.91	0.93	0.87	0.97	0.86	0.87	0.83	1.00		
nonassoc. pretest	0.94	0.87	0.98	0.88	0.84	0.82	0.92	0.88	1.00	
nonassoc. posttest	0.90	0.96	0.81	0.97	0.90	0.90	0.75	0.88	0.83	1.00

The subjects' test variables and subject variables were also correlated. The subject variables included chronological age, mental age, IQ, percent paradigmatic responses, percent syntagmatic responses, and percent klangs. These last three categories were derived from the normative data on single word-associations for each child. The correlations between test variables did not account for much of the variance. These results are presented in Table 19.

Table 19

Correlation Matrix Between Subject Variables and Word Test Variables

	CA	MA	IQ	% paradigmatic	% syntagmatic	% klang
Total pretest	0.38 (60)	0.33 (55)	0.01 (55)	0.39 (58)	-0.24 (58)	-0.10 (58)
Total posttest	0.48 (60)	0.39 (55)	0.01 (55)	0.39 (58)	-0.24 (58)	-0.10 (58)
Training pretest	0.24 (60)	0.21 (55)	0.00 (55)	0.33 (58)	-0.19 (58)	-0.10 (58)
Training posttest	0.44 (60)	0.36 (55)	0.01 (55)	0.36 (58)	-0.20 (58)	-0.12 (58)
Nontraining pretest	0.46 (60)	0.40 (55)	0.02 (55)	0.41 (58)	-0.27 (58)	-0.10 (58)
Nontraining posttest	0.49 (60)	0.40 (55)	0.00 (55)	0.39 (58)	-0.26 (58)	-0.08 (58)
High-association pretest	0.20 (60)	0.17 (55)	-0.01 (55)	0.30 (58)	-0.17 (58)	-0.10 (58)
High-association posttest	0.44 (60)	0.35 (55)	-0.01 (55)	0.29 (58)	-0.18 (58)	-0.07 (58)
Nonassociation pretest	0.27 (60)	0.24 (55)	0.01 (55)	0.34 (58)	-0.21 (58)	-0.10 (58)
Nonassociation posttest	0.41 (60)	0.36 (55)	0.03 (55)	0.41 (58)	-0.21 (58)	-0.15 (58)

The difference scores of training versus nontraining were analyzed in a 5 X 2 fixed ANOVA with repeated measures over the last factor. The subjects' entry level reading abilities on the nontraining words were significantly higher than on training words; as can be seen in Figure 1, therefore, difference scores were used rather than posttest scores.

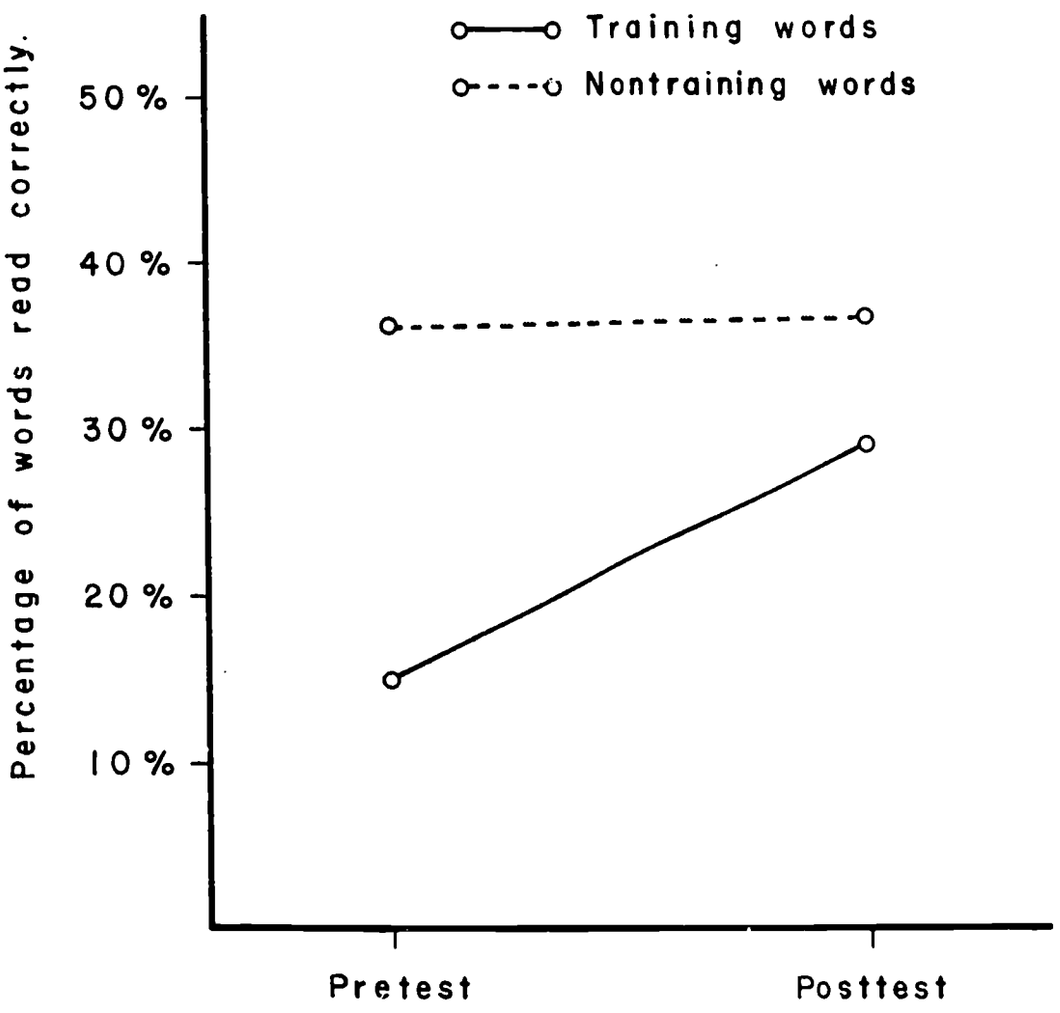


Fig. 1. Reading pretest and posttest scores in percent correct for training and nontraining words summed across classes.

The class effect (A) and training effect (B) were assessed. Table 20 (p. 49) summarizes the result.

Table 20

Summary of Analysis of Variance of Training vs. Nontraining of Words

Source	df	MS	F
Between Ss			
Classes (A)	4	13.425	2.382
Ss W/A	55	5.636	
Within Ss			
Training (B)	1	192.533	38.137***
A x B	4	18.950	3.754**
B Ss W/A	55	5.636	

** $p < .01$
*** $p < .001$

The main effect of classes was nonsignificant. The main effect of training was significant in favor of training ($p < .001$). The nontraining words did not show any increase in reading scores (see Figure 1). The two-way interaction of classes with training was also significant ($p < .01$). The Newman-Keuls method for post hoc comparisons was used to analyze the interaction effect. This procedure revealed that on the training words, Class C gained significantly more words than did Classes B, E, and D on their training words ($p < .01$), as can be seen in Figure 2.

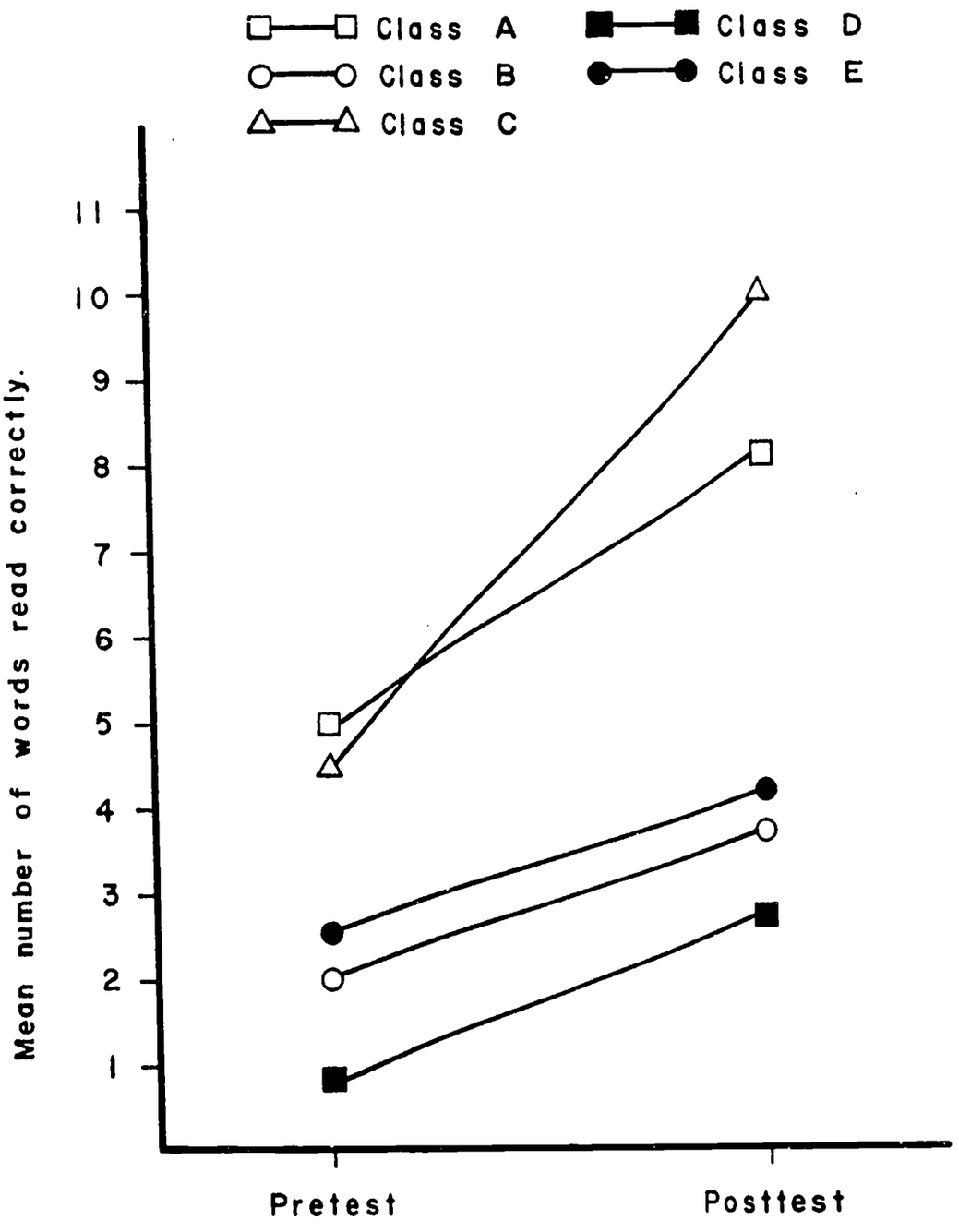


Fig. 2. Mean reading pretest and posttest word scores for each class on the 20 training words.

Class C also read significantly more training words than nontraining words ($p < .01$). The training words of Class A were also read with greater accuracy than the nontraining words ($p < .05$). There were, however, no significant differences between the training and nontraining words of the other three classes (B, E, and D).

A one-way ANOVA on the pretest scores of the training words was performed by classes, resulting in a significant F ($F = 6.99$, $df = 4.55$, $p < .01$). Following this a post hoc comparison was performed using the Scheffe method. For this analysis Class A and Class C's pretest scores were compared to those of Classes B, D, and E. The result was significant in favor of Classes A and C ($F = 22.19$, $p < .01$), indicating that those two classes combined read more training words on the pretest than did the other three classes combined.

The pretest scores for high-association words and nonassociation words were then submitted to t test for paired observation. This analysis was performed on subjects pooled across classes and was significant in favor of nonassociation words ($t = .59$, $df = 2.92$, $p < .01$). This result indicates that the nonassociation words were read on the pretest with greater accuracy than the high-association words.

The posttest scores of high- and nonassociational words were then analyzed by class in a 5 x 2 fixed ANOVA with repeated measures over the associational factor. Class effect (A) and associational effect (B) were assessed. Table 21 presents the summary of this analysis.

Table 21

Summary of Analysis of Variance of Associational Strength of Words

Source	df	MS	F
Between Ss			
Classes (A)	4	60.488	3.58*
Ss W/A	55	16.889	
Within Ss			
Association (B)	1	12.675	12.74**
AB	4	5.029	5.06**
B Ss W/A	55	0.995	

* $p < .05$
** $p < .01$

The main effect of associational strength was significant in favor of nonassociation ($p < .01$) (see Figure 3). The main effect of class and the interaction effect were also significant ($p < .05$; $p < .01$, respectively). Post hoc analyses were performed using the Newman-Keuls method. The analyses on classes revealed that Class C read significantly more training words than did Classes B, E, and D ($p < .05$). The results of the interaction effect revealed both within and between class differences. The comparisons within groups showed that Classes A and C were superior in their reading ability of nonassociation words over high-association words ($p < .01$). The other three classes did not perform differentially along this dimension. Under the high-association condition, Classes A and C read significantly more words than did Classes B, D,

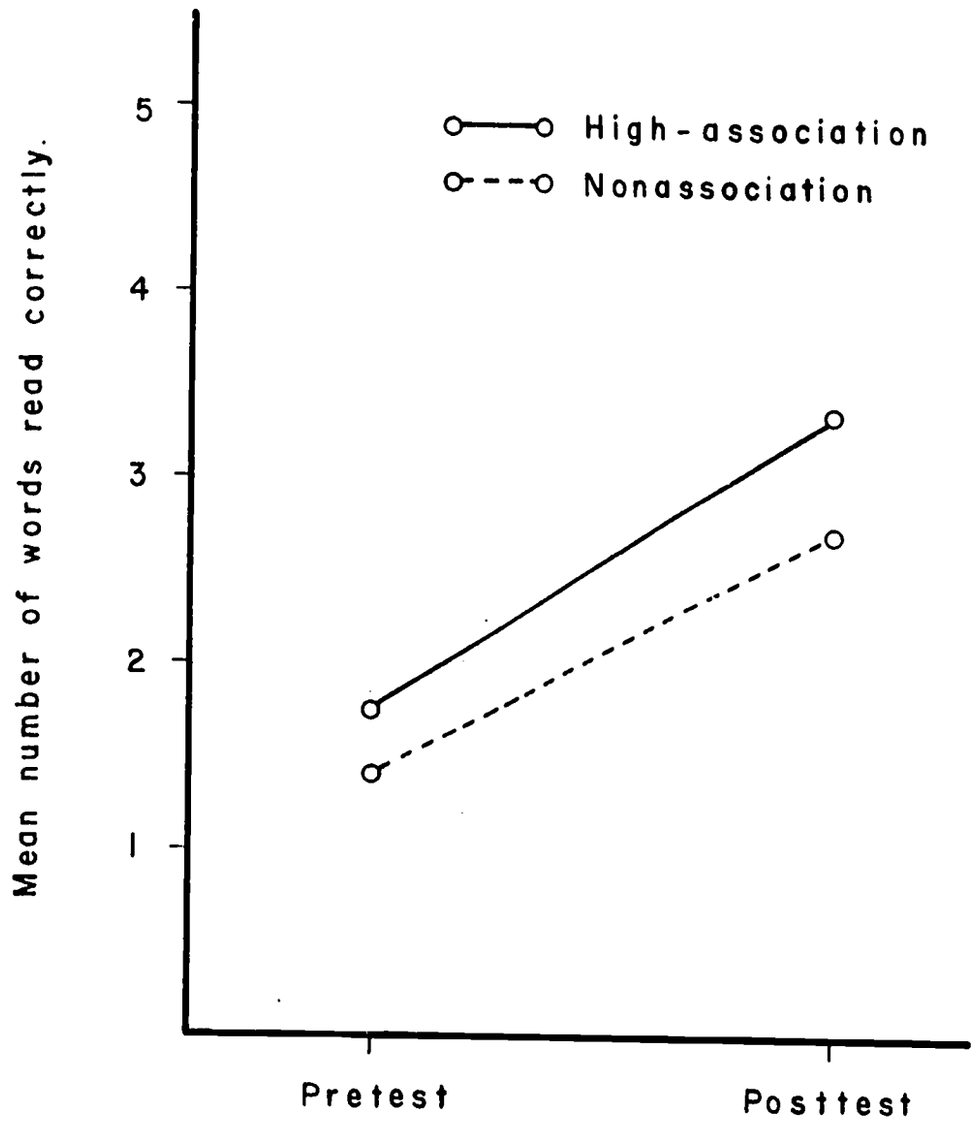


Fig. 3. Mean reading pretest and posttest word scores for high-association and nonassociation words summed across classes.

and E when each comparison is taken separately ($p < .01$). Classes A and C also read more nonassociation words than did Classes B, D, and E ($p < .01$). Class C, however, showed greater reading ability of nonassociation words than did Class A ($p < .01$). Also, Class E read the nonassociation words with greater accuracy than did Class D ($p < .05$). Figure 4 indicates the nature of the significant AB interaction.

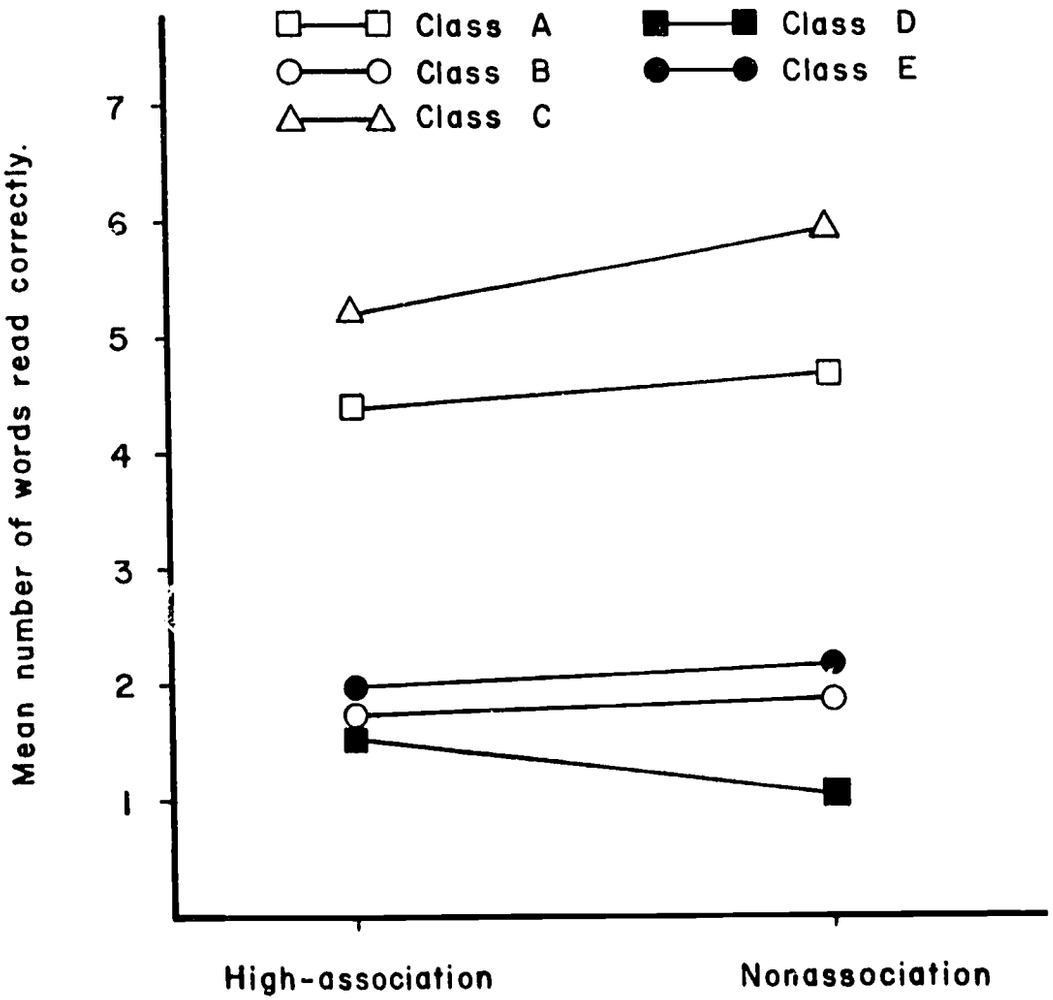


Fig. 4. High-associational and nonassociational mean reading posttost scores for each class for words.

High- and nonassociational words were then analyzed in a 5 x 2 analysis of covariance with repeated measures.* Posttest word scores were the dependent variable and pretest word scores were the covariate. Each pretest served as the covariate for the respective dependent measure, i.e., high-association word pretest served as the covariate for high-association word posttest and nonassociation word pretest served as the covariate for nonassociation word posttest. Class effect (A) and associational strength (B) were assessed. Table 22 presents the summary of this analysis.

Table 22

Summary of Analysis of Covariance of

Associational Strength of Words

Source	df	MS	F
Between Ss			
Classes (A)	4	12.85	2.82*
Ss W/A	54	4.55	
Within Ss			
Association (B)	1	9.86	9.82**
AB	4	4.44	4.39**
B Ss W/A	54	1.01	

*$p < .05$
**$p < .01$

*Note: For the analyses of covariance, Winer's model of a factorial experiment repeated measures was utilized, where $\beta\rho \neq \beta\nu$. Since each criterion measure was paired with a unique covariate, case two of the design was used.

The main effect of associational strength was significant in favor of nonassociation ($p < .01$). The main effect of class and the interaction effect were also significant ($p < .05$, $p < .01$, respectively). Post hoc analyses on adjusted means were performed using the Neuman-Keuls method. The analysis on class revealed identical results as did the analysis of variance on posttest scores, i.e., Class C read significantly more training words than did Classes B, E, and D ($p < .05$). The results of the interaction effect revealed both within and between differences. The results for within effects revealed that both Class A and Class C exhibited greater reading on nonassociation words than on high-association words ($p < .01$, $p < .05$, respectively). The between results revealed no significant differences between the high-association words in the classes. This can be seen in Figure 5 where the relative growth from pretest to posttest of the five classes are shown.

Under the nonassociation condition, however, Class C read significantly more words than the other four classes taken separately ($p < .01$). Class A also read significantly more nonassociation words than did Classes B, D, and E ($p < .05$). The relative gains under this condition from pretest to posttest can be seen in Figure 6.

Figure 7 shows the nature of this AB interaction based on adjusted means.

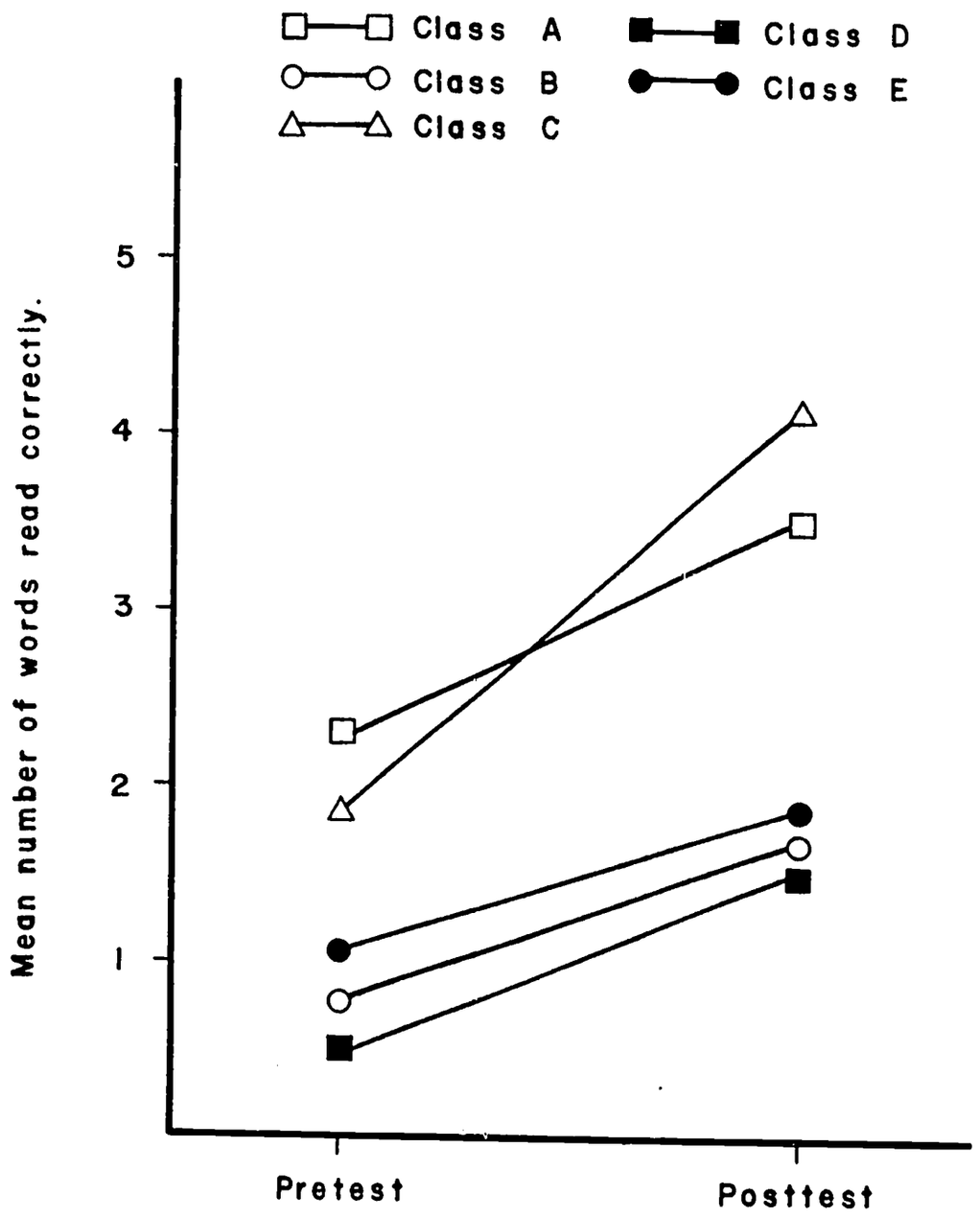


Fig. 5. Mean reading pretest and posttest word scores on high-association words for each class.

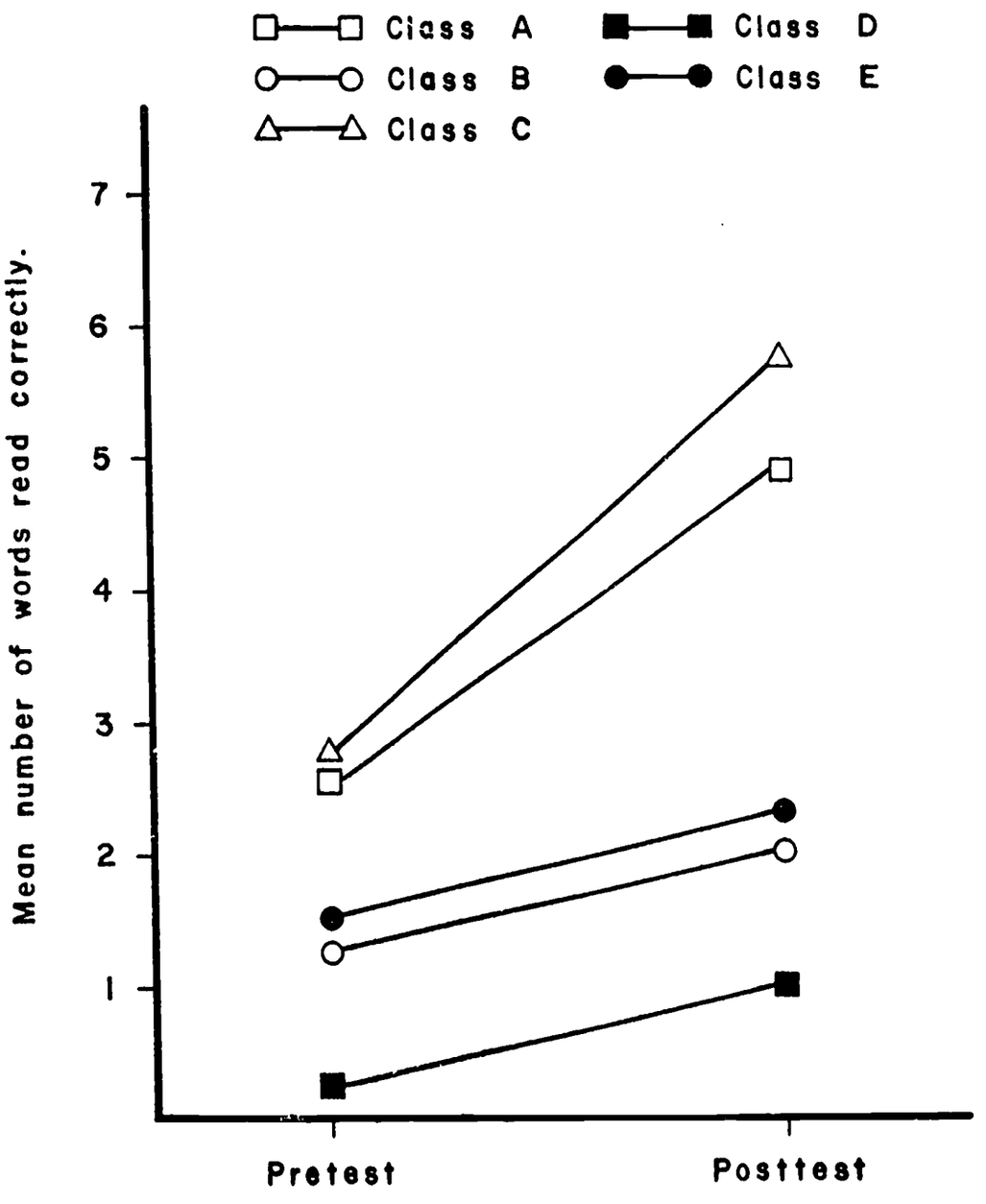


Fig. 6. Mean reading pretest and posttest word scores on nonassociation words for each class.

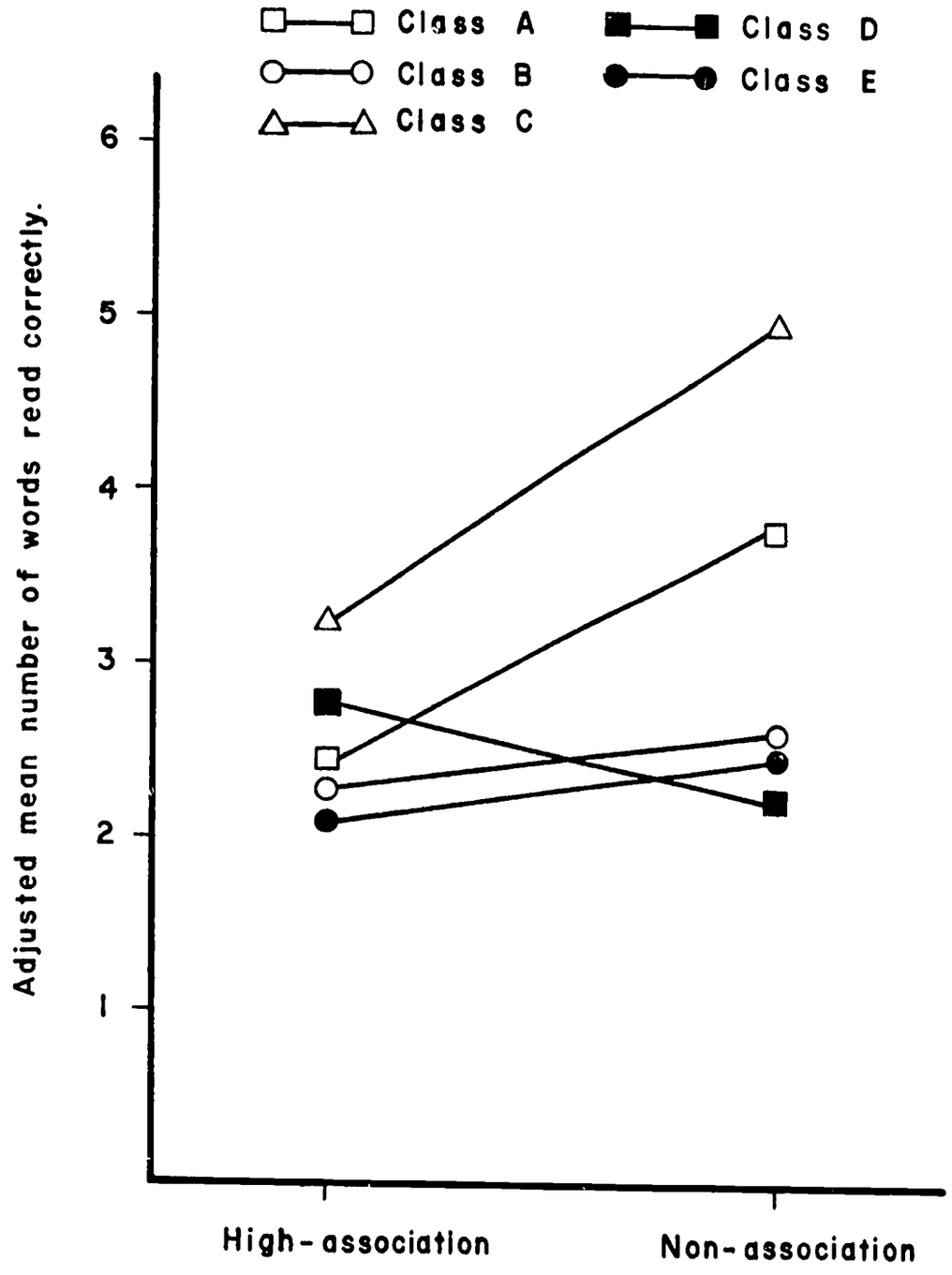


Fig. 7. High-associational and nonassociational adjusted mean reading scores for each class for words.

Discussion. It was predicted that, across all classes, constituent words of word pairs having the highest word-association response strength in a given class would be read with greater accuracy than nonassociated word pairs. This hypothesis was based on the premise that each classroom instructor would maintain the word pair contiguity in teaching sight recognition of the words. The results for sight word acquisition indicated a significant interaction of classes with training. This interaction revealed that the training or teaching procedure was only significant in two of five classes (Classes A and C). Hence, most of the gain in training across classes shown in Figures 1 and 2 is mainly due to the significant gains in the reading of training words in these two classes. There were no significant differences between the training and nontraining words in the other three classes. It is also noted that Class C demonstrated the steepest gradient of all five classes and therefore, the greatest learning and increase in reading scores of all five classes (see Figure 2). A possible explanation for these findings is that initially the remaining three classes contained a greater number of nonreaders relative to Classes A and C. In fact, Figure 2 reveals that this indeed was the case for the pretest training words. It is recalled that post hoc analyses revealed that Classes A and C combined read more training words on the pretest than did the other three classes combined. In essence, the children in Classes A and C are qualitatively a different group of retardates, with respect to reading ability as measured in this study, than those found in the remaining classes.

It should also be noted that the performance of the total retarded population on the twenty nontraining words was relatively stable during the course of the study. The results for posttest reading performance of high- and nonassociation words indicated a significant interaction between the effect of classes and associational strength of words, as well as a significant main effect of associational strength in favor of non-association words. The same orderliness in the data was revealed in that Classes A and C were the only ones to reveal within class differences. Classes A and C were found to be superior in their reading of nonassociation words over high-association words. The other three classes did not perform differentially along this associative strength dimension. The finding for Classes A and C was in direct contrast to the prediction of greater reading performance on high- rather than nonassociation word pairs. Classes A and C were further shown to read significantly more posttest words than did the other three classes under both the high- and nonassociation conditions. In addition, Class C was found to demonstrate greater reading ability of nonassociation words than did Class A (see Figure 4). These findings further illustrate the relative superiority and qualitative difference in the word-reading ability of Classes A and C.

The learning curves of each class for the high-association and nonassociation words are shown in Figures 5 and 6. The slopes of the curves represented in the figures graphically indicate the qualitative difference between Classes A and C and the remaining three classes particularly on the nonassociation words. Moreover, disregarding absolute levels of posttest performance, the slopes show that the

reading performance of Class C was relatively better than Class A for both high- and nonassociation training words. By pooling these results it may be concluded that the teacher in Class C was the most effective in training her children to learn the experimental sight words with the teacher in Class A being the next most effective teacher. When pretest performance was controlled or adjusted through statistical procedures, essentially the same class results were obtained. However, the relative superiority in sight word reading of Classes A and C vis-a-vis the remaining classes was found to be limited to the nonassociation words. In general the trend for four of the five classes was toward greater reading accuracy on nonassociation rather than high-association words (see Figure 7). Only one class displayed the predicted reverse trend in favor of high-association words.

A possible reason for the superiority in reading of nonassociation over high-association words is suggested by the fact that across all classes the nonassociation words were read on the pretest with greater accuracy than high-association words (see Figure 3). As a result the nonassociation word pairs may have been relatively easier to learn than high-association word pairs. However, of the two classes which demonstrated significant gains in reading the training words, only Class C revealed this finding. Another possible explanation of why the data offered no statistical support for the high-association position would involve the application of a perceptual notion. Perceptually the word pairs in the high-association condition would constitute minimal contrasts in terms of their perceptual discriminability. In other words, it may be more difficult to discriminate words for sight recognition which are

held or tied together by tight associative bonds (minimal contrasts), while it may be easier to discriminate word pairs such as those in the nonassociation condition which perceptually constitute maximal contrasts. From a teacher's point of view it may be relatively more difficult to devise good pedagogical techniques in teaching words which form minimal contrasts (e.g., dog - cat) than to teach words which form maximal contrasts (e.g., dog - building), using techniques such as novelty approaches, sentential mediation, and imagery. The hypothesis is interesting and perhaps deserves further study.

It may be concluded on the basis of the above results that the data offer no support for the high-association position at the word level. On the contrary, the data offer some support for the opposite point of view. There was some evidence that nonassociation word pairs may be read with greater accuracy than high-association words.

Sentence Reading Instruction Using High- And Nonassociation Sentences

The present study was initiated to test whether instruction with high-association sentences positively affects sentence recognition and comprehension scores. The high-association sentences used were derived from the most frequent oral responses of the children who were also subjects of the reading instruction program. The sequential nature of the associations between content words in each sentence was expected to facilitate reading recognition and comprehension.

Subjects

Subjects for the sentence reading study were the same as in the sight word acquisition study.

Method

Materials. 1. Training sentences. Lists of ten sentences were constructed for each class; each list consisted of five high-association and five nonassociation sentences. The high-association sentences were drawn from a pool of sentences showing the greatest associational strength for each class. The associations were those responses to successive verbal stimuli within a sentence unit, as described on pp. 28-30 in the normative study. Table 23 lists high- and nonassociation sentences for each class. The nonassociation sentences were constructed from those sentences which were the five next highest in associative strength for each class. The method for obtaining nonassociates was to interchange the verbs and object nouns with different subject nouns. Thus

the words used in both types of training sentences (high- and non-association) were the same as those given by the pupils in the collection of the normative data, with only the word order changed in five of ten high-association sentences.

2. Evaluation. In order to assess the relative efficacy of teaching high- and nonassociation sentences, two tests of sentence reading were developed. Both tests were used for pre- and post-test and follow-up measures of reading. One test was designed to measure word recognition in sentence reading, the other, comprehension in sentence reading. The test format for each class was identical but the content corresponded to the sentences (high- and nonassociation) taught in each class.

The recognition test contained 20 sentences. Of these, ten were sentences used in teaching and ten were controls. The ten teaching sentences were the five highest in association for a given class and five nonassociation sentences. The control sentences consisted of five high- and five low-association sentences, taken from the norms of other classes in the study. The 20 sentences were randomly listed in serial order on a test sheet, and each subject was asked to read each sentence on the list, selected at random by the test administrator. The test of reading comprehension was developed using the five high- and the five nonassociation sentences, and it was designed to measure both recognition and comprehension. Each of the ten items tested consisted of: (a) pictoral illustration of the training sentences, (b) the training sentence, (c) a close perceptual equivalent of the training sentence and (d) a subject noun, object noun re-ordering of the original sentence.

See pp. 171 to 230 of the Appendix for a complete set of test items.

Procedure. The pretest and posttest of word recognition in sentences were administered individually for each pupil, and the number of words read correctly was recorded on a duplicate test-item sheet. The comprehension and recognition tests (both pre- and post-) were given in alternate order to avoid the effect of test order on the classes. In order to measure the stability of the results both measures were repeated seven days after the posttest in a follow-up test.

The comprehension test required the pupil to look at three sentences which appeared with an illustration on a single page. The pupil was asked to indicate which of the three sentences "tells" about the picture, and to read aloud the sentence chosen. Records of correct choices and words read correctly were made on an answer sheet.

Instructions to teachers concerning the teaching of sentences were the same as those given for teaching words (Appendix, p. 169). Teachers were free to prepare lessons and approach the teaching of sentences in any manner they chose. An observer was present at each half-hour lesson and took an anecdotal record of the proceedings. Both the recognition and comprehension tests were given on the day following the last lesson. All lessons began at the same time each day and lasted approximately 30 minutes.

Table 23

High-association and Nonassociation Sentences

Taught to Each Class

Class	High-association	Nonassociation
A	The banker gave the money.	The baby cut the water.
	The nurse helped the people.	The butcher jumped on the ground.
	The baker baked the cake.	The bug taught the bottle.
	The dentist pulled the teeth.	The teacher crawled on the meat.
	The mouse ate the cheese.	The frog cried for the kids.
B	The milkman delivered the milk.	The lion cleaned the cheese.
	The dentist pulled the teeth.	The mouse taught the people.
	The bird flew in the air.	The pilot ate the kids.
	The monkey climbed the tree.	The teacher flew in the house.
	The baker baked the cake.	The woman growled at the airplane.
C	The dentist pulled the teeth.	The lion cleaned the cheese.
	The butcher cut the meat.	The woman crawled on the money.
	The teacher taught the kids.	The mouse gave the house.
	The pilot flew the airplane.	The banker growled at the ground.
	The baby cried for the bottle.	The bug ate the people.
D	The milkman delivered the milk.	The lion cleaned the cheese.
	The baby cried for the bottle.	The mouse taught the people.
	The butcher cut the meat.	The teacher growled at the tree.
	The bird flew in the air.	The woman climbed the kids.
	The fish swam in the water.	The monkey ate the house.
E	The baker baked the cake.	The lion cleaned the cheese.
	The dentist pulled the teeth.	The mouse taught the people.
	The butcher cut the meat.	The teacher flew in the house.
	The sailor sailed the boat.	The woman growled at the airplane.
	The milkman delivered the milk.	The pilot ate the kids.

Results

Recognition test. The total number of words correctly read per sentence (excluding articles and prepositions) was computed, resulting in a maximum score of three per sentence (noun, verb, object). These scores were computed for pre-, post-, and follow-up tests, and they were classified according to training or nontraining sentences. Training sentences were further divided according to high-association and nonassociation strength. The maximum total score for the recognition test was 60; training sentences, 30; nontraining sentences, 30; high-association sentences, 15; low-association sentences, 15. Difference scores between the pretest and posttest were generated and these scores were classified in the same manner as the raw scores (i.e., training or nontraining; high-association or nonassociation).

Product-moment correlations were computed between the subjects' four subscores on the Metropolitan Reading Achievement Test and the subjects' pre-, post- and follow-up recognition test scores. Table 24 summarizes these results.

Table 24

Correlation Matrix of Metropolitan Reading Scores with Pre-, Post-, and Follow-up Sentence Recognition Test Scores

Number of words read correctly	Metropolitan Reading Test Subdivisions			
	Met. word knowledge	Met. word analysis	Met. reading	Met. word knowledge & reading
Total pretest	.67 (54)	.73 (53)	.79 (53)	.78 (53)
Total posttest	.62 (54)	.63 (53)	.66 (53)	.64 (53)
Total follow-up test	.67 (43)	.64 (42)	.67 (42)	.75 (42)
Training pretest	.65 (54)	.71 (53)	.79 (53)	.73 (53)
Training posttest	.54 (54)	.54 (53)	.54 (53)	.52 (53)
Training follow-up	.59 (43)	.57 (42)	.56 (42)	.64 (42)
Nontraining pretest	.65 (54)	.71 (53)	.75 (53)	.79 (53)
Nontraining posttest	.65 (54)	.67 (53)	.74 (53)	.73 (53)
Nontraining follow-up test	.69 (43)	.65 (42)	.72 (42)	.78 (42)
High-association pretest	.64 (54)	.67 (53)	.74 (53)	.73 (53)
High-association posttest	.53 (54)	.52 (53)	.50 (53)	.53 (53)
High-association follow-up test	.59 (43)	.55 (42)	.53 (42)	.65 (42)
Nonassociation pretest	.63 (54)	.71 (53)	.79 (53)	.69 (53)
Nonassociation posttest	.52 (54)	.51 (53)	.55 (53)	.48 (53)
Nonassociation follow-up test	.57 (43)	.56 (42)	.56 (42)	.60 (42)

Intercorrelations between subjects' pre-, post-, and follow-up test scores on the recognition test were computed. These results are presented in Table 25.

The subjects' test variables and subject variables were also correlated. The subject variables used in the correlation were chronological age, mental age, IQ, percent paradigmatic, percent syntagmatic, and percent klangs. The last three variables were obtained from the normative data on single word-associations. The results are presented in Table 26.

A 5 x 2 fixed ANOVA, which analyzed the effect of training vs. nontraining, was computed using difference scores as dependent measure. The class effect (A) and the training effect (B) were assessed. Table 27 summarizes the results of this analysis.

Table 25

Inter-Correlation Matrix of Sentence Recognition Reading Scores

	total pretest	total posttest	total follow-up	training pretest	training posttest	training follow-up	nontraining pretest	nontraining posttest	nontraining follow-up	high-association pretest	high-association posttest	high-association follow-up	nonassociation pretest	nonassociation posttest	nonassociation follow-up
total pretest	1.00 (60)														
total posttest	0.87 (60)	1.00 (60)													
total follow-up	0.92 (49)	0.96 (49)	1.00 (49)												
training pretest	0.98 (60)	0.85 (60)	0.88 (49)	1.00 (60)											
training posttest	0.76 (60)	0.97 (60)	0.91 (49)	0.75 (60)	1.00 (60)										
training follow-up	0.81 (49)	0.95 (49)	0.96 (49)	0.78 (49)	0.96 (49)	1.00 (49)									
nontraining pretest	0.98 (60)	0.87 (60)	0.91 (49)	0.92 (60)	0.74 (60)	0.80 (49)	1.00 (60)								
nontraining posttest	0.94 (60)	0.94 (60)	0.93 (49)	0.90 (60)	0.83 (60)	0.83 (49)	0.95 (60)	1.00 (60)							
nontraining follow-up	0.95 (49)	0.88 (49)	0.94 (49)	0.90 (49)	0.75 (49)	0.81 (49)	0.95 (49)	0.96 (49)	1.00 (49)						
high-association pretest	0.96 (60)	0.86 (60)	0.89 (49)	0.98 (60)	0.77 (60)	0.81 (49)	0.91 (60)	0.87 (60)	0.90 (49)	1.00 (60)					
high-association posttest	0.74 (60)	0.94 (60)	0.88 (49)	0.73 (60)	0.97 (60)	0.93 (49)	0.72 (60)	0.79 (60)	0.72 (49)	0.76 (60)	1.00 (60)				
high-association follow-up	0.82 (49)	0.93 (49)	0.95 (49)	0.80 (49)	0.93 (49)	0.98 (49)	0.80 (49)	0.83 (49)	0.81 (49)	0.82 (49)	0.93 (49)	1.00 (49)			
nonassociation pretest	0.94 (60)	0.78 (60)	0.80 (49)	0.97 (60)	0.68 (60)	0.70 (49)	0.87 (60)	0.85 (60)	0.85 (49)	0.89 (60)	0.66 (60)	0.71 (49)	1.00 (60)		
nonassociation posttest	0.73 (60)	0.94 (60)	0.88 (49)	0.72 (60)	0.97 (60)	0.92 (49)	0.72 (60)	0.81 (60)	0.73 (49)	0.73 (60)	0.88 (60)	0.87 (49)	0.66 (60)	1.00 (60)	
nonassociation follow-up	0.77 (49)	0.93 (49)	0.94 (49)	0.74 (49)	0.94 (49)	0.98 (49)	0.77 (49)	0.80 (49)	0.79 (49)	0.77 (49)	0.88 (49)	0.92 (49)	0.66 (49)	0.94 (49)	1.00 (49)

Table 26

Correlation Matrix Between Subject Variables and Sentence Recognition Test Variables

	CA	MA	IQ	% paradigmatic	% syntagmatic	% klangs
total pretest	0.28 (60)	0.28 (56)	0.03 (56)	0.33 (58)	-0.19 (58)	-0.09 (58)
total posttest	0.43 (60)	0.41 (56)	0.10 (56)	0.42 (58)	-0.28 (58)	-0.06 (58)
total follow-up	0.48 (49)	0.55 (45)	0.23 (45)	0.47 (47)	-0.42 (47)	0.01 (47)
training pretest	0.27 (60)	0.26 (56)	0.04 (56)	0.29 (58)	-0.16 (58)	-0.08 (58)
training posttest	0.45 (60)	0.45 (56)	0.16 (56)	0.40 (58)	-0.31 (58)	-0.02 (58)
training follow-up	0.49 (49)	0.56 (45)	0.25 (45)	0.43 (47)	-0.41 (47)	0.04 (47)
nontraining pretest	0.29 (60)	0.29 (56)	0.01 (56)	0.36 (58)	-0.21 (58)	-0.09 (58)
nontraining posttest	0.35 (60)	0.30 (56)	0.00 (56)	0.40 (58)	-0.23 (58)	-0.11 (58)
nontrain. follow-up	0.40 (49)	0.48 (45)	0.17 (45)	0.47 (47)	-0.32 (47)	-0.04 (47)
high-assoc. pretest	0.26 (60)	0.30 (56)	0.11 (56)	0.34 (58)	-0.22 (58)	-0.06 (58)
high-assoc. posttest	0.44 (60)	0.45 (56)	0.18 (56)	0.34 (58)	-0.28 (58)	0.02 (58)
high-assoc. follow-up	0.54 (49)	0.57 (45)	0.23 (45)	0.37 (47)	-0.38 (47)	0.07 (47)
nonassoc. pretest	0.26 (60)	0.21 (56)	-0.04 (56)	0.21 (58)	-0.08 (58)	-0.10 (58)
nonassoc. posttest	0.44 (60)	0.44 (56)	0.14 (56)	0.44 (58)	-0.31 (58)	-0.06 (58)
nonassoc. follow-up	0.43 (49)	0.52 (45)	0.27 (45)	0.47 (47)	-0.43 (47)	0.01 (47)

Table 27

Summary of Analysis of Variance of Training vs. Nontraining on the Sentence Recognition Test

Source	df	MS	F
Between Ss			
Classes (A)	4	56.813	1.51
Ss W/A	55	37.571	
Within Ss			
Training (B)	1	1038.408	51.84***
AB	4	19.638	.98
B Ss W/A	55	20.028	

*** $p < .001$

The main effect of classes was nonsignificant, as was the interaction effect of classes and training. The main effect of training was significant in favor of training ($p < .001$). As can be seen in Figure 8 the words of the training and nontraining sentences had identical pretest scores but significantly differential gains.

The pretest scores for high-association sentences and nonassociation sentences were analyzed by t test for paired observations. For this the results were significant in favor of high-association sentences ($t = 2.32$, $df = 59$, $p < .05$). Figure 9 shows the relative gain on the training words from pretest to posttest for the five classes.

Figure 10 indicates the mean number of words read correctly for pretest scores.

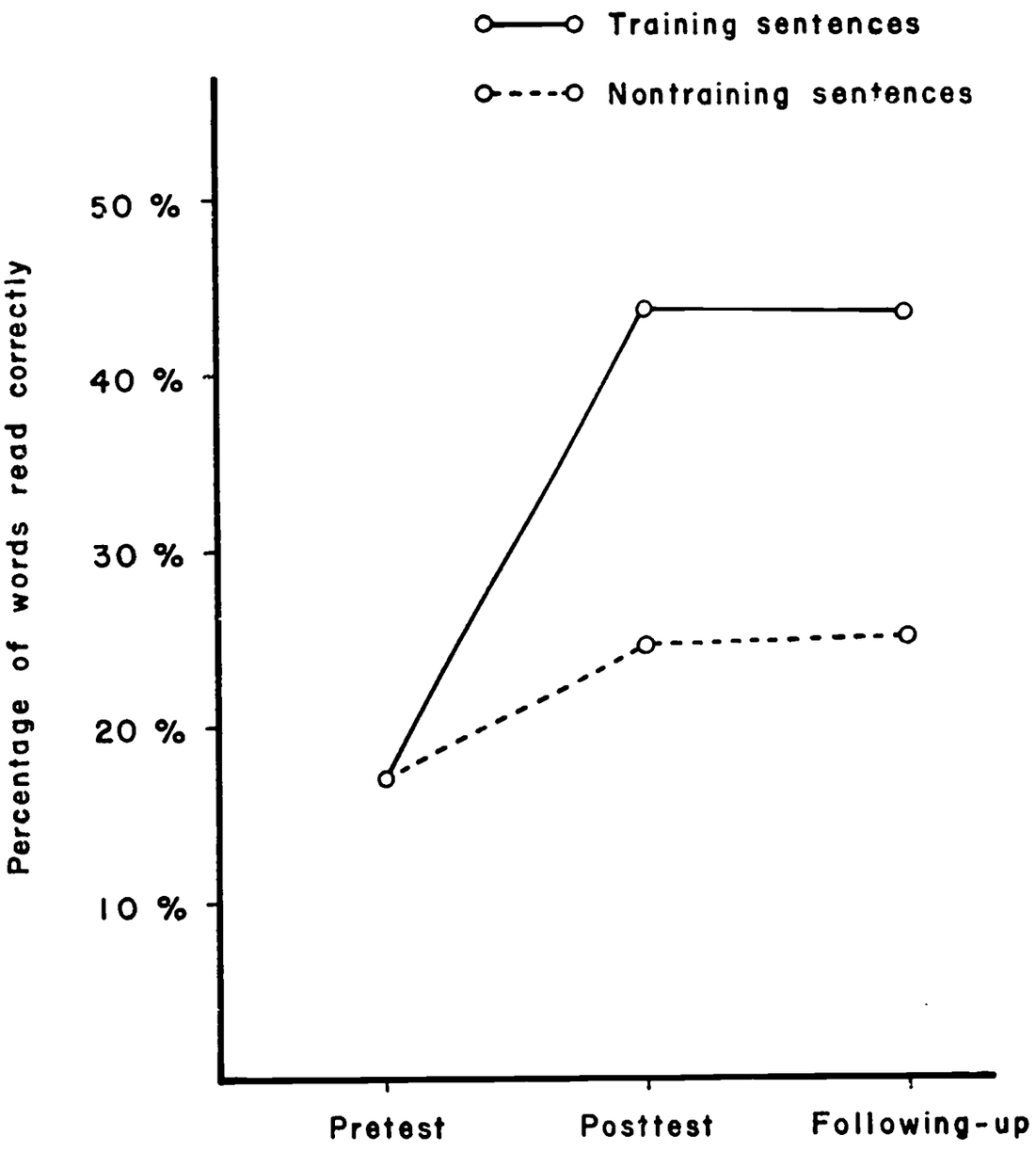


Fig. 8. Reading pretest, posttest, and follow-up scores in percent correct for training and nontraining sentences summed across classes on the sentence recognition test.

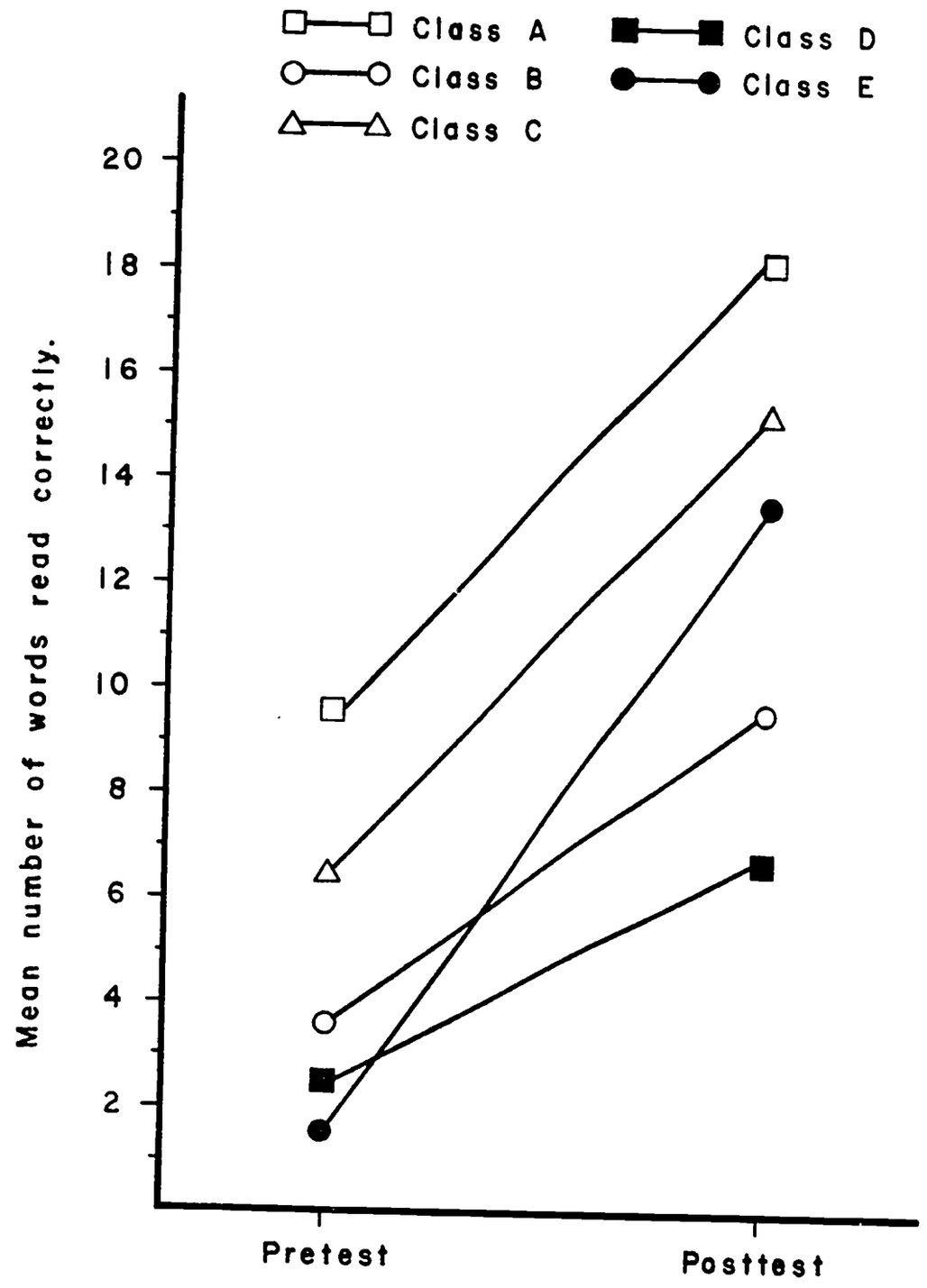


Fig. 9. Mean reading pretest and posttest scores for each class on the training sentences of the sentence recognition test.

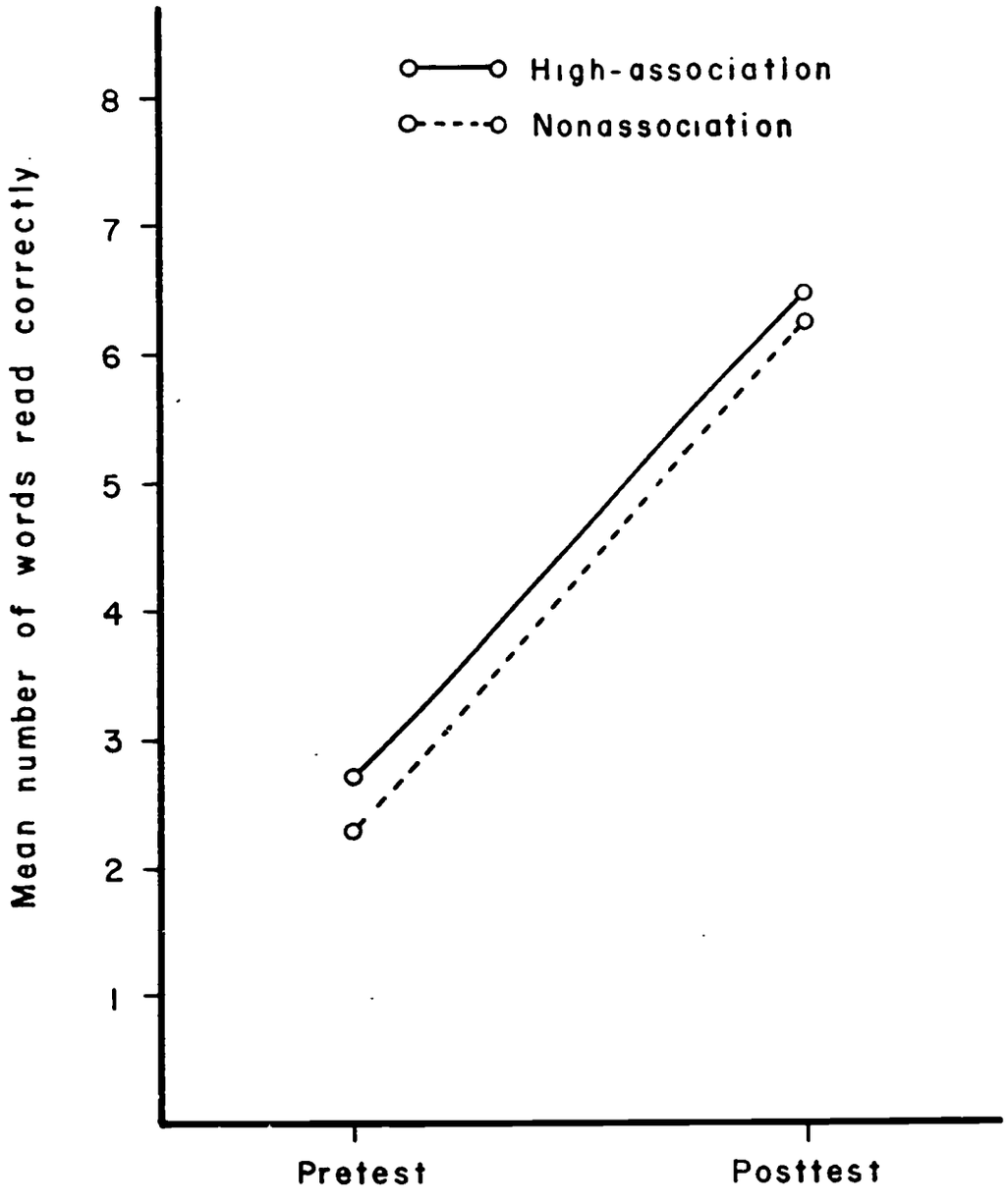


Fig. 10. Mean reading pretest and posttest scores for high-association and nonassociation sentences summed across classes on the sentence recognition test.

The posttest scores of high- and nonassociation sentences were then analyzed in a 5 x 2 fixed ANOVA design. Class effect (A) and associational effect (B) were assessed. Table 28 presents the summary of this analysis.

Table 28

Summary of Analysis of Variance of Associational Strength on the Sentence Recognition Test

Source	df	MS	F
Between Ss			
Classes (A)	4	122.404	2.246
Ss W/A	55	54.495	
Within Ss			
Association (B)	1	.075	.020
AB	4	3.471	.950
B Ss W/A	55	3.628	

The main effects of classes and associational strength were nonsignificant as was the interaction effect. The mean number of words read correctly on the association factor can be seen in Figure 10.

The posttest scores and the follow-up test scores for the training sentences (high- and nonassociation combined) were then submitted to t tests for paired observations. These analyses were performed by class and for the total subject population pooled across classes. All analyses proved to be nonsignificant, indicating no decrease in reading from posttest to follow-up (see Figure 9). The posttest scores and the

follow-up test scores for the nontraining sentences were then analyzed by a t test for paired observation. The analysis was done with subjects pooled across classes. The t test was not significant, indicating no decrease in reading performance on the nontraining words over time (see Figure 9).

High- and nonassociation sentences were then analyzed in a 5 x 2 analysis of covariance with repeated measures. Posttest scores for the high-association and nonassociation sentences were the dependent variable with the corresponding pretest score as the appropriate covariate. Class effect (A) and associational strength (B) were assessed. Table 29 presents the summary of this analysis.

Table 29

Summary of Analysis of Covariance of Asscciational Strength on the Sentence Recognition Test

Score	df	MS	F
Between Ss			
Classes (A)	4	32.05	1.22
S (A)	54	26.22	
Within Ss			
Association (B)	1	.34	.09
AB	4	3.37	.97
B Ss W/A	54	3.55	

As with the ANOVA using posttest scores, the analysis of covariance indicated that both main effects were nonsignificant as was the AB interaction. Figures 11 and 12 show the relative growth from pretest to

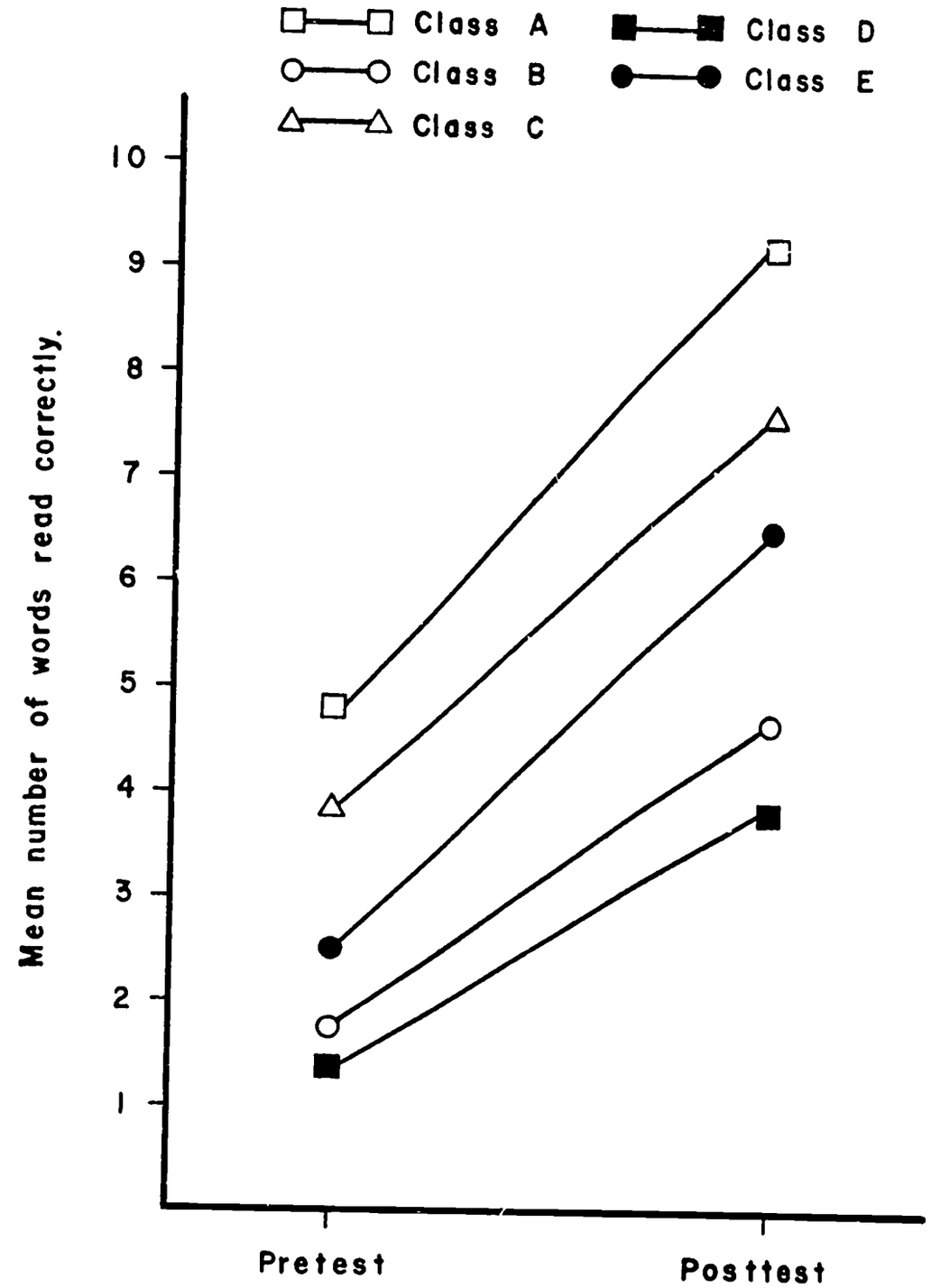


Fig. 11. Mean reading pretest and posttest scores on high-association sentences for each class on the sentence recognition test.

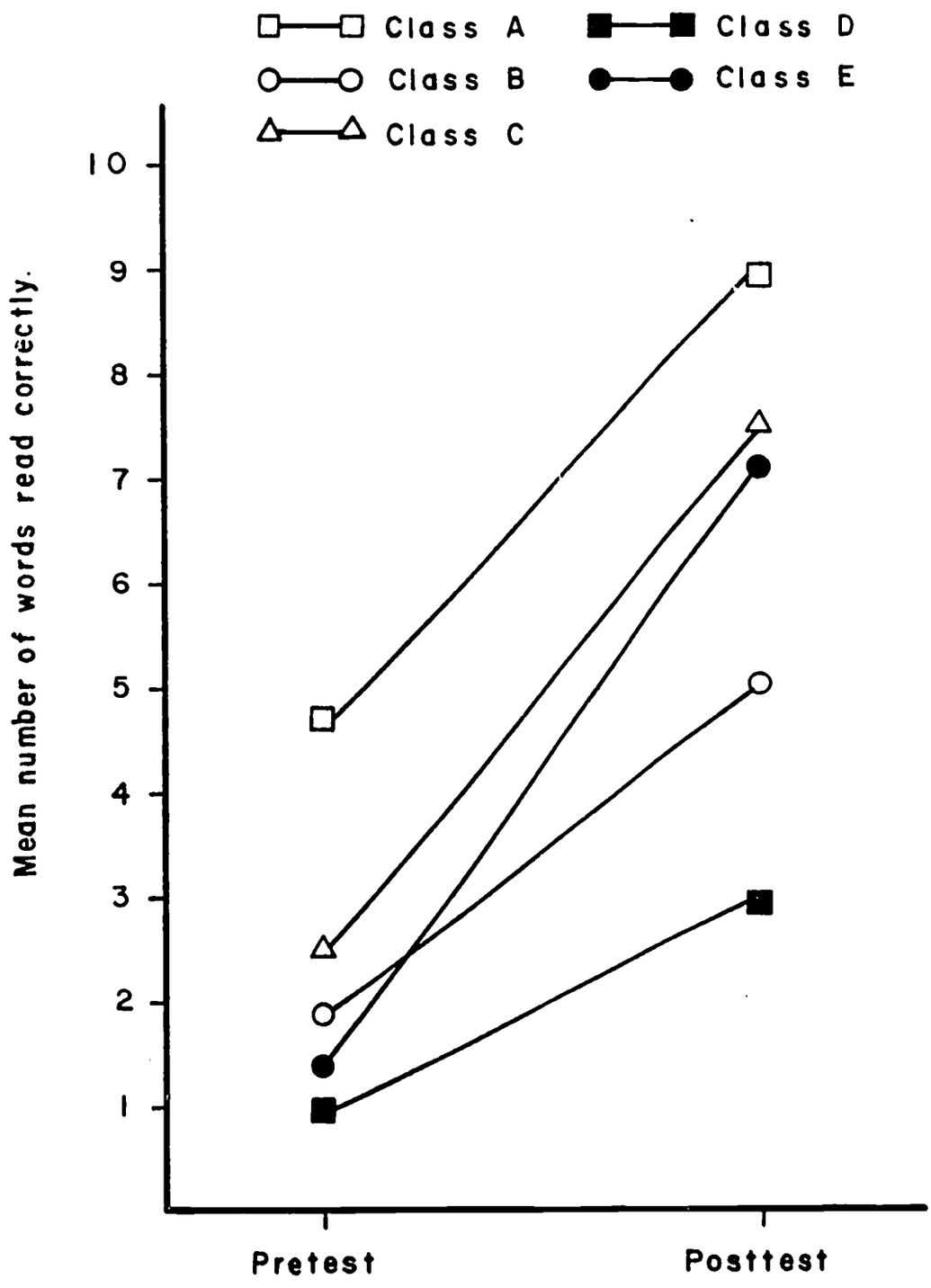


Fig. 12. Mean reading pretest and posttest scores on nonassociation sentences for each class on the sentence recognition test.

posttest for each class on both high-association and nonassociation sentences.

Comprehension test. The total number of words correctly read per sentence (excluding articles and prepositions) was computed, resulting in a maximum sentence score of three (noun, verb, object). If the sentence picked and read was the correct choice for that particular set of sentences, the score remained. If, on the other hand, the sentence read was the incorrect choice, the score for that particular sentence was nullified. These scores were computed on the pre- and posttests and were then divided into two groups, depending upon whether they were derived from high- or nonassociation sentences. The maximum total score for the sentence comprehension test was 30; high-association sentences, 15; nonassociational sentences, 15.

Correlational analyses were then conducted on the subjects' four subscores of the Metropolitan Reading Achievement Test and the pre- and post- comprehension test scores. These correlations ranged from .51 to .70 and are significant ($p < .01$). Table 30 summarizes these results.

Intercorrelations were also computed between the pre- and posttest scores on the sentence comprehension test. These results are presented in Table 31.

Correlations were then performed between comprehension test variables and subject variables. The subject variables consisted of chronological age, mental age, IQ, percent paradigmatic, percent syntagmatic, and percent klangs. The paradigmatic, syntagmatic and klang percentages were obtained from the normative data of single word responses. Table 32 shows the results of these correlations.

Table 30

Correlation Matrix of Metropolitan Reading Scores and Pre- and Posttest Scores on the Sentence Comprehension Test

Total Number of Words Read Correctly	Metropolitan Test Subdivisions			
	Met. word knowledge	Met. word analysis	Met. reading	Met. word knowledge & reading
	n=54	n=53	n=53	n=53
Training pretest	.66	.56	.70	.69
Training posttest	.69	.63	.60	.66
High-association pretest	.61	.51	.66	.66
High-association posttest	.66	.59	.55	.65
Nonassociation pretest	.63	.55	.65	.61
Nonassociation posttest	.63	.58	.57	.58

Table 31

Inter-Correlation Matrix of Sentence Comprehension Reading Scores (n = 60)

	training pretest	training posttest	high-assoc. pretest	high-assoc. posttest	nonassoc. pretest	nonassoc. posttest
training pretest	1.00					
training posttest	0.83	1.00				
high-assoc. pretest	0.96	0.79	1.00			
high-assoc. posttest	0.72	0.94	0.73	1.00		
nonassoc. pretest	0.88	0.73	0.70	0.57	1.00	
nonassoc. posttest	0.83	0.94	0.76	0.77	0.79	1.00

Table 32

Correlation Matrix Between Subject Variables
and Sentence Comprehension Test Variables

	CA	MA	IQ	% paradigmatic	% syntagmatic	% klang
training pretest	0.33 (60)	0.41 (56)	0.20 (56)	0.39 (58)	-0.35 (58)	0.01 (58)
training posttest	0.42 (60)	0.51 (56)	0.19 (56)	0.48 (58)	-0.40 (58)	0.00 (58)
high-assoc. pretest	0.36 (60)	0.47 (56)	0.25 (56)	0.31 (58)	-0.36 (58)	0.11 (58)
high-assoc. posttest	0.40 (60)	0.49 (56)	0.18 (56)	0.42 (58)	-0.44 (58)	0.09 (58)
nonassoc. pretest	0.22 (60)	0.25 (56)	0.08 (56)	0.43 (58)	-0.25 (58)	-0.15 (58)
nonassoc. posttest	0.39 (60)	0.48 (56)	0.17 (56)	0.47 (58)	-0.32 (58)	-0.09 (58)

Correlations were computed between the number of words read correctly on the training sentences of the recognition test and the training sentences of the comprehension test. The correlation between the pretest scores on the recognition training sentences and the pretest scores on the comprehension training sentences was .77. The correlation between the posttest scores on the recognition training sentences and the posttest scores on the comprehension training sentences was .85.

The pretest scores for high-association and nonassociation sentences pooled across class were subjected to a t test for paired observations. The result was significant in favor of high-association sentences, ($t = 2.06$, $df = 48$, $p < .05$). Figure 13 shows the mean number of words read correctly on the pretest for the high- and nonassociation sentences combined for the five classes.

Figure 14 shows the mean number of words read correctly on pretest and posttest sentences summed across classes.

The posttest scores on high- and nonassociation sentences were then analyzed in a 5 x 2 ANOVA with repeated measures. Class effect (A) and associational effect (B) were assessed. Table 33 presents the summary of this analysis.

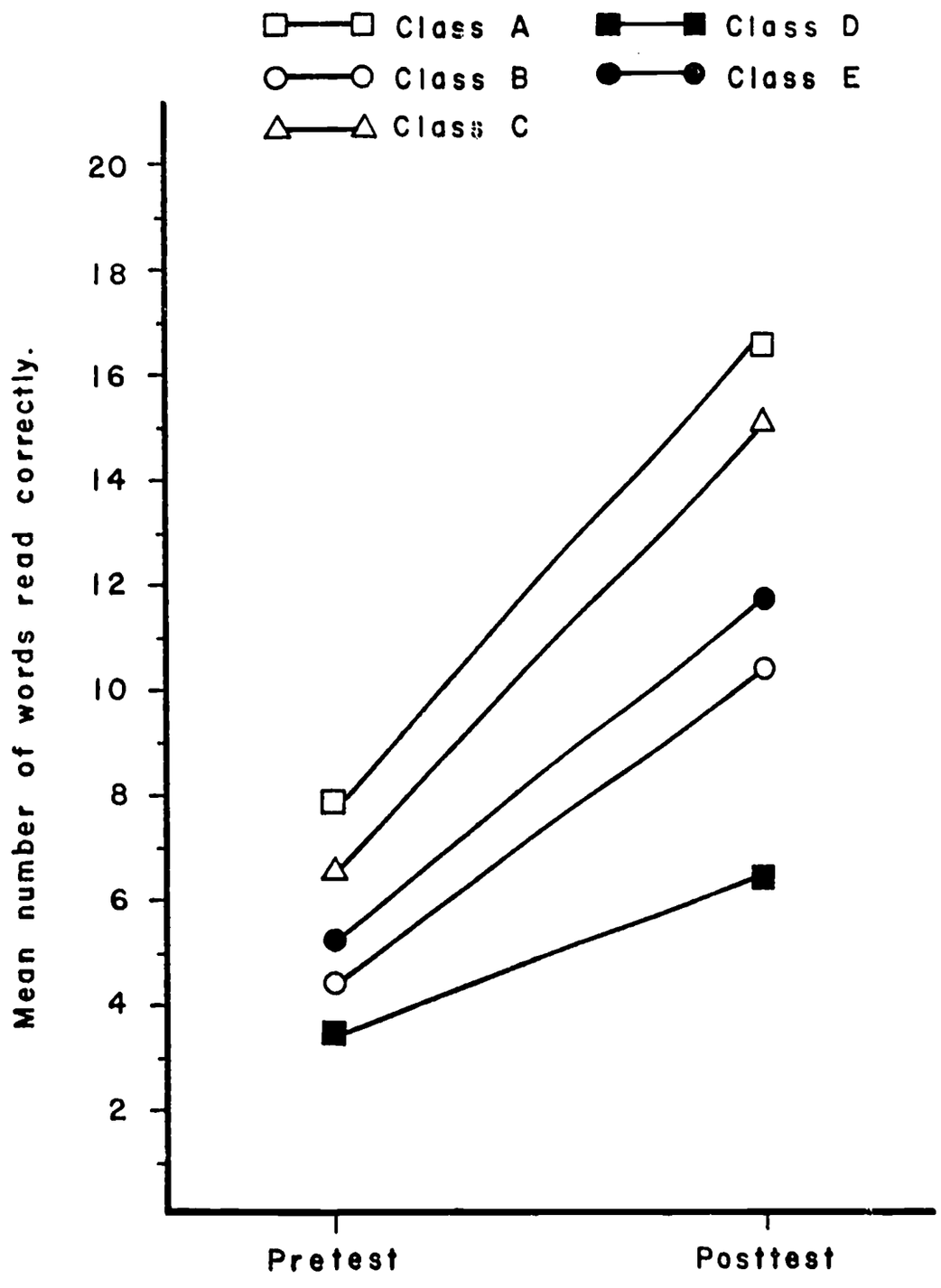


Fig. 13. Mean reading pretest and posttest scores for each class on the training sentences of the sentence comprehension test.

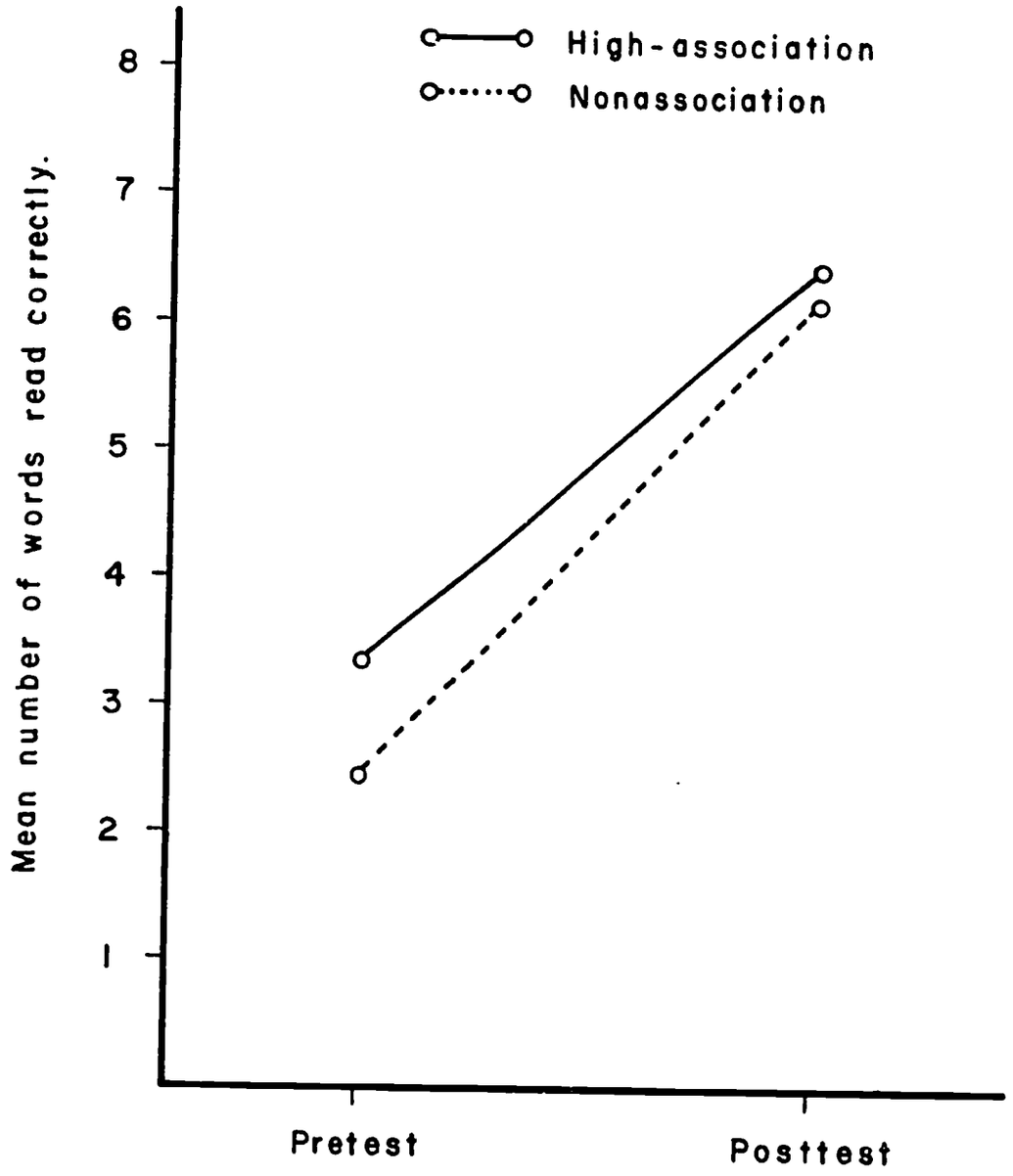


Fig. 14. Mean reading pretest and posttest score for high-association and nonassociation sentences summed across classes on the sentence comprehension test.

Table 33

Summary of Analysis of Variance of Associational Strength on the Sentence Comprehension Test

Source	df	MS	F
Between Ss			
Classes (A)	4	95.300	3.01*
Ss W/A	55	31.612	
Within Ss			
Association (B)	1	2.700	.66
AB	4	14.742	3.65*
B Ss W/A	55	4.042	

*$p < .05$

The main effect of associational strength was nonsignificant. (See Figure 14 for relative mean posttest scores.) The main effect of classes as well as the interaction effect were significant ($p < .05$). A post hoc analysis on the significant main effect was then performed using the Newman-Keuls method. The analysis on the class effect revealed that Class A showed superior reading over Class D ($p < .05$).

The Newman-Keuls method was also used on the significant interaction. The comparisons for within groups showed that both Classes D and E were superior in their reading ability of high-association sentences over nonassociation sentences ($p < .05$). The other three classes did not show any significant difference in reading ability between the two sentence types. Under the high-association sentence condition, Classes

C and E read significantly more words than did Classes B and D ($p < .05$). Class A also read significantly more under high-association than did Classes B and D ($p < .01$). Under the nonassociation condition Class A showed greater reading ability than did Classes B, D, and E ($p < .05$, $p < .01$, $p < .01$ respectively). Class C also read more nonassociation sentence words than did Classes B, D, and E ($p < .05$, $p < .01$, $p < .01$ respectively). Also Class B read more nonassociation words than did Class D ($p < .01$) and Class E read more than did Class D ($p < .05$). Figure 15 indicates the nature of the significant AB interactions.

High- and nonassociation sentences were then analyzed in a 5 x 2 analysis of covariance with repeated measures. Posttest scores were the dependent variable and the corresponding pretest scores were the covariates; i.e., the high-association pretest was the covariate for the high-association posttest and the nonassociation pretest was the covariate for the nonassociation posttest. Class effect (A) and associational strength (B), were assessed. Table 34 presents the summary of the analysis.

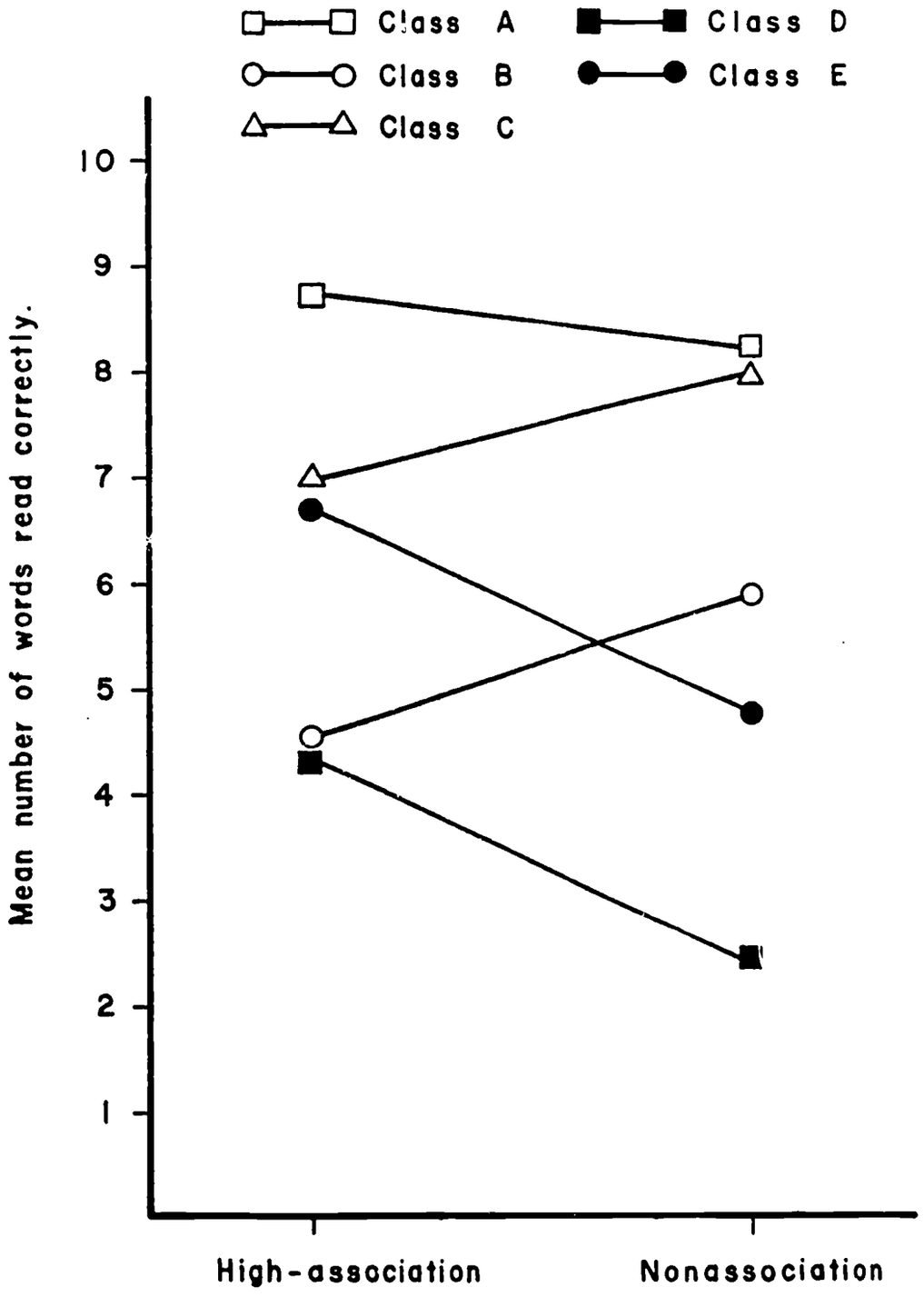


Fig. 15. High-association and nonassociation mean reading posttest scores for each class on the sentence comprehension test.

Table 34

Summary of Analysis of Covariance of Associational Strength on the Sentence Comprehension Test

Source	df	MS	F
Between Ss			
Classes (A)	4	21.52	1.97
Ss W/A	54	10.90	
Within Ss			
Association (B)	1	.32	.08
AB	4	12.91	3.34*
B Ss W/A	54	3.06	

*$p < .05$

The main effects of classes and associational strength were non-significant. The interaction of association and classes was significant ($p < .05$). Post hoc analyses on the interaction effect were performed on the adjusted means using the Newman-Keuls method. The results indicated no within differences. The between differences that were found to be significant were under the nonassociation condition. Under the high-association condition no differences were found between classes. Figure 16 shows the relative gain from pretest to posttest under the high-association condition.

Under the nonassociation condition, Class C read significantly more words than did Classes D and E ($p < .05$, $p < .01$ respectively).

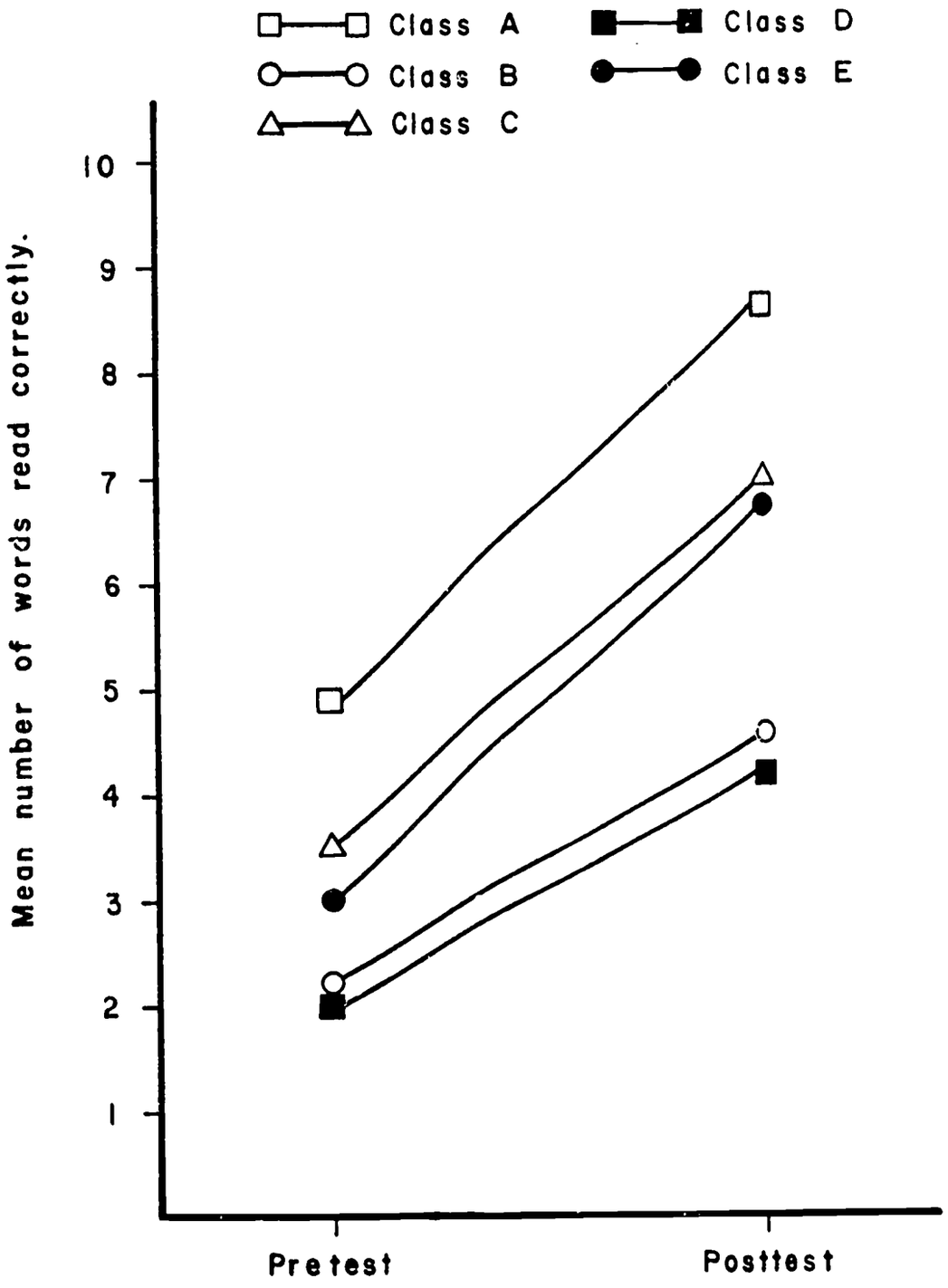


Fig. 16. Mean reading pretest and posttest scores on high-association sentences for each class on the sentence comprehension test.

Also Class A showed superior reading ability on nonassociation sentences as compared to Class D ($p < .01$). Class B also showed greater accuracy in reading over Class D under the nonassociation condition ($p < .01$). Figure 17 shows the relative gain from pretest to posttest for non-association sentences.

Figure 18 shows the nature of the AB interaction based on adjusted means.

Table 35 presents the intercorrelation matrix of pretest and posttest training scores for the words and the sentence recognition and comprehension tests. All correlations are highly significant.

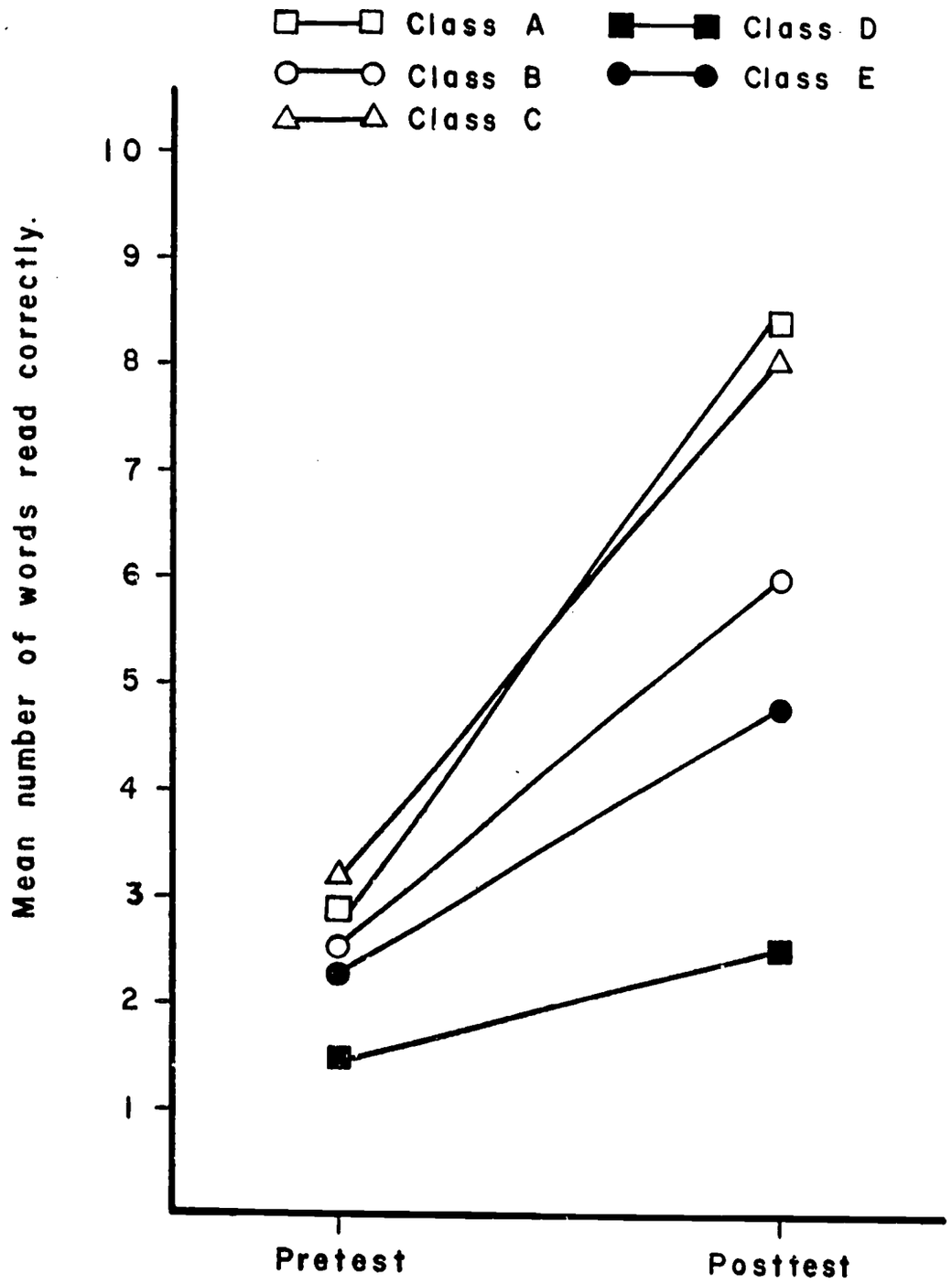


Fig. 17. Mean reading pretest and posttest scores on nonassociation sentences for each class on the sentence comprehension test.

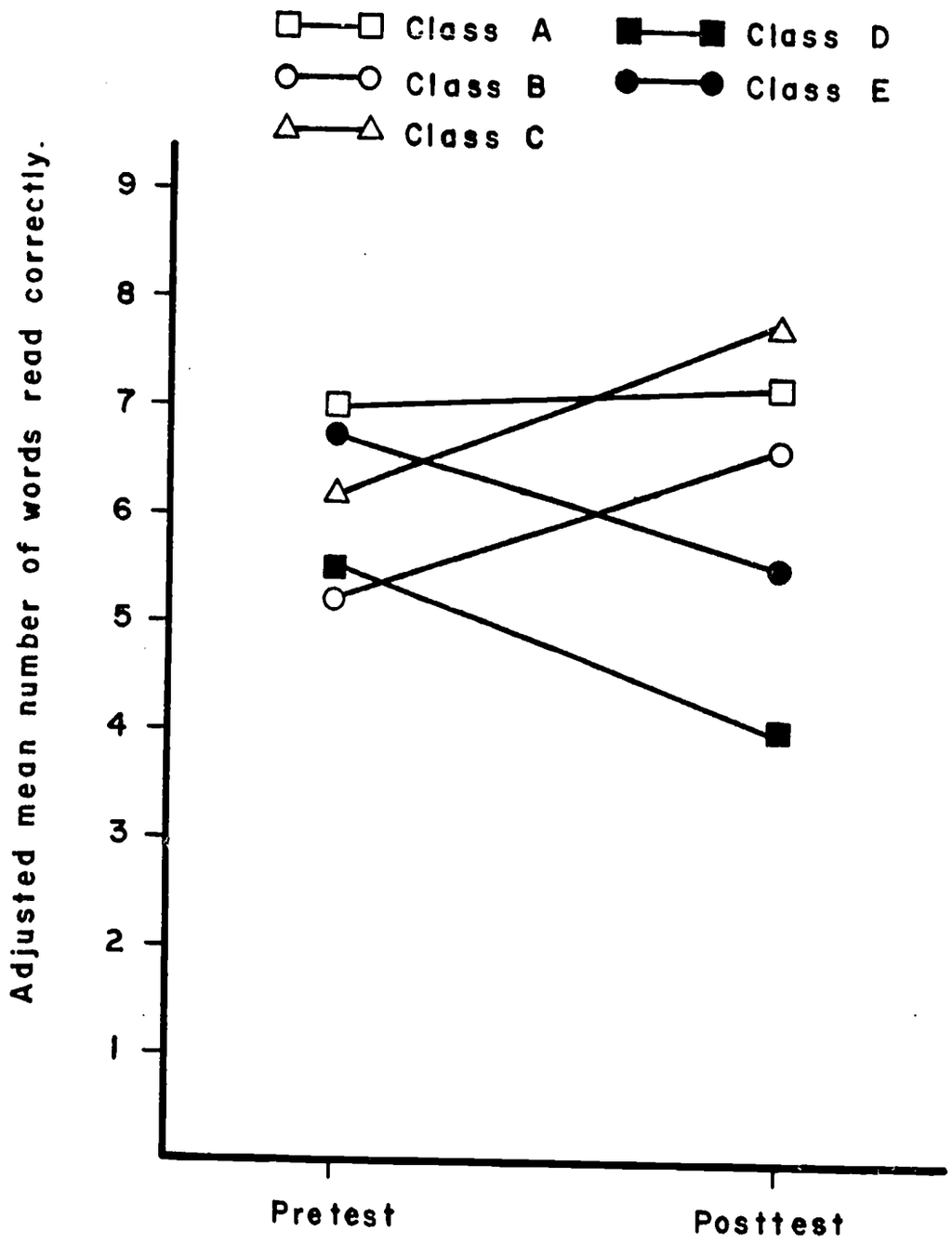


Fig. 18. High-associational and nonassociational adjusted mean reading scores for each class on the sentence comprehension test.

Table 35

Intercorrelation Matrix of Pre- and Posttest Training Words and Sentences

	train. pretest words	train. posttest words	train. pretest sent. recog.	train. posttest sent. recog.	train. pretest sent. comprehen.	train. posttest sent. comprehen.
training pretest words	1.00					
training posttest words	.86	1.00				
training pretest sentence recognition	.93	.84	1.00			
training posttest sentence recognition	.74	.87	.76	1.00		
training pretest sentence comprehension	.82	.76	.80	.69	1.00	
training posttest sentence comprehension	.81	.83	.81	.86	.82	1.00

Discussion

Sentence Recognition. It was predicted that those sentences that have the greatest associative sequential strength in each class would be read with greater accuracy than sentences showing no associational relationship. The hypothesis was based on the premise that both types of sentences would be used as reading material by the classroom teacher. The results for sentence reading indicated that although the effect of training was significant across all classes, there were no differences between high- and nonassociation sentences. Similarly when reading performance was adjusted or controlled statistically for initial pretest reading level, there were no significant effects on sentence recognition due to class effect or associational strength. It would appear, therefore, that sentence training was equally effective for high- and nonassociation sentences. It is important to note that reading performance on nontraining sentences did not change significantly over the course of the study (see Figure 8). Corresponding to the word data, this finding further testifies to the stability or reliability in the sentence stimuli. Inspection of Figure 8 indicates that the significant effect of training or teaching across classes was maintained during the week following training. Although the class and interaction effects were not significant, Figure 9 reveals that Classes A and C again contained a greater proportion of readers relative to the remaining three classes, as indicated by their ranking on the pre- and posttests. There was also a tendency for Classes A and C to demonstrate greater gains in sentence recognition relative to Classes B and D on the nonassociation sentences (Figure 12). However, Class E appeared to demonstrate the greatest learning relative

to the other four classes, especially on nonassociation sentences (see Figures 9 and 12). Nevertheless, these trends in the sentence data were not statistically significant. As with the word data it is clear that the results offer no support for the high-association position at the sentence recognition level.

Sentence Comprehension. It was predicted that those sentences that have the greatest associative sequential strength in each class will be better comprehended than those sentences showing no associational relationship. The results of the posttest performance of high- and nonassociation sentences indicated a significant interaction between the effect of classes and the associational strength of words. Within class differences were found between Classes D and E. Classes D and E were found to be superior in their reading performance of high-association sentences over nonassociation sentences. The other three classes did not perform differentially along this associative strength dimension. The finding for Classes D and E supported the prediction of greater reading comprehension on high- rather than nonassociation sentences. However, when posttest scores were statistically corrected or controlled for initial reading ability on comprehension, no within differences between the classes were revealed. Inspection of Figure 17 indicates that the learning curves of Classes A and C for nonassociation sentences were qualitatively different than those of the remaining classes, with the greatest gains occurring in Classes A and C. However, the absence of a significant class effect indicates that the class gain in comprehension performance following training was equally distributed across classes.

The differences in learning gradients shown in Figure 13 probably reflect chance differences.

It may be concluded on the basis of these results that the data offer no support for the high-association position at the sentence comprehension level.

Classroom Procedures and Observational Data

Anecdotal records of each lesson were made by an observer assigned to each class. There were three half-hour lessons for sight word instruction, each commencing at the same time each day and running for three consecutive days. A posttest was administered on the fourth day. The same procedure was followed for the sentence instruction period, with anecdotal records made of each lesson. A posttest of both sentence recognition and sentence comprehension was administered on the day following the third lesson. In addition, a tape-recording of the last sentence lesson was made in each class. The tapes were used to retrospectively analyze the cognitive transactions in each class.

The following reports are summaries of the anecdotal records of the classroom procedures used by each teacher.

Characteristics of Teaching Style and Lessons for Each Class. Summaries of Anecdotal Reports.

Class A

Class A was taught by a male student teacher, who was assigned on a full-time basis to Class A, and had been with the class for five weeks prior to the word learning. All instructions to the student teacher were relayed by the regular classroom teacher. During the course of the three lessons the regular teacher left and returned to the classroom intermittently. The regular teacher occasionally participated, mainly asserting his presence if there was some behavior he disapproved. The regular teacher is male and has approximately ten years regular elementary and three years Special Education experience.

In both the word- and sentence- learning lessons, an overhead projector was used, and in all cases the projector showed the complete stimulus lists each day, and in the same serial order. The primary technique used by the student teacher was to elicit the correct reading response to the word pair or sentence as it appeared on the overhead projector, and then to move serially down the list by calling on individuals or asking for group oral repetition of the word or sentence. The list was repeated successively during the entire course of the lesson with different children in groups or individually responding to the visual stimulus.

Most of the total lesson time was given to visual memory and auditory memory drill and repetition. There was one written exercise given on the last day of the word pair lessons, in which pupils were

asked to trace word pairs by connecting dashes on a work sheet. There were two written exercises during the sentence lessons. On the second day a ditto showing the 20 nouns from the training sentences and illustrations of the nouns was used as an individual seatwork exercise. Pupils were asked to match the picture with the word and the student teacher assisted pupils individually. On the last session of the sentence lessons a worksheet with the ten sentences written in broken lines was used. After the pupils completed tracing all the words, they came forward and read the list to the teacher, who assisted them with words they did not know. Only six pupils got to read their lists to the teacher before the lesson time was up. Massed and repeated visual, perceptual, and auditory memory drill characterized most of the lessons. The inexperience of the student teacher manifested itself in the exacerbation of behavior problems (primarily lack of attention to lesson). There was much verbal threat and imposition of sanctions as the teacher attempted to manage and control the class.

It appeared that minimal preparation time was expended by the student teacher. The drill format supplied the basic structure for the lessons and as such required little effort.

Class B

The teacher is female, first year Special Education teacher with no other teaching experience. The classroom is devoid of decoration, bulletin boards, or any evidence of activity or materials. There was very scant evidence of planning for the first word lesson. The mode of presentation was to display the word pairs on cards, read the words and ask the pupils to repeat them. After the initial word identification, pupils or group were asked to locate and read the words when shown. The children were then asked to make up sentences (orally) using both words. During the last half of the lesson, pupils copied the word pairs from the board. In the second session, there was a flash card presentation for word recall. A seatwork exercise followed. The teacher placed pairs of words on an overhead projector and the pupils were required to locate and circle the same pair on a worksheet containing the ten pairs. The last session was mainly drill and repetition of flashed word pairs. The pupils were also given a sheet of paper and asked to illustrate the word pairs, i.e., "bird - fly," "draw bird flying," etc. None of the pupils completed the exercise or made more than one or two drawings before the papers were collected.

The sentence lessons followed the same format but with sentences written on the board only. On the last day, a mimeo with sentences lettered in dashes was used. The teacher read a sentence and the pupils traced the dotted lines in the proper sentence. The most marked characteristics identified by the observer were the tense atmosphere in the classroom, and a persistence of negative, punitive, and sarcastic attitudes toward the pupils. The visual (sight word) memory of words

and sentences was stressed throughout the lessons, with some attempt at sentence mediation in the word pairs.

The observer saw little evidence of preparation to teach and reported that on the first day of the lessons the teacher spent time making word cards while children sat and waited.

Class C

The teacher is female, with three years of Special Education experience. The room is well equipped, with bulletin boards and materials showing several ongoing classroom projects. There was evidence of elaborate preparation to teach words and sentences. In the word lessons, a tape recorder and six headsets were used, and taped instructions (reading and writing exercises) were coordinated with a teacher-prepared workbook. These were used during the first and second days of instruction. Also, a teacher-made word bingo game was prepared, consisting of the 20 training words printed on squares of a sheet of construction paper. The game was played as review exercise, on the last day.

There was similarly great material preparation in teaching the sentences. Identification of words and sentences were coordinated with workbook exercises. The sentences taught the first day were tested by means of multiple choice identification. Children were required to identify the correct sentence from a group of three similar sentences. The workbook exercises were accumulated into individual booklets of sentences and illustrations.

The observer reported an easy rapport between teacher and pupils, with no interruption of any of the sessions for discipline or behavior problems.

The teaching method employed involved visual memory, auditory memory and sentential mediation of word pairs as well as concurrent auditory and perceptual-motor tasks.

Class D

The teacher is female, with two years of Special Education teaching experience. The class is in a large, new, well-illuminated room. It is pleasantly decorated with posters and the children's art work. The class was divided in half for the lessons, with half the class participating at one time, while the rest were at their own seats and at other tasks. The teacher had done considerable preparation for both the word and sentence lessons. For the word lesson, each pupil was supplied with a set of word pair cards. The word pairs were also presented on a chart and worksheet, with words and illustrations. The major method employed was sight word repetition in game form. On the second day the teacher had word pairs incorporated into sentences and printed on an experience chart. A game format was consistently employed to elicit identification of words. Worksheets were used on the second and third days. Word pairs were written on the chalk board, and the individual words, incorporated into sentences, were on a chart. A match-word card game was used on the last day.

The chalk board and experience chart were used for sentence lessons. Sentences on the board had colored chalk cues, with content words in red, the rest in white. The teacher tested the group on sentences by asking the pupils to supply nouns that go with a given verb. The pupils wrote the sentences taught each day and reviewed the sentences by playing games such as word-matching, guessing, taking turns at the board, or being "teacher." In a final review, all words were elicited in an auditory memory exercise.

Class E

The teacher is female with two years of elementary education experience. She is currently in her first year of Special Education teaching. The classroom is pleasant, and neatly decorated, with the children's art work on display. The children were seated around a common table. The look-say method of word identification was used with occasional attention given to phonic analysis. Word pairs and the pupils' names were written on the board. A correct response resulted in the drawing of a circle next to the pupil's name. On the second and third days a correct response was rewarded by finishing the circle so that it became a smiling face. The seatwork exercise required the pupils to match words to illustrations, and to write individual words twice.

In teaching sentences, the look-say method with some phonic analysis was used. Illustrations of sentences as well as the training sentences were taped to the chalkboard. Drill and attention to individual words were stressed. The observer reported that a good relationship between the teacher and pupils was apparent, and that the teacher was well prepared for the lessons and communicated her enthusiasm to the class.

Techniques of Teaching

Both the descriptive chart of classroom structure, (Appendix pp. 147-149) and the anecdotal summaries yield little that would quantitatively distinguish each class. All of the teachers approach the problem of teaching the word pairs and the ten sentences by presenting the materials visually, with varied degrees of auditory cue assistance, so that a visual-auditory association with the perceptual configuration of the word or sentence is made. In three classes (C, D and E) sentential mediation and association were used in word pair training. In Class C, sentence mediation was used in a variety of situations: via tape recorder, in a teacher-made workbook (requiring association of written exercises and pictoral illustration) as well as on the chalk board and orally. The use of multiple sense modalities in the presentation and drill of stimulus materials distinguished Class C from the other four classes. Classes D and E were closest to Class C in variation of presentation. There was greater use of word games in Classes D and E, and teacher E employed extrinsic reward as a motivator.

Teacher B used techniques similar to those in Classes D and E (i.e., verbal-auditory association to visual configuration of word pairs and sentence mediation of words). In Class B, sentences were elicited from the students, while in the other classes sentences were supplied by the teacher. The extended preparation of sentence mediators in Class C (workbook exercise and taped instructions) is qualitatively greater than similar preparation involved in Classes D and E, where word pairs were also embedded in sentences as a means of word pair presentation. The sentences used in Class D were printed on an experience chart.

These three classes contrast sharply with Class B, where the sentential mediation was elicited from the class rather than preplanned, and there was little variation in the presentation of the materials. However, Class A showed the least variety of presentation. All lessons in this class followed a similar format, the major stress being on visual memory of word pairs and sentences. The items were presented serially as visual stimuli and an unvarying repetition of verbal association of the word-sentence to a visual stimulus constituted the main body of the lesson.

Classroom Climate

Classes C, D and E were distinguished from Classes A and B in that observers reported a warm, positive, accepting emotional climate in the classroom. Most tension and negativism was manifest in Class B. Class A showed similar negativism, but it was not as marked as in Class B.

Table 36 lists categories of traits and activities taken from Barr and Burton (1931), An Introduction to Classroom Supervision. The pattern of observer ranking maintains the previously described split between Classes A and B (both of whom ranked below the median in almost all categories) and Classes C, D and E, all of whom ranked above.

The ranking of teaching by the observer on a set of selected items from the Stanford Teacher Competence Appraisal Guide yielded mean rank scores for each teacher. The grouping by observer appraisal was consistent with previous observations: Class C ranked highest followed by E and D, with A and B ranking lowest. See Table 37.

Classroom Verbal Interaction

An analysis of cognitive demands, which used the Lynch Individual Cognitive Demand Schedule (1971) was taken from a 20 minute segment of each tape recording made during the third sentence lesson.

There is great variation in the total number of cognitive demands made by each teacher. The greater number of interactions in Classes A, D and E is indicative of the greater verbal involvement and teacher direction in all phases of the lesson. The very low number of transactions in Class B would indicate less teacher direction and involvement in the lesson. Class C, which on all previous measures ranked highest, was found to have an intermediate number of interactions. This was explained as a reflection of the amount of time devoted to individual seatwork exercises, with more pupil self-direction and consequently fewer interactions. It is interesting to contrast the low number of interactions in Class C with those in Class B. Most of Class B's interactions were classified as low level, whereas 19% of Class C's interactions fell in the high-level demands classification. There were many more high-level demands in Classes D and E but since there were so many more teacher-pupil transactions, they (the higher-level demands) reflected only 9 to 10% of all demands in those two classes. The pattern in Class A is unambiguous, with almost the total number of interactions falling in category two (observing-discrimination). This reflects the pattern of repetitions and drill which constituted the substance of the lessons in that class.

Table 36[1]

	poor 1	fair 2	aver. 3	good 4	excel. 5
general appearance		B		A,D	C,E
appearance of room	B		A,D		C,E
preparation		A,B		D	C,E
definiteness of aim		B		A,C,D	E
skill in assignment		A,B		D	C,E
drill			A,B	D,E	C
organization of subject matter	A	B		D	C,E
originality	A	B	D	E	C
skill in motivating work	A,B		D		C,E
teaching ability	A,B			D	C,E
enthusiasm	B	A		D	C,E
sincerity	B	A		D	C,E
sense of humor	A,B			D	C,E
interest in work	B	A		D	C,E
cheerfulness	B	A			C,D,E
understanding of children		A,B		D	C,E
attention to individual needs	A,B		D		C,E
classroom management		A	B	D,E	C
class discipline		A	B	D,E	C
self discipline		A,B		D	C,E

[1]Traits and Activities Occuring with a frequency of five or more in 209 rating scales. In: An Introduction to the Scientific Study of Classroom Supervision, Barr, A. S. and Burton, W. M. (Eds.), D. Appleton and Co., New York, 1931, Table 49, pp. 330-333.

Table 37

Selected Items from Stanford Teacher Competence Appraisal Guide[1]

	Class	A	B	C	D	E
1.	Clarity of Aims	5	3	7	5	5
2.	Organization of Lesson	3	3	5	5	5
3.	Selection of Material	3	3	7	5	6
4.	Selection of Content	1	3	6	5	6
5.	Beginning of Lesson	5	1	6	6	6
6.	Pacing of Lesson	2	1	4	5	5
7.	Pupil Attention and Participation	4	2	7	6	6
8.	Ending the Lesson	1	1	0	5	6
9.	Teacher-pupil Rapport	2	1	7	7	7
10.	Variety of Evaluative Procedures	1	1	7	4	7
	Σ =	27	18	56	53	59
	Mean Rating[2] $\bar{X}$ =	2.7	1.8	6.2	5.3	5.9

[1]SCALE
0 = unable to observe
1 = weak
2 = below average
3 = average
4 = strong
5 = superior
6 = outstanding
7 = truly exceptional

[2]Rank order of classes from high to low: Class C, E, D, A and B.

Table 38

Lynch-Cognitive Demand Schedule

Total # Interchanges Recorded per 20 Min.	74	15	43	73	89
Teacher Name	A	B	C	D	E
TEACHER COGNITIVE DEMANDS					
Total # Cognitive Demands	73	15	42	72	88
LOWER LEVEL DEMANDS					
#1 - Routine Responding Ex: Repeat after me, say the word, etc.	0	2	1	1	10
#2 - Observing/Discriminating Ex: Find/Read the word/sound/letter/ Point to.	71	1	10	41	42
#3 - Chaining Ex: Read a sentence/Spell/Write a word.	2	10	14	10	24
#4 - Informing Ex: Give learned information/ Tell about past events.	0	0	9	10	3
#5 - Explaining Ex: How, Why, What is the reason for...	0	0	0	3	1
#6 - Classifying Ex: What is a...? What does...mean? What is an example of...?	0	0	0	5	4
#7 - Relating Ex: How is that different from/like...? Compare...?	0	0	0	0	0
HIGHER LEVEL DEMANDS					
#8 - Inferring Ex: What do you think/suppose...? What happens if...?	0	0	0	0	0
#9 - Imagining Ex: What would you do if...? What would it be like if...?	0	0	1	0	0
#10 - Evaluating Ex: Which was better? Give me your opinion of...	0	0	1	2	0
#11 - Problem Solving Ex: How else could we find out?	0	0	0	0	0
#12 - Reviewing Ex: What did you have for the answer? Read the sentence and fill the blank	0	0	3	0	0
#13 - Clarification Ex: Are you sure? What do you mean? The what?	0	2	3	0	4
PUPIL RESPONSES					
Total Number of Responses Made (included pupil initiated)	67	15	41	67	84
Number of unanswered Cognitive Demands	7	0	2	6	5
Number of Pupil Initiated Interchanges/ Comments Recognized by Teaching	1	0	1	1	1
Do Pupil Responses Follow Same Categories of Teacher Cognitive Demands	Yes 100%	Yes 100%	Yes 100%	Yes 100%	Yes 100%
TEACHER FEEDBACK					
Number of Instances of Teacher Feedback	63	5	28	62	51
Number Positive Feedback Responses Teacher Indicates Pupil Response Acceptable/Correct	53	0	10	38	19
Number Negative Feedback Responses Teacher Indicates Inadequate/Incorrect Response	1	0	0	1	3
Number Instances Where Information Given Any Other Feedback Inc. + or - w/Emotion Shown	9	5	18	23	29

Discussion

Several conclusions appear warranted from the observational data reported. First, the two classes (A and C) which showed the greatest gain after sight word training and were thus distinctly different in achievement when compared to the three remaining classes, were in no way similar when classroom instructional variables were compared. The observer rankings (Tables 36 and 37) showed Classes A and C to be at opposite ends of the teacher appraisal measures. Class C was consistently ranked superior to all other classes and Class A fell below average on the two scales of teaching appraisal. It should be noted that Class A was not ranked the lowest of the five classes, since in all instances, Class B was rated below Class A, whereas Class C consistently received the highest ratings.

On measures of classroom climate (positive atmosphere, teacher warmth and acceptance), Class C could not be differentiated from Classes D and E (both non-gain classes). All three of the classes (C, D and E) ranked high on these measures. Within the range of climate observable in the five classes, positive classroom climate alone could not account for gain. Classes A and C (high gain) were again on opposite ends of the scale on climate variables.

Much of the superior rating attributed to Class C was due to the amount of material preparation and the variety of teaching methods used by the teacher. In contrast, Class A evidenced only minimal preparation of instructional materials. Since both classes evidenced gain but gross measures of teaching style indicate that they greatly differed, it may be interesting to speculate on those elements they exhibit in common,

contrasted with the three classes that failed to show any gain after instruction.

Most characteristic of Class A was a pattern of drill and repetition. The Class A teacher was involved directly in class activity the entire time allotted to instruction. Massed repetition by learners, consistent evocation, and monitoring of responses appeared to demand and sustain the pupils' attention to the materials. The observer reported pupils' spontaneous statements to the effect that they were "tired" or "bored," and concluded that attention was reluctant. Nevertheless the implicit demand for attention that rapid drill requires as well as the threat of sanctions for inattention kept the class focused on the drill. Another salient characteristic of drill is that it focuses on the stimulus elements entirely. There are no extraneous materials introduced, little "enrichment" or attempt to relate the materials to other activities or experiences. The activities described might best be related to gain in light of the singularity of purpose exhibited by teacher A. The business-like, purposeful and delimited presentation of materials is similar to the description of "clarity" by Rosenshine (1971), who concluded that teachers who rated high in clarity spend less time interpreting course material. Similarly, Wright and Nuthall (1970) found that teacher "utterances" containing one question were positively related to achievement, whereas utterances with two or more questions or teacher information following a question were each negatively related to achievement.

Class C must also rate high on clarity and its constituent elements. For although this class is distinguished by its great variety of

presentation of materials, the variety forms a cohesive, teacher-directed set of materials that encourages pupils to focus on stimulus materials. While there were fewer teacher directed verbal interchanges in this class when compared to A, there was control and specific direction by the teacher in the form of tape-recorded directions and emphasis on completion of written assignments. These were also highly structured, unambiguous assignments.

It is much more difficult to account for the non-gain in Classes D and E. However, when clarity of purpose and direct teacher intervention through structuring materials or specific focusing on task is inferred from the data available, it appears that these two classes exhibited more diffusion of effort, and engaged in more efforts to explain and classify the materials.

CONCLUSIONS AND IMPLICATIONS

One of the most persistent problems in the education of EMR children is that of effective reading instruction. Unfortunately, most EMR programs report failure in efforts to have pupils read at levels commensurate with ability. Over the years, therefore, much attention has been focused on the search for a method of teaching that would be truly effective. However, there seems to be no definite support for asserting the superiority of one method over another. The present project sought to verify certain psycholinguistic principles and to demonstrate the practicality of applying them in the special classroom. It was hypothesized that the acquisition of reading skills can be facilitated by the incorporation of natural language forms and habits of the learner into reading materials. Hence, the actual language and usage of the learner should provide the basis for the selection of words and sentences for teaching reading. This approach should maximize the child's opportunity to develop efficient habits of forming and testing hypotheses during the reading process.

Phase I of the project sought to demonstrate the practicality of gathering a data base of words, sentence and inter-sentence associations as a basis for a thesaurus of words, sentences and connected discourse, derived from the associational habits of a given EMR class or group of classes. A discussion of this phase of the project may be found in a previous section of this report. It is recalled that the results of

the collection of both word-association and sentence-association responses indicated that a substantial number of the stimulus words and sentences yielded a high degree of response commonality. Based on these results it was concluded that on a free word-association task EMR pupils as a group will reveal commonality of associational responses. Furthermore EMR pupils will give common associative responses to sequentially constrained stimuli within a sentence. However, the evidence did not support the hypothesis that EMR pupils' sentential responses to stimulus sentences will yield response commonality. In addition, the tedious clerical details involved in tabulating class norms, suggests that it is an impractical basis for a classroom method. Alternative sources of word-association norms have to be used in the construction of teacher-made reading materials.

Phase II, the training phase of the project, had as its major purpose the demonstration of the facilitative effect of reading materials that reflect the normative proclivities of EMR pupils. The group of high-frequency associations collected in Phase I became the basis of the second phase of the project, i.e., the use of high-association pairs in sight vocabulary lessons, and high sentence-associations for sentence reading instruction. A discussion of this phase of the project may be found in a previous section of the report. It is recalled that the data offer no support for the high-association position at the word level. On the contrary, the data offer some support for the opposite point of view. There was some evidence that nonassociation word pairs may be read with greater accuracy than high-association words. Moreover, as with the word data it is clear that the results offer no

support for the facilitative effect of high-associations on pupils' gain in reading at both the sentence recognition level or the sentence comprehension level.

Although high-associations at the word and sentence level failed to show a relationship to reading gain, there was differential reading gain between classes. Greatest gains were obtained in two of the five classes in the study. The observational data obtained revealed that teaching style, classroom climate, and amount of teacher preparation of instructural materials in each of the two high-gain classes were substantially different in each class. An explanation of gain due to teacher effectiveness would entail a more systematic study of the variables involved in teaching and cannot be reasonably inferred from a study of the effect of the associational nature of instructional materials.

Most special education classes today use variations of a basic phonic analysis approach (Woodcock & Dunn, 1966). In this respect, the five classes in the present study were typical. All of the teachers used one of two analytic techniques, or a combination of both. In some cases (whole word, sight vocabulary approach) the words were taught and the phonic relationships were induced or discovered by the learners. In the other instances (phonic-centered approach), the phonic relationships were taught and words were synthesized by the learner.

Both of these methods take the word as the basic unit of reading. The difference between them lies in the teacher's orientation toward the initial stage of reading. Whether the teacher begins with phonics

training and teaches the learners to generate the whole word from a phonic analysis, or whether instruction commences with the whole word and then requires pupils to induce the phonetic constituents, the word remains the basic unit of reading. Neither of these methods attends to the communicative nature of reading. Neither method is addressed to the relevance of linguistic context (semantic and syntactic relationships) in determining word perception (Kohlers, 1969) and comprehension (Goodman, 1969).

Goodman (1969) calls for shifting the focus from words to comprehension strategies, and for the avoidance of the teaching of words in isolation wherever possible. "Children learning to read should see words always as units of larger, meaningful units. In that way they can use the correspondences between oral and written English within the semantic and syntactic contents."

It is apparent that the use of either of these approaches to reading predisposes the learner to attend to the segmental units involved. Sentences and word pairs that are based on the semantic and associative features of language will not facilitate learning unless there is a set or training for attention to this feature. The predisposition and set for a perceptual-analytic approach to words and sentences will militate against use of normal language ability that comprehension requires. This appears to be true even when the materials used (as in the present study) approximate the normal usage and associative organization of the learner.

It appears that for associative proclivities of learners to be useful in enhancing their acquisition of reading skills, they must be

taught to attend to the associative (semantic) properties of word pairs and the associative constraints implicit in high-association sentences.

There is some evidence that most children below the age of eight years are not aware of associative or semantic properties of word pairs (McNeill, 1970). In fact, several investigators (Brown & Berko, 1960; Entwisle, 1966; Entwisle, Forsyth, & Muuss, 1964; and Erwin, 1961) have demonstrated that as young children develop linguistically, somewhere between the ages of six and eight years there is a progressive change in the nature of their free word-associations (W-As). These investigators found that children's W-As shift from "syntagmatic" or sequential associates (e.g., dog-bark, red-apple) to associations falling within the same grammatical form class as the stimulus - "paradigmatic" associates (e.g., dog-cat, red-black). McNeill (1970) reported that six- and seven-year-olds often reveal anomalous W-As which are syntactically possible but semantically anomalous (e.g., "fast-shout"). The reader will recall that in the present study, the nonassociation word pairs used in the study of sight word instruction were precisely of this form.

McNeill (1966, 1970) posited a "semantic" explanation for the paradigmatic shift phenomenon. He contended that the paradigmatic shift "results from adding sufficient numbers of features so that the minimal contrast for any word will always be within the boundaries of the word's major grammatical class" (McNeill, 1966, p. 556). Features in this quotation refer to semantic features, which are descriptive aspects or characteristics of words which presumably separate classes of words from each other and help children form definitions of words (e.g., "bird" helps identify sparrow). In other words, the paradigmatic

shift would result from a semantic consolidation process, occuring between the ages of six and eight years, where the child sequentially acquires a number of discriminating features of words and adds new words into his lexicon or "word dictionary." Anderson and Beh (1968) reported considerable data which are consistent with McNeill's position. If McNeill is correct, his theory could perhaps offer a possible explanation as to why the data in the present study offered no support for the high-association position at the word level. According to McNeill (1970) a child may have a given word in his vocabulary, but if he has not yet formed a sufficient semantic network around it, it is limited to a few properties or associations. As a result, such a child could accept grammatical combinations of word-associations that an older child with a more sophisticated lexicon would regard as anomalous (e.g., soft-wall).

Similarly at the sentence level, McNeill (1970) provides evidence which indicates that the paradigmatic shift takes place at the same period of time (i.e., six to eight years) at which children are able to distinguish between anomalous sentences (e.g., "wild elevators shoot ticking restaurants") and fully grammatical sentences (e.g., "wild Indians shoot running buffaloes"). He also demonstrates that five-year-old children are less able than eight-year-olds to recall and take advantage of semantic consistency in sentences. In addition, five-year-olds find fully grammatical sentences only slightly superior to anomalous sentences. Based on this evidence, it is possible to hypothesize a similar "semantic" explanation to account for the findings of the present study at the sentence level. The results revealed that in each class sentences that had the greatest

associative sequential strength were not read with greater accuracy nor better comprehended than essentially "anomalous" sentences (e.g., The lion cleaned the cheese.) showing no associational relationship. One could again speculate that as the majority of EMRs in the study had mental ages below eight years, they could not adequately discriminate between the high- and nonassociation sentences. The hypothesis is interesting and probably deserves further study. It should be noted that the period of six to eight years of age in the child's development is the age at which several other cognitive changes are noted to occur in the child's learning behavior, (cf. White, 1965).

The hypothetical semantic features (or markers) mentioned above are further thought to provide an "efficient combinatorial organization for verbal memory" (Anderson & Beh, 1968, p. 1050). Anderson and Beh suggested that the paradigmatic shift not only represents the acquisition of a tendency to match semantic features or markers in recall, but also accompanies an increase in "storage efficiency." McNeill (1970) summarizes Anderson's and Beh's position as suggesting "that syntagmatic associations reflect a basically different and less efficient principle or organization of a child's lexicon than do paradigmatic associations" (McNeill, 1970, p. 1123).

Semmel et al., (1968) and Sitko (1970) found that on a free W-A task EMR children gave fewer paradigmatic responses than normal children of the same CA. Based on the above line of thinking, it is possible that EMR children, relative to normal children of the same CA, fail to acquire a sufficient number of contrasted semantic features of words. This failure may therefore limit their ability to organize or recode linguistic

units into hierarchical classes. It would be relatively more difficult for retarded children to chunk or recode verbal stimuli since they would tend to have much broader semantic classes than normal children.

Research by Semmel and his associates (Agard, 1971; Semmel, 1967, 1969; Semmel, Barritt, & Bennett, 1970; Semmel, Barritt, Bennett, & Perfetti, 1968; Semmel & Bennett, 1970; Herzog, 1968; Sitko, 1970) has provided considerable evidence which suggests that there is a qualitative difference in the organizational strategies used by EMR and nonretarded children in processing verbal stimuli. According to Semmel, EMR children use primarily "sequential-associative" strategies in processing language, while "hierarchical" and "sequential-associative" strategies seem to be synchronized in nonretarded children. Of the two, sequential-associative strategies are relatively more primitive since they develop as the child experiences associations between linguistic units in a language environment. Hierarchical-grammatical and -semantic strategies are more abstract, frequently taking the form of rules governing the permissible relationships between linguistic units. Because the generality of such strategies makes them more powerful tools for generating and processing language, they are probably related to more proficient language behavior than are sequential-associative strategies. In addition to providing evidence for a qualitative difference between the organizational strategies of EMR and nonretarded children, Semmel and his colleagues provide additional evidence (Semmel et al., 1967; Sitko & Semmel, 1972) which suggests that EMR children probably have the ability to recode linguistic units into hierarchical components when prompted. Unlike nonretarded children who tend to avail themselves of this competence naturally, EMR children

fail to reveal these tendencies. They apparently rely on simple associative cues between linguistic units rather than on hierarchical organizers when processing verbal stimuli.

Assuming the validity of the above line of thinking, it appears reasonable to contend that the difficulty experienced by retarded Ss in reading comprehension and perhaps in other classroom activities may be due to a basic inability to organize verbal materials. Bilsky and Evans (1970) have presented evidence which supports this contention. With respect to the present study we would also contend that the high-association reading materials which were based on the oral language associations or habits of the children in the sample did not provide powerful enough associative cues to facilitate organization and reading performance by that group. We would further argue that at least at the sentence recognition and comprehension level, a certain amount or level of hierarchical organizational ability may be required before associative or semantic cues can be most effective in facilitating reading performance. In line with McNeill's thinking discussed above, it is reasonable to suggest that children who function at a primitive, sequential-associative organizational level are unable to distinguish adequately or to discriminate high and low or anomalous words and sentences in a reading performance situation, when compared with children who use primarily "hierarchical" strategies in processing language.

It would seem logical therefore to contend that modifying relatively inefficient sequential-associative strategies in the direction of more hierarchical rule-governed strategies will result in greater

academic success for EMR children, particularly with respect to initial reading performance.

Evans (1970) has suggested that a certain level of organizational ability may be required for the development of reading comprehension ability. Bilsky and Evans (1970) argued that in order to significantly improve reading comprehension performance, it would probably be necessary to establish "somewhat stable tendencies for individuals to organize incoming verbal materials" (p. 775). Bilsky and Evans further suggested that it may be possible to increase the "effectiveness" of organizational skills in mentally retarded individuals. Ryan and Semmel (1969) have emphasized the importance of language-processing strategies in beginning and mature reading. They suggested that the beginning reader should be encouraged to develop appropriate high-order language strategies. Emphasis should be focused on "conceptual" aspects of reading rather than on "perceptual" aspects and relations, or on single words. In an extensive review and investigation of organizational strategies of EMR and nonretarded children, Sitko (1970) concluded that teachers may be able to improve storage and/or retrieval of information in retarded children and make information more "accessible" in secondary memory by presenting stimulus materials in a highly organized manner. Similarly, in a recent dissertation, Agard (1971) stressed the need to develop techniques which alleviate input organization deficiencies of retarded children. Her results also suggested that the underlying "competencies" for the development of hierarchical organization in retarded children "are present but are not being used."

The reader will recall that the present study is actually part of a larger developmental project which seeks to lay the groundwork for a psycholinguistically based reading program that can be used by the classroom teacher in preparing reading materials for EMR classes. Nevertheless, a major goal of the present study was to demonstrate the facilitative effect of reading materials that reflect the associative proclivities of EMR children. On the basis of the results at both word and sentence levels, it may be concluded the data offered no direct support for the high-associative position at either reading level. An eventual goal of the project is the development of activities and games that encourage pupils to attend to and to use relevant linguistic organizational strategies which take advantage of the familiar structure of reading materials.

The equivocal results of the present study notwithstanding, the argument for a language-based reading program remains persuasive. It is our contention that research and program development focusing on an earlier level of language development will, in the long run, be most fruitful. A test of the hypothesis that high-frequency associates facilitate the acquisition of reading skills should, ideally, involve children who have not been exposed to other instructional methods. The set for reading generated by phonic-analytic instruction appears to mitigate the pupils' attention to the meaning of the written text. It divorces the reading process from the natural language process and thus hampers the acquisition of reading skills.

Children, particularly EMR's and slow learners, who have been exposed to phonic/analytic methods of instruction from the outset of

their school careers, will experience difficulty in relating to the printed word as anything but a series of symbols to be literally "read." "Read" is in this sense the literal, oral pronunciation of a string of phonemes. The child does not process these utterances as he would normally process and interpret oral language.

Equally as critical with EMR and slow learning children, however, is the development of a pre-reading program designed to improve associative and language organization skills. It is from such a base of organizational, classificatory language skills that one can build a reading program centered around materials that facilitate the pupils' learning to read in a fashion which approximates the ease by which the oral language skills were originally acquired.

References

Agard, J. A. Training conceptual organization in retarded children. Unpublished doctoral dissertation, University of Michigan, 1971.

Anderson, S. W., & Beh, W. The reorganization of verbal memory in childhood. Journal of Verbal Learning and Verbal Behavior, 1968, 7, 1049-1053.

Ashton-Warner, S. Teacher. New York: Bantam Books, 1963.

Barr, A. S., & Burton, W. M. (Eds.), An Introduction to the Scientific Study of Classroom Supervision. New York: Appleton and Co., 1931.

Bhussry, R. (Ed.), Developmental curriculum, children with learning disabilities, retarded mental development, educable. Montgomery County Board of Education. Rockville, Md.: Summer Workshop, 1960.

Bilsky, L., & Evans, R. A. Use of associative clustering technique in the study of reading disability: Effects of list organization. American Journal of Mental Deficiency, 1970, 74, 771-776.

Borreca, F. A., Burgar, R., Goldstein, I., & Simches, R. A functional core vocabulary for slow learners. American Journal of Mental Deficiency, 1953, 58, 273-300.

Brown, A., & Berko, J. Word association and the acquisition of grammar. Child Development, 1960, 31, 1-14.

Chomsky, N. Aspects of the theory of syntax. Cambridge: MIT Press, 1965.

Cofer, C. N. Comparison of word associations obtained by the methods of discrete single word and continued association. Psychology Reports, 1958, 4, 507-510.

Dunn, L. M. A comparison of the reading processes of mentally retarded boys of the same mental age. In L. M. Dunn, & P. J. Capobianco (Eds.), Studies of Reading and Arithmetic in Mentally Retarded Boys. Society for Research in Child Development. 1954, monograph.

Dykstra, R. Summary of the second grade phase of the cooperative research program in primary reading instruction. Reading Research Quarterly, 1968, 4, 49-70.

Entwisle, D. R. Children's word associations. Baltimore: The Johns Hopkins Press, 1966.

Entwisle, D. R., Forsyth, D. F., & Muuss, R. The syntactic-paradigmatic shift in children's word associations. Journal of Verbal Learning and Verbal Behavior, 1964, 3, 19-29.

Erwin, S. M. Changes with age in the verbal determinant of word associations. American Journal of Psychology, 1961, 74, 361-372.

Evans, R. A. Use of associative clustering technique in the study of reading disability: Effects of presentation mode. American Journal of Mental Deficiency, 1970, 74, 765-770.

Fry, E. Comparison of beginning reading with ITA, DMS and TO, after three years. The Reading Teacher, 1969, 22, 357-362.

Gallagher, J. W., Baumeister, A. A., & Patterson, G. A. Word association norms for institutionalized retarded, noninstitutionalized retarded and normal children. Research Bulletin, Department of Psychology, University of Alabama. University, Alabama, 1970.

Gorjuoy, I. R., & Winters, P. J. Word Association Norms: Adolescent Retardates. Johnstore Training and Research Center. Bordentown, N. J.: 1969.

Goodman, K. S. Words and Morphemes in Reading. In K. S. Goodman & J. T. Fleming (Eds.), Psycholinguistics and the teaching of reading. International Reading Association. Newark, Delaware: 1969.

Goodman, K. S. Reading a psycholinguistic guessing game. Journal of the Reading Specialist, 1967, 4, 126-135.

Groelle, M. C. Reading Survey Tests Given to Educable Mentally Retarded Children. Exceptional Children, 1961, 27, 443-448.

Hayes, R. B., & Wuest, R. C. A three year look at ITA, Lippincott, phonics and word power, and Scott Foresman. The Reading Teacher, 1969, 22, 363-370.

Herzog, B. H. Associative grouping strategies among educable mentally retarded and normal boys. Unpublished doctoral dissertation, University of Michigan, 1968.

Horan, E. Word-association frequency tables of mentally retarded children. Journal of Consulting Psychology, 1956, 20, 22.

Horton, D. L., Marlowe, D., & Crowne, D. P. The effect of instructional set and need for social approval on commonality of word association responses. Journal of Abnormal Social Psychology, 1963, 66, 67-72.

Jenkins, J. P. Effects on word-association of the set to give popular responses. Psychological Reports, 1959, 5, 94.

Jenkins, J. J., & Russell, W. A. Systematic changes in word association norms, 1910-1952. Journal of Abnormal Social Psychology, 1960, 60, 293-304.

Kent, G. H., & Rosanoff, A. J. A study of association in insanity. American Journal of Insanity, 1910, 67, 37-96, 317-390.

Kirk, S. A., & Johnson, G. O. Educating the retarded child. Boston: Houghton-Mifflin, 1940.

Kohlers, P. A. Reading is only incidentally visual. In K. S. Goodman & J. T. Fleming (Eds.), Psycholinguistics and the teaching of reading. International Reading Association. Newark, Delaware: 1969.

Kohlers, P. A. Three stages of reading. In J. Levin & J. Williams (Eds.), Basic Studies on Reading. New York: Harper & Row, 1970.

Lee, D. M., & Allen, P. V. Learning to read through experience. New York: Appleton-Century-Crofts, 1963.

Lefevre, C. A. Linguistics and the teaching of reading. New York: McGraw-Hill, 1964.

Lynch, W. C., & Ames. C. Individual Cognitive Demand Schedule. (Mimeo) Center for Innovation in Teaching the Handicapped. Indiana University, Bloomington, Indiana, 1971.

McNeill, D. A study of word association. Journal of Verbal Learning and verbal Behavior, 1966, 5, 548-557.

McNeill, D. The development of language. In P. H. Mussen (Ed.), Carmichael's manual of child psychology, Vol. 1, New York: John Wiley, 1970. Pp. 1061-1161.

Neisser, U. Cognitive Psychology. New York: Appleton-Century-Croft, 1967.

Noble, C. E. An analysis of meaning. Psychological Review, 1952, 59, 421-430.

Oaken, R., Wiener, M., & Cromer, W. Identification, organization, and reading comprehension for good and poor readers. Journal of Educational Psychology, 1971, 62, (1), 71-78.

Palermo, D. S., & Jenkins, J. J. Oral word association norms for children in grades one through four. Research Bulletin, No. 60., Department of Psychology, Penn State University, University Park, Penn., 1966.

Rosenberg, S. Associative factors in the recall of connected discourse. Psychonomic Science, 1966, 4, 53-54.

Rosenshine, B., & Furst, N. Research in teacher performance criteria. In B. O. Smith (Ed.), Research in Teacher Education. Englewood Cliffs, N. J.: Prentice-Hall, 1971.

Ryan, E. B., & Semmel, M. I. Reading as a constructive language process. Reading Research Quarterly, 1969, 1, 59-83.

Samuels, S. J Effect of word association on reading speed, recall, and guessing behavior on tests. Journal of Educational Psychology, 1968, 59, 12-15.

Samuels, S. J. Factors which influence the word recognition process of skilled readers. Paper presented at the National Reading Conference. Atlanta, Ga., December 1969.

Samuels, S. J., & Wittrock, M. Word association strength and learning to read. Journal of Education Psychology, 1969, 60, 248-252

San Diego County, California, Superintendent of Schools. Improving Reading Instruction. 1961, monograph No. 2.

Scharf, L. A comparative study in reading progress of two groups of mentally retarded adolescents subjected to differential reading materials· a comparison of the effectiveness of teacher-prepared versus published reading materials. Unpublished dissertation, New York University, 1959.

Scharf, L., Holtz, A., et al., Teachers guide for the preparation of reading materials in a program of occupational education. New York Advisory Council of Teachers of C.R.M.D. Classes, 1948.

Schneyer, J. W. Reading achivement of first grade children taught by a linguistic approach and a basal reader approach -- extended into third grade. The Reading Teacher, 1969, 22, 315-319.

Semmel, M. I. Language behavior of mentally retarded and culturally disadvantaged children. In J. F. Magory and R. B. McIntyre (Eds.), Fifth annual distinguished lectures in special education. Los Angeles: University of Southern California Press, 1967, 31-47.

Semmel, M. I. Competence vs. performance re language. In M. B. Miller (Chm.), Performance vs. competence: A critical psycho-educational issue in mental retardation. Colloquium presented at the ninety-third annual meeting of the American Association on Mental Deficiency, San Francisco, May 1969.

Semmel, M. I., Barritt, L. S., & Bennett, S. W. Performance of EMR and nonretarded children on a modified Cloze task. American Journal of Mental Deficiency, 1970, 74, 681-688.

Semmel, M. I., Barritt, L. S., Bennett, S. W., & Perfetti, C. A. Grammatical analysis of word associations of educable mentally retarded and normal children. American Journal of Mental Deficiency, 1968, 72, 567-576.

Semmel, M. I., & Bennett, S. W. Effects of linguistic structure and delay on memory span of EMR children. American Journal of Mental Deficiency, 1970, 74, 674-680.

Semmel, M. I., Lifson, M. W., & Sitko, M. C. Learning and transfer of paradigmatic word associations by educable mentally retarded children: a preliminary study. Studies in language and language behavior, V, Sept. 1, 1967. Center for Research on Language and Language Behavior, University of Michigan, Contract No. OEC-3-6-061784-0508, U.S. Office of Education, 343-363.

Semmel, M. I., Sitko, M. C., & Semmel, D. Free word association norms for educable mentally retarded children. Studies in language and language behavior. Center for Research on Language and Language Behavior, University of Michigan, VIII, 1969.

Sheldon, W., Stinson, F., & Peebles, J. D. Comparison of three methods of teaching reading: a continuation study in the third grade. The Reading Teacher, 1969, 22, 539-546.

Shima, F. Research on word association in connected discourse. Southwest Regional Education Lab., Inglewood, Calif., 1970.

Sitko, M. C. Input organizational strategies of EMR and normal boys in the free recall verbal learning. Unpublished doctoral dissertation, University of Michigan, 1970.

Sitko, M. C., & Semmel, M. I. Effects of phrasal cueing on free recall of educable mentally retarded and nonretarded children. American Educational Research Journal, (in press), 1972.

White, S. W. Evidence for a hierarchical arrangement of learning processes. In L. P. Lipsitt & C. C. Spiker (Eds.), Advances in child development and behavior, Vol. 2. New York: Academic Press, 1965.

Woodcock, R., & Dunn, L. Efficacy of several approaches for teaching reading to the educable mentally retarded. Project of USOE, Project, George Peabody College for Teachers, 1967. IMRID Papers & Reports Vol. III. No. 5, 1966.

Wright, C. J., & Nuthall, G. Relationships between teacher behaviors and pupil achievement in three experimental elementary science lessons. American Educational Research Journal, 1970, 7, 477-491.

APPENDIX

The Probability of Word Gains by Nonreaders in Each Class

In order to better assess the impact of class composition and teaching variables on gains in word knowledge, scatter plots of pre- and posttest scores were drawn for the total group and for each class (Figures 18 to 23).

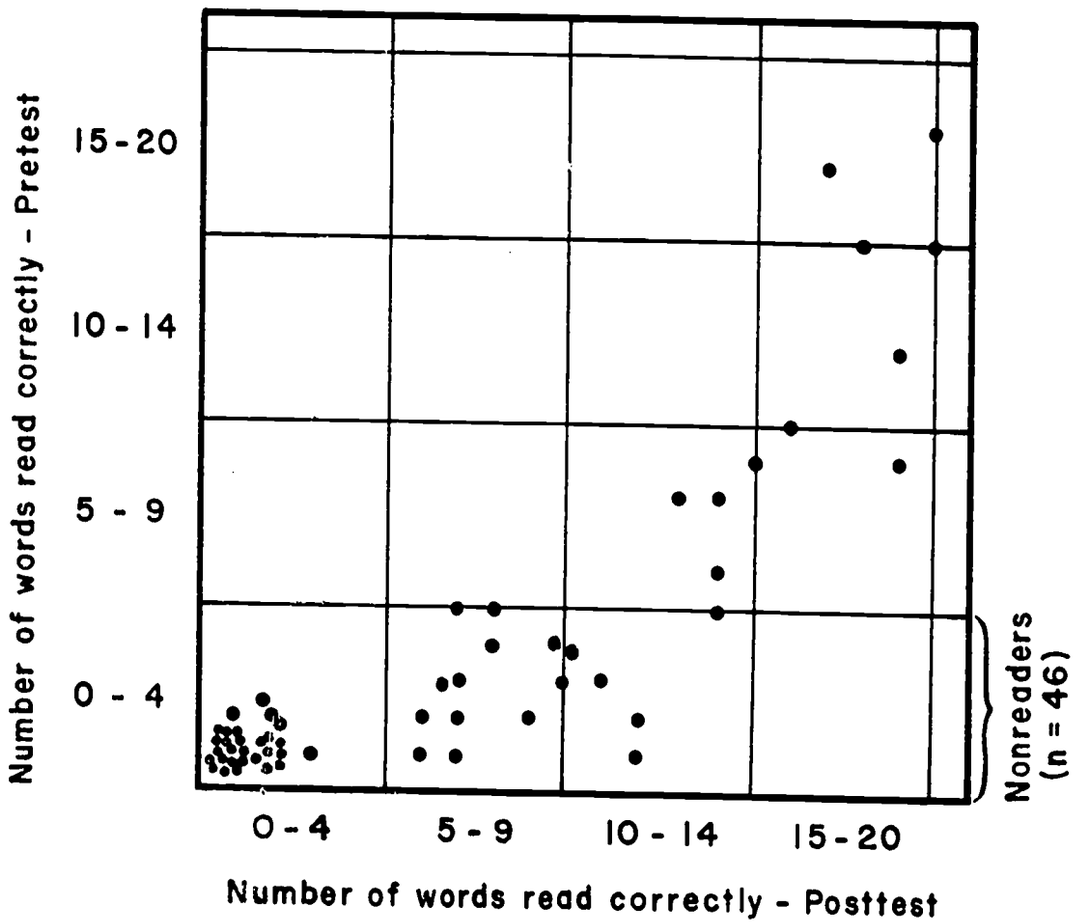
An arbitrary division of the range of scores into quarters was used to conceptualize the reading level of the subjects. Thus the first quartile (Q) contained all test scores between 0 and 4; QII, scores between 5 and 9, etc. The subjects (78% of all Ss in study) whose pretest scores fell in the first quartile were considered nonreaders. In fact, the bulk of the nonreaders in this quartile, (47% of all subjects) were unable to read any words.

When the percentage of pupils in each vertical quadrant was expressed as a probability of gain for nonreaders (see QI), the probability of no posttest gain for the entire group was 63% (Figure 18). Similarly, there is a .29 probability that nonreaders will fall in the second quadrant on posttesting (e.g., read between 5 and 9 words correctly). Eight percent will fall in the third quadrant (read between 10 and 14 words correctly). Figures 19 to 23 dramatically illustrate the differential probability of gain by nonreaders in each class.

When viewed in terms of the probability of gain--no gain for the classes (Figure 18), the teachers who were able to generate the most gains from their "nonreaders" were in Classes A and C. Class D nonreaders remained at the mean level of the entire group, while the

gains by nonreaders in Classes B and E were the lowest.

It may be inferred therefore that nonreaders had differential chances of improving the number of words correctly read, depending on which class and by which teacher they were taught.



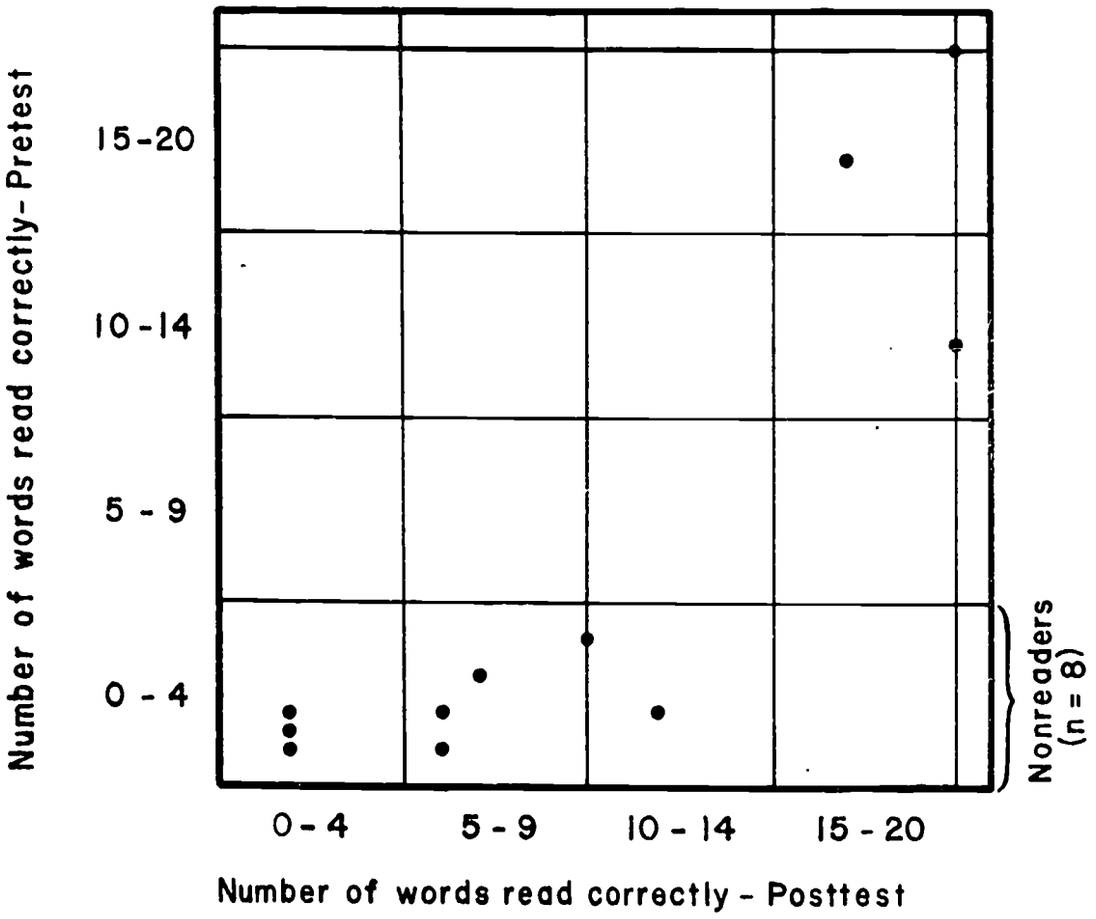
Probability of gain/no gain for nonreaders (0-4 words read on pretest):

Probability of no gain (reading 0-4 words) on posttest = .63

Probability of gain (reading 5-9 words) on posttest = .29

Probability of gain (reading 10-14 words) on posttest = .08

Fig. 18. All Classes. Sight Reading Gain (n=59). High- and low-association words combined.



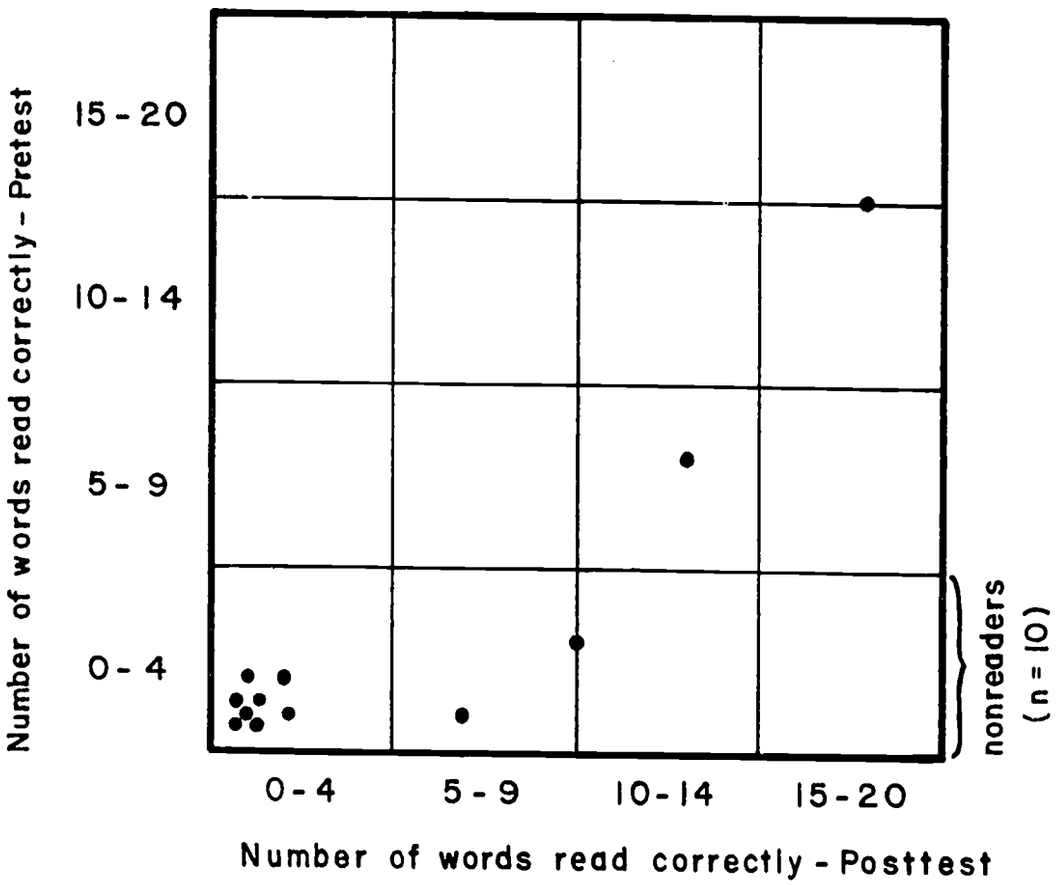
Probability of no gain/no gain for nonreaders (0-4 words read on pretest):

Probability of no gain (reading 0-4 words) on posttest = .375

Probability of gain (reading 5-9 words) on posttest = .50

Probability of gain (reading 10-14 words) on posttest = .125

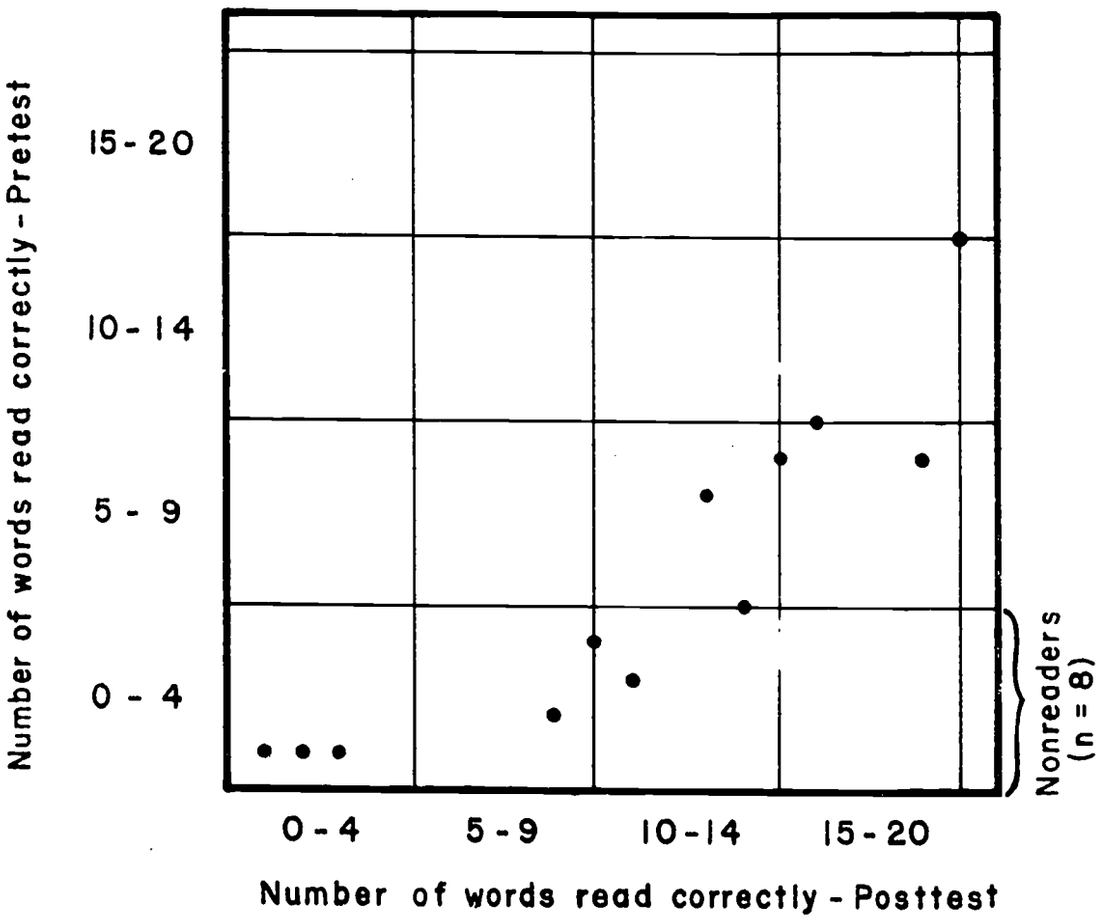
Fig. 19. Class A. Sight Reading Gain (n=11). High- and low-association words combined.



Probability of gain/no gain for nonreaders (0-4 words read on pretest)

Probability of no gain on posttest = .80
Probability of gain (reading 5-9 words) on posttest = .20

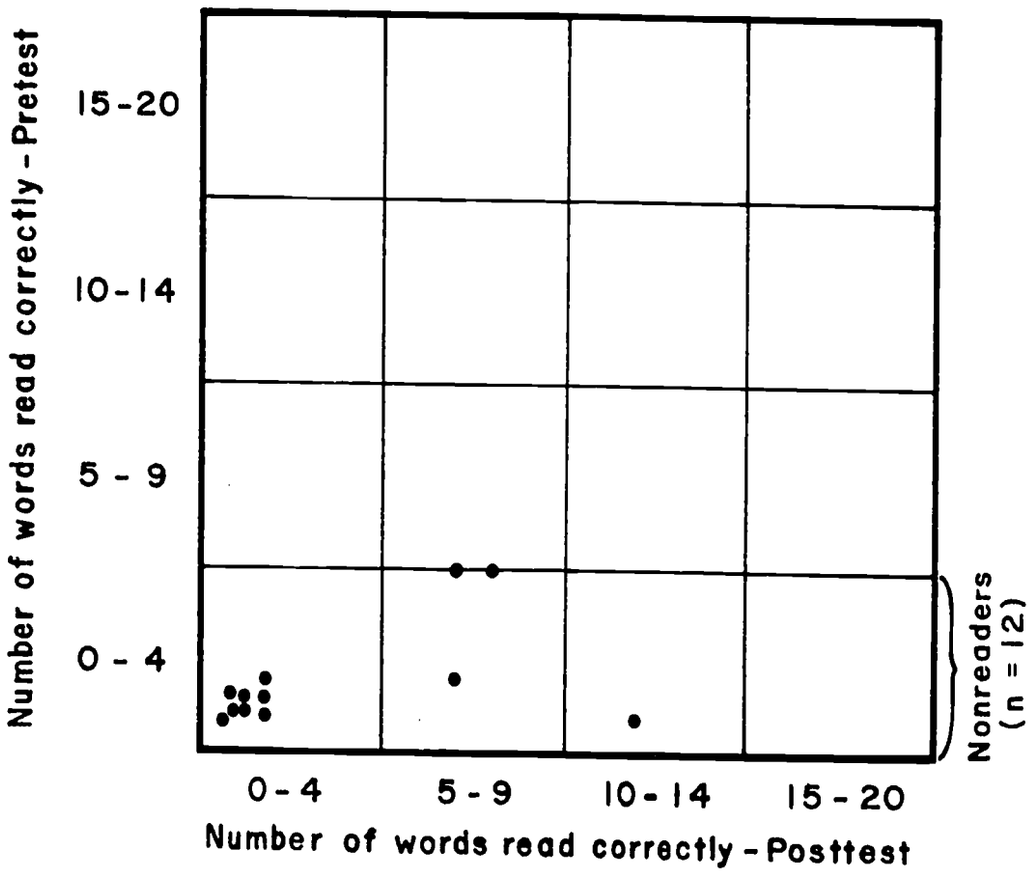
Fig. 20. Sight reading Gains (n=12) High- and low-association Words Combined.



Probability of gain/no gain for nonreaders (0-4 words read on pretest)

Probability of no gain (reading 0-4 words) on posttest = .43
Probability of gain (reading 5-9 words) on posttest = .43
Probability of gain (reading 10-14 words) on posttest = .14

Fig. 21. Class C. Sight Reading Gain (n=12). High- and low-association words combined.



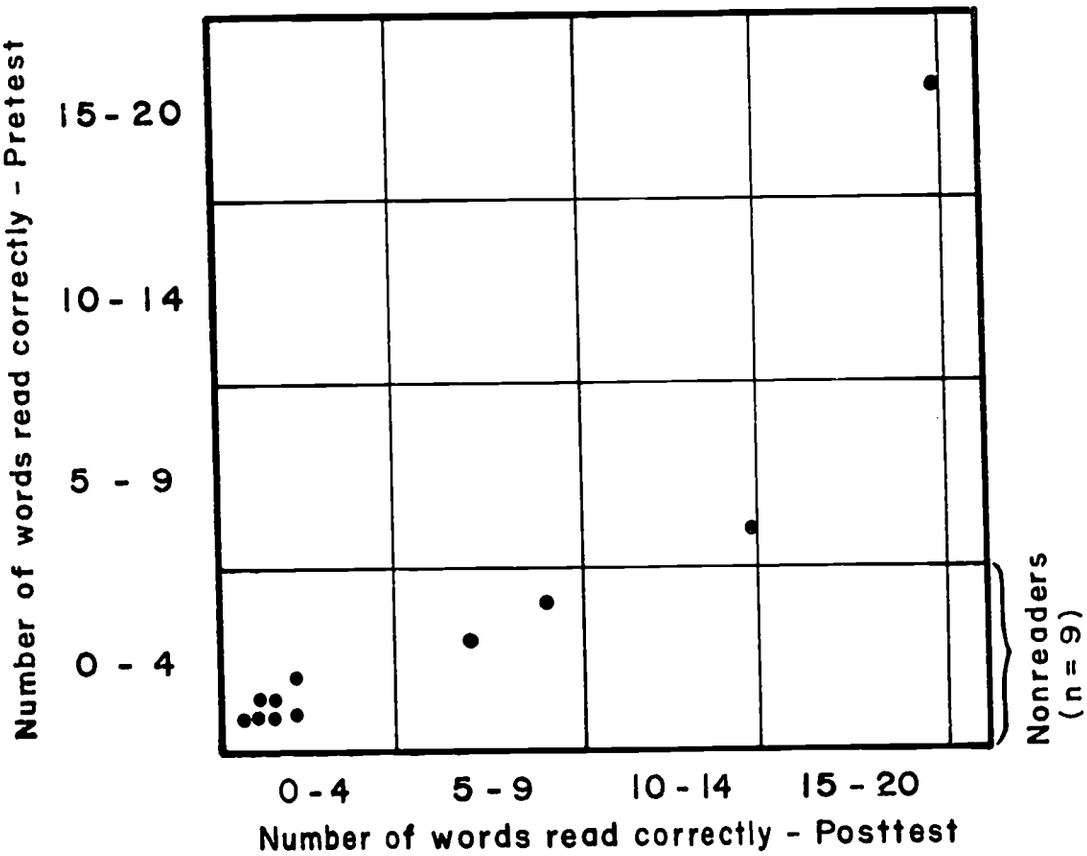
Probability of gain/no gain for nonreaders (0 - 4 words read on pretest)

Probability of no gain (reading 0-4 words) on posttest = .66

Probability of gain (reading 5-9 words) on posttest = .25

Probability of gain (reading 10-14 words) on posttest = .09

Fig. 22. Class D. Sight Reading Gain (n=12). High- and low-association words combined.



Probability of gain/no gain for nonreaders (0-4 word read on pretest):

Probability of no gain (reading 0-4 words) on posttest = .77

Probability of gain (reading 5-9 words) on posttest = .22

Fig. 23. Class E. Sight Reading Gain (n=11). High- and low-association words combined.

SIGHT WORD LESSONS - COMPOSITE DESCRIPTION OF THREE HALF-HOUR LESSONS

OBSERVATION	CLASS A	B	C	D	E
TIME: each day	9:00	9:00	10:20	12:15	12:20
seating arrangement for lesson.	pupils seated. desks in 3 rows facing board & teacher.	1st day seated around common table. 2nd & 3rd day seated at desks in rows facing board and teacher.	"U" desk arrangement facing board pupils in seats.	pupils seated around common table near board.	pupils seated around common table.
location of teacher during lesson.	standing in front of board, facing class.	day 1 seated at desk. days 2 & 3 in front of class standing.	in front of class at board.	standing at table near board.	in front of table near board.
materials used.	1. day 1-chalk board 2. days 2 & 3 overhead projector.	1. flash card. 2. ditto sheets.	1. tape recorder 2. ditto sheets - written exercises. 3. chalk & board 4. bingo game	1. experience chart 2. set of flashcards for each pupil. 3. chalkboard	1. Illus. flashcards. 2. chalk & board. 3. ditto sheet exercises.
teacher-prepared materials.	1. word list shown on O.H. projector. 2. 1 ditto worksheet.	1. flash cards, color cued. 2. 1 ditto worksheet.	1. tape recorded instructions for written review in teach. prepared workbook. 2. const. paper bound booklets for days 1 and 2. 3. word cards for bingo game.	1. experience chart. 2. set of flashcards for each pupil. 3. 2 ditto worksheets.	1. flash card set with word pairs. 2. 2 ditto worksheets. 3. lg. chart with word pairs & pupils' names.

OBSERVATION	CLASS A	B	C	D	E
METHOD Intro. of lesson, and presentation of words.	asked for class to define a pair*-very brief intro. all word pairs on board before lesson began. teacher read words in succession. alternately called on some pupils to read whole list, or called out first word in pair & elicited response word from pupil. words always read in same order as listed on board.	discussed meaning of the word pair* showed word pairs on flashcards - said word & group repeated it. teacher made up a sentence for each word. showed flashcards again - read stimulus words and asked pupils to find it on the card. pupils then made up sentences using both words in pair.	discussed concept of pair*, intro. word pair by telling short story inc. a sentence containing the word pair. same sentence used in workbook. pair also written on board. some variation in presentation of different pairs, i.e., 1 pair "mystery words" presented in workbook only.	told class that they will learn words* that go together - gave examples. each pupil had set of flashcards. teacher pointed to a word & asked for identification. assisted by cueing with letter sounds. used only when verbal descriptive cues or sight identification did not result in correct response.	intro. the word "pair" & its meaning.* word pairs with assoc. picture cues shown on flashcards-pupils assisted in identifying word by teacher's offering phonic cues. gave examples of word pairs in sentences.
Elaboration			seatwork. words written on board. emphasized relatedness of pairs.	sentence work exercises.	
Learning tasks involved	visual memory task (drill) auditory memory task (drill)	visual memory sentence mediation*	visual memory sentence mediation. visual-motor & auditory pictoral assoc.	visual memory pictoral assoc. auditory memory, sentence mediation	phonic analysis (initial consonants), visual memory sentence mediation.
days 2 & 3 method & variations			played word bingo 3rd session-words presented singly but paired order-tested pupils by calling word & asking them to circle words in different colors.		

*First day only.

OBSERVATION	CLASS A	B	C	D	E
METHOD number of word pairs introduced each day.	day 1 - all pairs.	day 1 - all pairs.	day 1 - 4 pairs 2 - 6 pairs	day 1 - 5 pairs 2 - 5 pairs	day 1 - 3 pairs 2 - 3 pairs 3 - 4 pairs
group for instruction	whole class	whole class	group inst. to half of class at a time. followed by ind. workbook - tape instruction activity. session 3 - whole class inst. 40 min.	half class	whole class
pupil participation	variable - indifferent to average.	poor	voluntary, good attention	good	good
physical description of classroom.	work papers & class charts displayed. 1 work area in rear of room.	poor-devoid of childrens' work or other materials.	many bulletin boards & on going activities in evidence - specific work areas.	posters & childrens' work displayed.	posters& childrens' work displayed.

Teacher _____
Date _____

Check List for Classroom Anecdotal Record

Description

Record time obs. begun:

Location of pupils -

all in seats

some in seats

grouped (specify)

Location of teacher

Introductory Phase of Lesson

Teacher-verbal behavior

housekeeping instruction

directions

whole group instruction

small group instruction

individual instruction

Instructional Method

sight voc. (look-say)

teacher reads stimulus word/sentence

teacher elicits stimulus word/sentence

from individual
from group

Analytic (phonic) (specify aspect)

teacher reads stimulus word/sentence

teacher elicits stimulus word/sentence

Other (specify) Instructional Method

Use of Materials

How is stimulus presented

(oral, chalk board, flash card, mimeo. paper, etc.)

Specify if presentation is massed or single.

Pupil Participation

Attention of pupil

Is attention required of group (state size) or individual?

All pupils attending?

Some pupils attending?

If only small group involvement, what are others doing?

Prevailing nature of verbal interaction

Pupil initiation?

Teacher initiation?

Pupil responses

Predominant type of verbal reinforcement

Does teacher anticipate desired response from certain pupils and use to demonstrate objective?

Does teacher appear to select respondents randomly?

Variation and Elaboration of initial pattern.

change in topic

repetitions of stimulus

intro. of new material

change in verbal mode - i.e., demonstration, lecture, questioning, discussion, drill, etc.

Indication of conclusion, (culmination) of lesson.

Teachers verbal close-out, i.e., drill, time limit, direct statement.

Other Characteristics of Lesson and Classroom Environment

Behavioral problems

how manifested by pupil

how recognized by teacher

how resolved by teacher (interrupt lesson, verbal chastisement, exclusion, ignoral, etc.)

Physical Arrangement of Room

approx size

light conditions

number & type of furniture & equip.

decorations, bulletin boards, posters

activity corners

other

Subjective Impression of Teacher-
Pupil Relationship

Authoritarian

permissive

Teacher warmth

pupils at ease, tense

List names of pupils absent & number present.

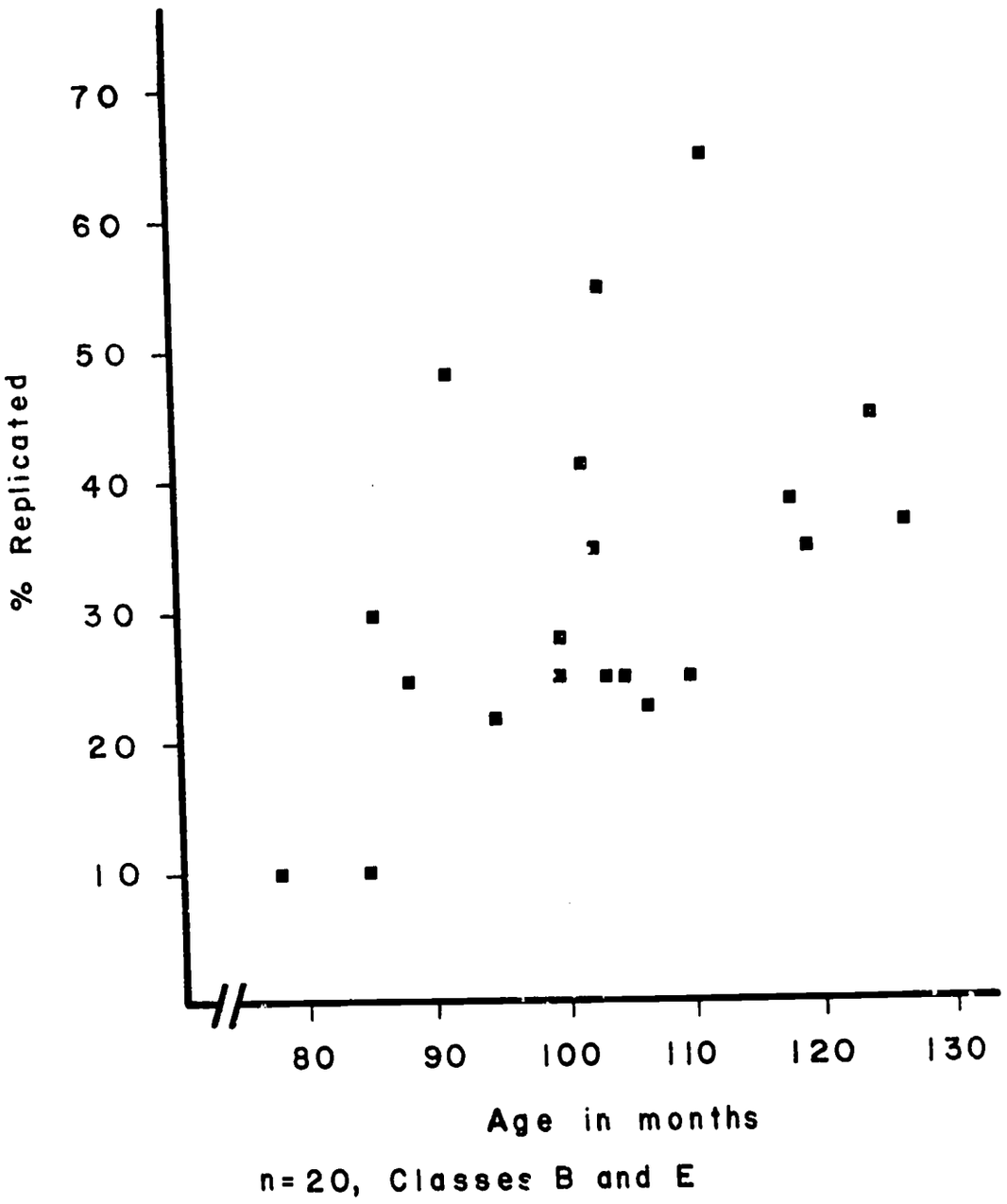


Fig. 24. The relationship of Percentage replication of word pairs to age of subjects.

Paradigmatic, Syntagmatic and Klang Classifiation

of Responses to Free W-As for Each Class

Class		A	B	C	D	E	TOTAL
Number		12	13	13	12	9	59
Classification							
Paradigmatic							
	$\bar{X}$	34.17	33.69	38.92	21.00	43.89	33.92
	SD	19.62	20.73	25.39	20.02	27.09	22.98
Syntagmatic and Klang responses Combined							
	$\bar{X}$	65.50	65.54	61.08	79.00	56.11	65.85
	SD	19.83	19.40	21.92	20.07	27.09	22.02

Stimulus Words for Collection of Word and Continuous Association Norms.

Each list contains 10 words made up of 6 nouns. (One each from 6 noun semantic categories), 4 additional words (one each from noun-verbs, adjective, and "other" lists). Thorndike-Lorge frequencies: Nine out of ten words on each list are A or AA.

Asterisk indicates that the word has been used in previous W-A Studies and yielded 25% or greater associative strength. Eight lists have 5 such words each and the remaining 2 lists have 4 such words each.

List 1	List 2	List 3	List 4	List 5
*salt - AA	coke - 5	meat - AA	apple - A	*milk - AA
lion - A	*bird - AA	pig - 44	cow - A	cat - A
*man - AA	*king - AA	baby - AA	doctor - AA	*girl - AA
bus - 9	gun - A	*train - AA	rocket - 4	television - 1
*ocean - AA	*moon - AA	*city - AA	*street - AA	*house - AA
war - AA	rain - AA	*joy - AA	*light - AA	army - AA
cook - AA	wash - AA	watch - AA	taste - AA	sleep - AA
ask - AA	make - AA	give - AA	stop - AA	cry - AA
*dark - AA	*soft - AA	*short - AA	*hard - AA	*black - AA
*off - AA	*her - AA	*on - AA	*up - AA	*in - AA

List 6	List 7	List 8	List 9	List 10
pizza - 0	bread - A	candy - 32	*fruit - AA	cake - A
animal - AA	*horse - AA	*dog - AA	but - 10	lion - A
sister - AA	uncle - AA	*boy - AA	*mother - AA	*boy - AA
clock - A	jet - 9	stove - AA	car - AA	movie - 29
*bed - AA	*money - AA	table - AA	book - AA	table - AA
skin - AA	age - AA	game - AA	nose - AA	air - AA
skin - AA	dress - AA	smell - AA	drink - AA	play - AA
*smile - AA	*run - AA	*come - AA	*sit - AA	*stand - AA
*add - AA	*high - AA	*pretty - AA	*sweet - AA	*cold - AA
*long - AA	*over - AA	as - AA	*me - AA	*it - AA
*into - AA				

Assignment of Stimulus Words to Lists

List 1	List 2	List 3	List 4
lion	woman	rocket	moon
ask	cake	run	horse
house	train	ocean	make
bus	carry	friend	tell
soft	sister	fear	come
up	table	cow	doctor
pizza	meat	build	car
bird	sound	bread	into
eat	rabbit	love	radio
hate	movie	over	stove
money	cold	sit	stand
in	short	off	high
stop	dog	television	uncle
truth	king	mother	monkey
gun	apple	clock	give
time	find	dark	girl
sheep	sing	sweet	city
pretty	book	self	under
long	bed	street	letter
salt	joy	fruit	hard
coke	block	take	idea
call	cry	chicken	candy
man	on	boy	milk
baby	drive	cat	of
look	above	between	leader

List 1 has 14 nouns, 6 verbs, and 5 other form class.
List 2 has 16 nouns, 5 verbs, and 4 other form class.
List 3 has 14 nouns, 6 verbs, and 5 other form class.
List 4 has 15 nouns, 5 verbs, and 5 other form class.

Continuous W-A, Data Collection Instructions

Administration Format

1. We are going to play a word game.

2. I am going to say a word, and want you to tell me the first word you think of when you hear the word.

3. For example, suppose I say Snow - you might say ball, cold, rain. Can you think of any more words that go with snow? _____ (respond - reinforce)

4. The game is to say as many words as you can think of, that go with the word I say.

5. Let's try this one: "Pencil".
   (Prompt - after 5 sec.* (do not use stimulus word again).
   Let's try one more: "Sandwich".

6. OK. Now we start the game:
   (options:)

7. a) Stimulus word only.
   b) "What word goes with _____?"
   c) "What about _____?"
   d) "Tell me all the words that go with _____?"

*Administrator can use judgment as to time interval to prompt.

Additional training words

picture
telephone
teacher

Rules for Administration

1. Don't go back and give pretest (training) items.

2. Give stimulus word only one time - when prompting, do not repeat.

3. Can regenerate interest by: reiterating rules (only once during administration.)

4. If all responses are letters - can reiterate rules (only once during administration.)

5. Accept all other types of response unconditionally (i.e., klangs).

6. If they catch on at latter point in list - can repeat stimulus words of the first part of list, but make note of this.

7. Use margin of data sheets to make note of any observations of interest.

Stimulus Words for Free W-A Norms

Name _____

Class _____

List 1		List 2	
stop		build	
coke		dog	
rabbit		letter	
salt		street	
bed		television	
hate		fruit	
bird		clock	
off		book	
boy		cold	
run		leader	
baby		sit	
in		take	
cat		rocket	
apple		king	
ask		mother	
stand		pizza	
man		sell	
bus		doctor	
ocean		bread	
hard		candy	
moon		long	
gun		up	
sister		monkey	
come		sheep	
sing		cry	

Oral Instructions for W-A Collection

1. "Today I want to play a new word game with you."

2. "I'm going to read you some words, one at a time."

3. "Each time I read a word, I want you to tell me the first word you think of that goes with the word I say."

4. "When you tell me the word, I'll write it down and then read you another."

5. "Let's try one. I'll say a word, and then you tell me the first word you think of that goes with the word I say."

6. "Tell me the first word you think of that goes with snow."

(response-reinforce)
(prompt after 5 sec. repeating stimulus word)

7. "Let's try this one: 'sandwich'."

(response-reinforce)

8. "O.K. Now we start the game and see if you can think of a word to tell me for every word I read to you. All right?"

---

9. Options used in introducing stimulus words:
   a) stimulus word only
   b) "What word goes with _____?"
   c) "What about _____?"

10. Additional training words:
    picture
    telephone
    teacher

(If prompting is necessary--prompt once repeating stimulus word.)

Stimulus Words for Collection of Sequential-Associative Dependencies in Active Declarative Sentences

The fifty animate nouns used in the construction of the sentences are classified as animals, humans, family relationships and occupations.

Each group of 25 sentences consists of 10 animals, 10 occupations and at least 2 and no more than 3 each of family and human classifications.

List 1

1.	The bear	____	the	____.
2.	The sheep	____	the	____.
*3.	The horse	____	the	____.
4.	The pig	____	the	____.
*5.	The lion	____	the	____.
6.	The elephant	____	the	____.
*7.	The bug	____	the	____.
8.	The goat	____	the	____.
9.	The fish	____	the	____.
10.	The mouse	____	the	____.
*11.	The king	____	the	____.
12.	The pilot	____	the	____.
13.	The baker	____	the	____.
14.	The worker	____	the	____.
15.	The queen	____	the	____.
16.	The teacher	____	the	____.
17.	The clown	____	the	____.
18.	The sailor	____	the	____.
19.	The milkman	____	the	____.
20.	The banker	____	the	____.
21.	The sister	____	the	____.
*22.	The mother	____	the	____.
*23.	The girl	____	the	____.
24.	The father	____	the	____.
*25.	The man	____	the	____.

List 2

*1.	The dog	____	the	____.
2.	The chicken	____	the	____.
*3.	The cow	____	the	____.
4.	The frog	____	the	____.
5.	The eagle	____	the	____.
*6.	The monkey	____	the	____.
7.	The cat	____	the	____.
8.	The rabbit	____	the	____.
*9.	The bird	____	the	____.
10.	The bee	____	the	____.
11.	The farmer	____	the	____.
12.	The grocer	____	the	____.
13.	The nurse	____	the	____.
14.	The dentist	____	the	____.
15.	The cowboy	____	the	____.
*16.	The doctor	____	the	____.
17.	The farmer	____	the	____.
18.	The cowboy	____	the	____.
19.	The tailor	____	the	____.
20.	The butcher	____	the	____.
*21.	The woman	____	the	____.
22.	The brother	____	the	____.
*23.	The boy	____	the	____.
24.	The wife	____	the	____.
25.	The baby	____	the	____.

*Stimulus noun also appears on W-A list.

Data Collection Sheet for

Sentence-Association Norms

Name _____
Date _____
School _____

List 1

1. The sister _____ the _____.
2. The fish _____ the _____.
3. The bear _____ the _____.
4. The milkman _____ the _____.
5. The bug _____ the _____.
6. The teacher _____ the _____.
7. The king _____ the _____.
8. The pig _____ the _____.
9. The mouse _____ the _____.
10. The elephant _____ the _____.
11. The girl _____ the _____.
12. The lion _____ the _____.
13. The baker _____ the _____.
14. The horse _____ the _____.
15. The queen _____ the _____.
16. The banker _____ the _____.
17. The father _____ the _____.
18. The mother _____ the _____.
19. The pilot _____ the _____.
20. The goat _____ the _____.
21. The sailor _____ the _____.
22. The man _____ the _____.
23. The worker _____ the _____.
24. The sheep _____ the _____.
25. The clown _____ the _____.

List 2

Name _____
Date _____
School _____

1. The farmer _____ the _____.
2. The tailor _____ the _____.
3. The bee _____ the _____.
4. The dentist _____ the _____.
5. The dog _____ the _____.
6. The wife _____ the _____.
7. The fireman _____ the _____.
8. The bird _____ the _____.
9. The cow _____ the _____.
10. The rabbit _____ the _____.
11. The baby _____ the _____.
12. The butcher _____ the _____.
13. The brother _____ the _____.
14. The eagle _____ the _____.
15. The cat _____ the _____.
16. The nurse _____ the _____.
17. The boy _____ the _____.
18. The monkey _____ the _____.
19. The woman _____ the _____.
20. The frog _____ the _____.
21. The doctor _____ the _____.
22. The boy _____ the _____.
23. The grocer _____ the _____.
24. The chicken _____ the _____.
25. The farmer _____ the _____.

Instructions for Administration of Sentence-Association Task

"This game is called finishing the sentence. In this game, I tell you the beginning of the sentence and you make up the rest of it.

This is how it goes:

when I say - The child -
you can say - the child plays -
then I say - the child plays the -
you can say - the game.

Remember, when I start a sentence, you can fill in with any word you like."

"Try this one: The postman -

what word comes next?' (response)
(the postman mails _____)
"Good - now finish" (stimulus, response and "the", i.e., "The postman mails the _____") - response.

"Very good -

"Listen to this one -

"The robin _____" (elicit response)
repeat - "The robin (+ response, i.e., flies) the" _____
(elicit response)

Stimulus Sentences for Collection of Inter-Sentence (Connected Discourse) Association Data.

Name _____

Class _____

1. The farmer worked on the cows.

2. The dentist pulled the teeth.

3. The dog barked at the cat.

4. The fireman put out the fire.

5. The bird flew in the air.

6. The baby cried for the bottle.

7. The butcher cut the meat.

8. The nurse helped the people.

9. The monkey climbed the tree.

10. The woman cleaned the house.

11. The frog jumped in the water.

12. The chicken laid the eggs.

13. The sister played the game.

Name _____

Class _____

14. The fish swam in the water.

15. The milkman delivered the milk.

16. The teacher taught the kids.

17. The bug crawled on the ground.

18. The mouse ate the cheese.

19. The lion growled at the people.

20. The baker baked the cake.

21. The banker gave the money.

22. The pilot flew the airplane.

23. The goat ate the grass.

24. The sailor sailed the boat.

25. The clown did the tricks.

Oral Instructions for Collection of

Inter-Sentence Association Norms

1. "Today we are going to do something special. I think you'll like it."

2. "I want you to help me write a short story."

3. "I will read you a sentence and then I want you to tell me the very next thing that happened. OK?"

4. "Let's try one."

   The mother cooked the dinner.

5. "Now you tell me the next thing that happened."

   (response-reinforce)

   If the child does not correctly respond -

6. "You could say the mother then cleaned the house or watched the television or went to the store, OK?"

7. "Let's try another one."

   The grocer sacked the groceries.

8. "What's the next thing that happened?"

High- & Low-Association Pairs Assigned to Each Class for Sight Vocabulary Instruction

Class B	Class C	Class E
High	High	High
television - watch	salt - pepper	gun - shoot
salt - pepper	sister - brother	sister - brother
bird - fly	gun - shoot	cold - hot
book - read	baby - cry	book - read
gun - shoot	street - car	television - watch
Low	Low	Low
build - sleep	television - building	bird - car
cold - building	build - sleep	salt - building
street - brother	cold - fly	street - pepper
baby - hot	bed - watch	bed - fly
bed - car	book - hot	build - sleep

Class A	Class D
High	High
book - read	salt - pepper
cold - hot	bird - fly
gun - shoot	sister - brother
sister - brother	street - car
build - building	book - read
Low	Low
television - car	television - building
salt - watch	gun - cry
baby - pepper	baby - hot
bed - fly	build - sleep
street - sleep	bed - watch

Instructions to Teachers for Sight Vocabulary and Sentence Lessons

I. General Instructions

1. Take three consecutive days to present materials.
2. If possible, introduce material at same time each day.
3. Please allocate half an hour for each lesson.
4. Use any teaching method and organization you wish.

II. Materials

A. Words (First Week)

1. You will be given a list of ten pairs of words.
2. Introduce and teach words in given pairs.
3. Except for paired presentation, there are no limits on any aspect of teaching them.

B. Sentences (Second Week)

1. You will be given a list of ten sentences.
2. Teach them in any way you wish.

III. Lesson Period

1. Please teach the words (or sentences) only during lesson period.
2. An observer will be present to write a description of the lesson. Our interest is in getting a description of the teaching process. We are not interested in teaching evaluation.
3. On the day following the last lesson period, an observer will individually test pupils' recall of words (or sentences).

We plan to share all the results of this study with you and will be happy to answer any questions you may have concerning any aspect of it.

Name _____

Date _____

Sight Vocabulary Pre-Post Test

1. apple
2. down
3. watch
4. street
5. baby
6. stand
7. eat
8. go
9. television
10. out
11. bed
12. sit
13. shoot
14. car
15. bird
16. sister
17. like
18. fly
19. salt
20. book
21. girl
22. off
23 mother
24. in
25. hate
26. read
27. gun
28. cold
29. dog
30. cry
31. cat
32. boy
33. build
34. pepper
35. on
36. brother
37. building
38. father
39. hot
40. sleep

Sentence Recognition Pre-Post Test

Teacher C

Name _____

Date _____

The woman climbed the kids.

The sailor sailed the boat.

The banker growled at the ground.

The nurse helped the people.

The lion cleaned the cheese.

The baker baked the cake.

The baby cut the water.

The woman crawled on the money.

The teacher taught the kids.

The fish swam in the water.

The dentist pulled the teeth.

The baby cried for the bottle.

The pilot flew the airplane.

The bug ate the people.

The butcher cut the meat.

The monkey climbed the tree.

The bird flew in the air.

The mouse gave the house.

The mouse ate the cheese.

The frog cried for the kids.

Teacher E

Name _____

Date _____

The banker gave the money.

The milkman delivered the milk.

The sailor sailed the boat.

The teacher flew in the house.

The nurse helped the people.

The lion cleaned the cheese.

The woman growled at the airplane.

The baker baked the cake.

The woman crawled on the money.

The fish swam in the water.

The mouse taught the people.

The dentist pulled the teeth.

The baby cried for the bottle.

The pilot ate the kids.

The bug ate the people.

The butcher cut the meat.

The bug taught the bottle.

The bird flew in the air.

The mouse gave the house.

The frog cried for the kids.

Teacher D

Name _____

Date _____

The mouse taught the people.

The dentist pulled the teeth.

The baby cried for the bottle.

The pilot ate the kids.

The monkey ate the house.

The bug ate the people.

The butcher cut the meat.

The teacher growled at the tree.

The bird flew in the air.

The mouse ate the cheese.

The frog cried for the kids.

The woman climbed the kids.

The milkman delivered the milk.

The sailor sailed the boat.

The banker growled at the ground.

The nurse helped the people.

The lion cleaned the cheese.

The baker baked the cake.

The baby cut the water.

The fish swam in the water.

Teacher _____

Name _____

Date _____

The banker gave the money.

The milkman delivered the milk.

The nurse helped the people.

The lion cleaned the cheese.

The baker baked the cake.

The baby cut the water.

The woman crawled on the money.

The teacher taught the kids.

The fish swam in the water.

The butcher jumped on the ground.

The dentist pulled the teeth.

The baby cried for the bottle.

The pilot ate the kids.

The bug ate the people.

The monkey climbed the tree.

The bug taught the bottle.

The bird flew in the air.

The mouse ate the cheese.

The teacher crawled on the meat.

The frog cried for the kids.

Procedure for Reading Comprehension Test Administration

Introduction · "There are three sentences and one picture."

1. "Read the three sentences."
2. "Look at the picture."
3. "Show which sentence tells about the picture."
4. "Now read the sentence."

If they say they can't read - ask them to try or make a guess.

Do not make any statements or give hints about the sentences or pictures. Ask them to guess if they can't read.

Reading Comprehension Test Data

Collection Forms.

Class E

Name _____

Date _____

The baker baked the cake.
The cake baked the baker.
The banker baked the candy.

The dentist pulled the teeth.
The teeth pulled the dentist.
The doctor pulled the train.

The butcher cut the meat.
The meat cut the butcher.
The barber cut the mail.

The sailor sailed the boat.
The boat sailed the sailor.
The soldier sailed the bat.

The milkman delivered the milk.
The milk delivered the milkman.
The mailman delivered the mail.

The lion cleaned the cheese.
The cheese cleaned the lion.
The line cleaned the chair.

The mouse taught the people.
The people taught the mouse.
The mother taught the piano.

The teacher flew in the house.
The house flew in the teacher.
The tractor flew in the home.

The woman growled at the airplane.
The airplane growled at the woman.
The wife growled at the automobile.

The pilot ate the kids.
The kids ate the pilot.
The pillow ate the kite.

Class D

Student _____

Date _____

The milkman delivered the milk.
The milk delivered the milkman.
The mailman delivered the mail.

The baby cried for the bottle.
The bottle cried for the baby.
The boy cried for the ball.

The butcher cut the meat.
The meat cut the butcher.
The barber cut the mat.

The bird flew in the air.
The air flew in the bird.
The boat flew in the ark.

The fish swam in the water.
The water swam in the fish.
The fist swam in the wall.

The lion cleaned the cheese.
The cheese cleaned the lion.
The line cleaned the chair.

The mouse taught the people.
The people taught the mouse.
The mother taught the piano.

The teacher growled at the tree.
The tree growled at the teacher.
The tractor growled at the trap.

The woman climbed the kids.
The kids climbed the woman.
The wife climbed the kite.

The monkey ate the house.
The house ate the monkey.
The money ate the home.

Class C

Student _____

Date _____

The dentist pulled the teeth.
The teeth pulled the dentist.
The doctor pulled the train.

The butcher cut the meat.
The meat cut the butcher.
The baker cut the mail.

The teacher taught the kids.
The kids taught the teacher.
The tractor taught the kite.

The pilot flew the airplane.
The airplane flew the pilot.
The pillow flew the automobile.

The baby cried for the bottle.
The bottle cried for the baby.
The boy cried for the ball.

The lion cleaned the cheese.
The cheese cleaned the lion.
The line cleaned the chair.

The woman crawled on the money.
The money crawled on the woman.
The wife crawled on the monkey.

The mouse gave the house.
The house gave the mouse.
The mother gave the honey.

The banker growled at the ground.
The ground growled at the banker.
The barber growled at the gown.

The bug ate the people.
The people ate the bug.
The boy ate the pole.

Class A

Student _____

Date _____

The dentist pulled the teeth.
The teeth pulled the dentist.
The doctor pulled the train.

The nurse helped the people.
The people helped the nurse.
The noise helped the poles.

The baker baked the cake.
The cake baked the baker.
The banker baked the candy.

The mouse ate the cheese.
The cheese ate the mouse.
The moth ate the chairs.

The banker gave the money.
The money gave the banker.
The barber gave the monkey.

The bug taught the bottle.
The bottle taught the bug.
The boy taught the battle.

The baby cut the water.
The water cut the baby.
The boy cut the we-l.

The frog cried for the kids.
The kids cried for the frog.
The fog cried for the kite.

The butcher jumped on the ground.
The ground jumped on the butcher.
The barber jumped on the grass.

The teacher crawled on the meat.
The meat crawled on the teacher.
The tailor crawled on the mat.

Class B

Name _____

Date _____

The milkman delivered the milk.
The milk delivered the milkman.
The mailman delivered the mail.

The dentist pulled the teeth.
The teeth pulled the dentist.
The doctor pulled the train.

The bird flew in the air.
The air flew in the bird.
The boat flew in the ark.

The monkey climbed the tree.
The tree climbed the monkey.
The money climbed the track.

The baker baked the cake.
The cake baked the baker.
The banker baked the candy.

The lion cleaned the cheese.
The cheese cleaned the lion.
The line cleaned the chair.

The mouse taught the people.
The people taught the mouse.
The mother taught the piano.

The pilot ate the kids.
The kids ate the pilot.
The pillow ate the kite.

The teacher flew in the house.
The house flew in the teacher.
The tractor flew in the home.

The woman growled at the airplane.
The airplane growled at the woman.
The wife growled at the automobile.

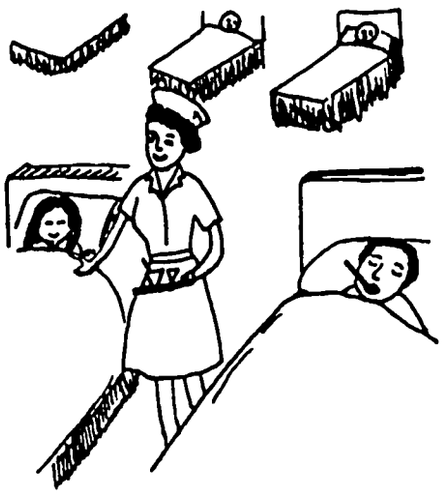
Class A

The dentist pulled the teeth.

The teeth pulled the dentist.

The doctor pulled the train.

Class A

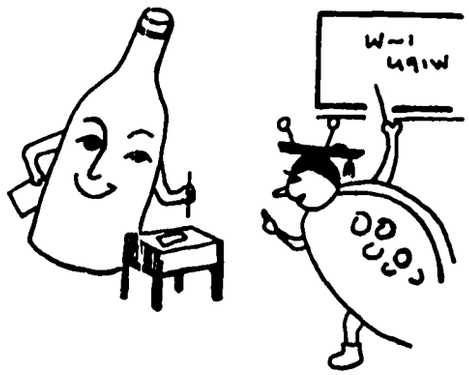


The people helped the nurse.

The nurse helped the people.

The noise helped the poles.

Class A

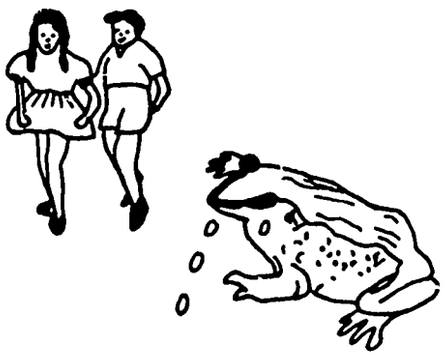


The boy taught the battle.

The bottle taught the bug.

The bug taught the bottle.

Class A



The kids cried for the frog.

The fog cried for the kite.

The frog cried for the kids.

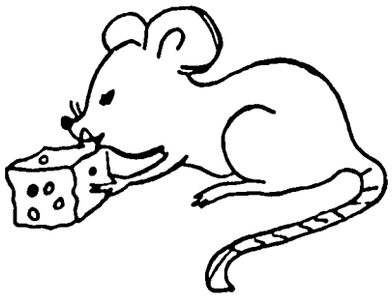
Class A

The baby cut the water.

The water cut the baby.

The boy cut the well.

Class A

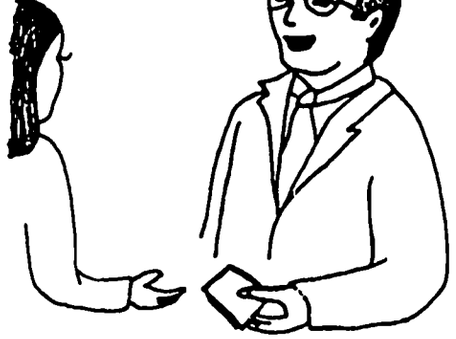


The cheese ate the mouse.

The moth ate the chairs.

The mouse ate the cheese.

Class A



The banker gave the money.

The barber gave the monkey.

The money gave the banker.

Class A

The ground jumped on the butcher.

The butcher jumped on the ground.

The barber jumped on the grass.

Class A

The banker baked the candy.

The baker baked the cake.

The cake baked the baker.

Class A

The tailor crawled on the mat.

The teacher crawled on the meat.

The meat crawled on the teacher.

Class B

The teeth pulled the dentist.

The dentist pulled the teeth.

The doctor pulled the train.

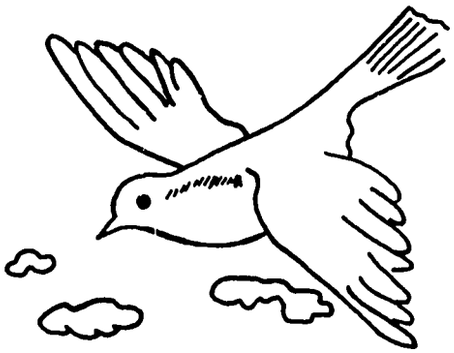
Class B

The mouse taught the people.

The people taught the mouse.

The mother taught the piano.

Class B



The boat flew in the ark.

The air flew in the bird.

The bird flew in the air.

Class B

The money climbed the track.

The monkey climbed the tree.

The tree climbed the monkey.

Class B

The cake baked the baker.

The banker baked the candy.

The baker baked the cake.

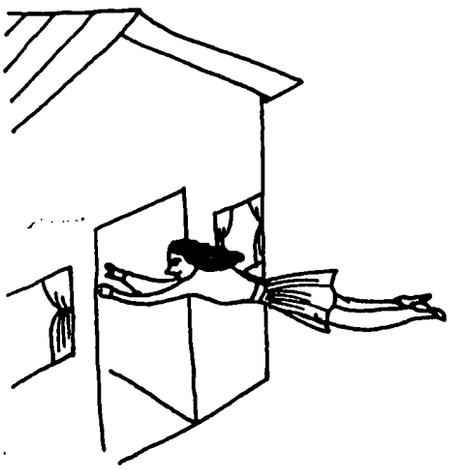
Class B

The lion cleaned the cheese.

The line cleaned the chair.

The cheese cleaned the lion.

Class B



The house flew in the teacher.

The teacher flew in the house.

The tractor flew in the home.

Class B

The wife growled at the automobile.

The airplane growled at the woman.

The woman growled at the airplane.

Class B

The milk delivered the milkman.

The mailman delivered the mail.

The milkman delivered the milk.

Class B

The pillow ate the kite.

The pilot ate the kids.

The kids ate the pilot.

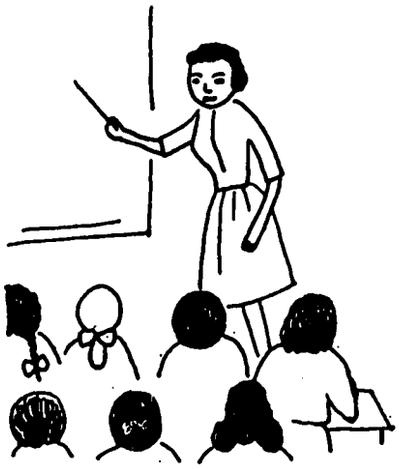
Class C

The boy cried for the ball.

The baby cried for the bottle.

The bottle cried for the baby.

Class C



The teacher taught the kids.

The kids taught the teacher.

The tractor taught the kite.

Class C

The teeth pulled the dentist.

The dentist pulled the teeth.

The doctor pulled the train.

Class C

The money crawled on the woman.

The woman crawled on the money.

The wife crawled on the monkey.

Class C

The people ate the bug.

The bug ate the people.

The boy ate the pole.

Class C

The meat cut the butcher.

The baker cut the mail.

The butcher cut the meat.

Class C

The mouse gave the house.

The house gave the mouse.

The mother gave the honey.

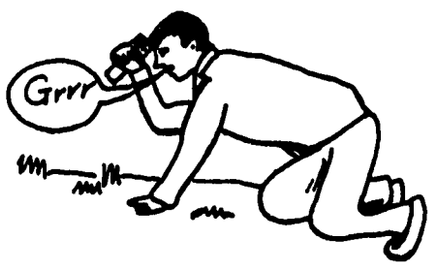
Class C

The line cleaned the chair.

The cheese cleaned the lion.

The lion cleaned the cheese.

Class C

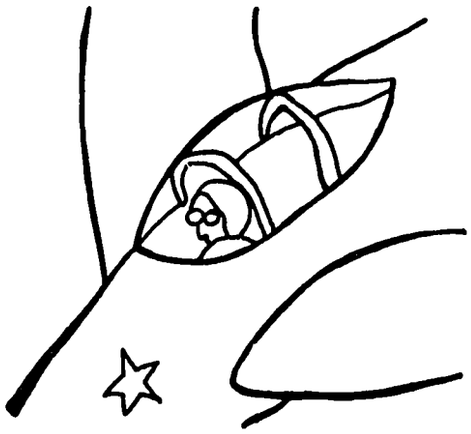


The barber growled at the gown.

The ground growled at the banker.

The banker growled at the ground.

Class C

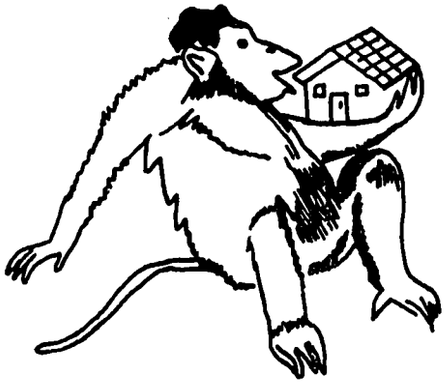


The pillow flew the automobile.

The airplane flew the pilot.

The pilot flew the airplane.

Class D



The money ate the home.

The house ate the monkey.

The monkey ate the house.

Class D

The kids climbed the woman.

The woman climbed the kids.

The wife climbed the kite.

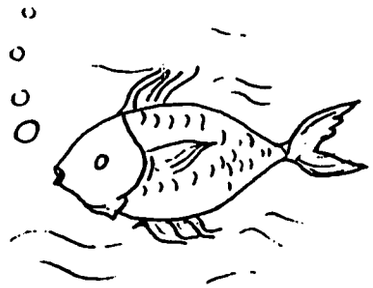
Class I)

The mouse taught the people.

The people taught the mouse.

The mother taught the piano.

Class D



The water swam in the fish

The fish swam in the water

The fist swam in the wall

Class D

The baby cried for the bottle.

The bottle cried for the baby.

The boy cried for the ball.

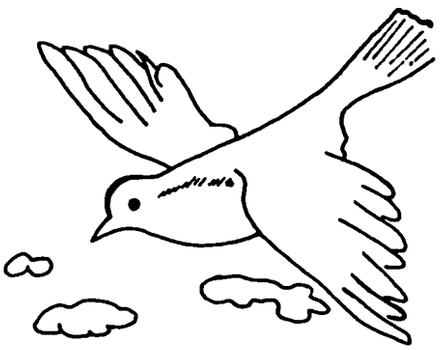
Class D

The tractor growled at the trap.

The tree growled at the teacher.

The teacher growled at the tree.

Class D



The boat flew in the ark.

The bird flew in the air.

The air flew in the bird.

Class D

The cheese cleaned the lion.

The line cleaned the chair.

The lion cleaned the cheese.

Class D

The barber cut the meat.

The meat cut the butcher.

The butcher cut the meat.

Class D

The milk delivered the milkman.

The milkman delivered the milk.

The mailman delivered the mail.

Class L

The soldier sailed the bat.

The boat sailed the sailor.

The sailor sailed the boat.

Class E

The meat cut the butcher.

The barber cut the mail.

The butcher cut the meat.

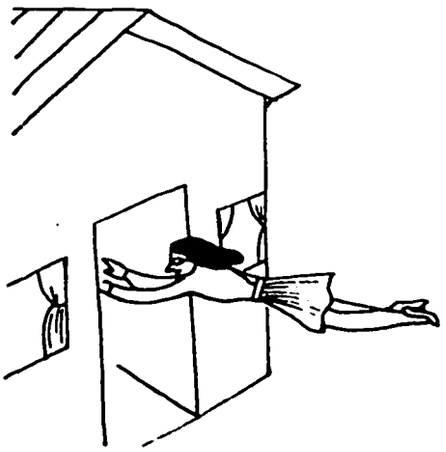
Class E

The line cleaned the chair.

The cheese cleaned the lion.

The lion cleaned the cheese.

Class L



The tractor flew in the home.

The house flew in the teacher.

The teacher flew in the house.

Class E

The pillow ate the kite.

The pilot ate the kids.

The kids ate the pilot.

Class E

The milk delivered the milkman.

The milkman delivered the milk.

The mailman delivered the mail.

Class E

The baker baked the cake.

The cake baked the baker.

The banker baked the candy.

Class E

The woman growled at the airplane.

The wife growled at the automobile.

The airplane growled at the woman.

Class E

The people taught the mouse.

The mouse taught the people.

The mother taught the piano.

Class E

The dentist pulled the teeth.

The doctor pulled the train.

The teeth pulled the dentist.