

1972

# Concreteness and imagery in sentence meaning, revisited.

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CONCRETENESS AND IMAGERY IN  
SENTENCE MEANING, REVISITED<sup>1</sup>

A Thesis Presented

By

Kathy Pezdek

Submitted to the Graduate School of the  
University of Massachusetts in  
partial fulfillment of the requirements for the degree of  
MASTER OF SCIENCE

May  
(Month)

1972  
(Year)

DEPARTMENT OF PSYCHOLOGY

CONCRETENESS AND IMAGERY IN  
SENTENCE MEANING, REVISITED

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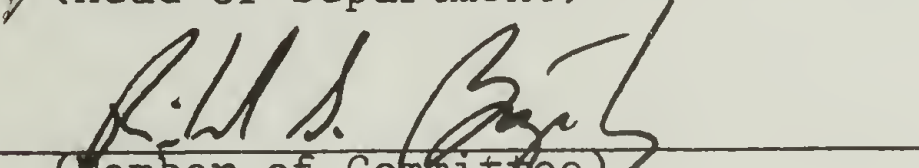
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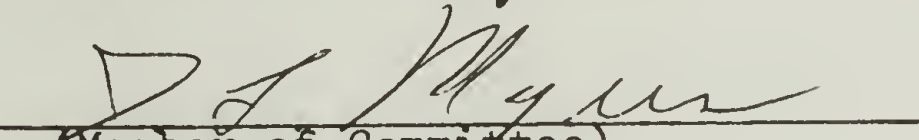
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## INTRODUCTION

Historical Background

As part of an expanding concern for cognitive psychology, an interest in imagery as an effective symbolic process has ensued. Images and words can be considered as two alternative representations of events, objects or language. Imaginal mediation can be differentiated from verbal mediation by the absence of direct use of words. Drawing specifically on suggestions by Paivio (1971, p.12), an image can be defined as a nonverbal, spatial or temporal memory code, which represents perception. To the degree that visual imagery is analogous to visual perception, imaginal processing presumably involves parallel processing of information. "Processing" in this sense refers to that which occurs at storage as well as at retrieval. Verbal processing is functionally linked to the auditory sensory modality and therefore involves sequential processing of information. This is in part due to the syntactic organization of most verbal material and the characteristic left-to-right scanning involved in reading. In contrast, William James (1899) specified that "an imaginal object, however complex, is at any one moment thought in one idea, which is aware of all its qualities together."

The notion of imagery is not new. William James included a chapter on imagination in his book published in 1899, The Principles of Psychology. He spoke of images



as "copies" of sensations that arise after the original stimulus is gone. James even tried to identify a physiological basis of imagery. Soon afterward, reverberations from J.B. Watson's statement, "The action is the meaning," were picked up by Titchener (1911) who wrote, "...it takes at least two sensations to make a meaning... kinaesthesia and verbal images." Bartlett (1932) handled the function of imagery more specifically--"imagining consists essentially in the utilization of experiences which are no longer fully presented to perceptual sensory organs, and such utilization is a part of all remembering processes." This assertion has recently become a source of considerable attention in the area of cognitive research.

### Two Empirical Approaches

The study of imagery has been approached two ways. The first involves imagery-mediating instructions. In this method, subjects are usually presented noun pairs or a list of nouns with or without instructions to form a mental picture of the objects names. The effects of imagery instructions increase recall when the nouns are concrete (Kirkpatrick, 1894; Bower, Lesgold, Tieman, 1959; Schnorr and Atkinson, 1969), but do not facilitate recall for abstract (low-imagery value) noun-verb pairs (Gupton and Frincke, 1970). This approach to studying imagery seems somewhat contrived. The primary role of imagery,

per se, is not actually being measured, but instead it is the effect of inserting imagery as a supplementary memory code that is being manipulated.

This paper will primarily be concerned with a second approach to studying imagery. With this method, characteristics of the to-be-remembered materials which seem to correlate with ease of imagining are varied, and then measures are taken of the effect on recall. An extensive program of research initiated by Paivio has been instrumental in specifying the function of imagery in a way that can be integrated into a general memory theory. Of particular interest in this paper is the function of imagery in learning sentences.

#### Background of Specific Experiments

In recent years an interest in the effects of imagery on learning prose materials has arisen. A study by Pompi and Lachman (1967) reflects this interest. In their study, Pompi and Lachman presented subjects with 79 words, one word at a time. The words were organized syntactically as a paragraph, or they were randomly organized. After one exposure to the entire set of 79 words, the subjects received a recognition test. In the recognition test the previously learned words were interspersed among 150 distractor words which were thematically associated with the test words (high TA) or not thematically associated (low TA). Thematic association refers to the likelihood

that a word is conceptually related to the theme of a given passage. Two results of this study are relevant. First, regardless of other manipulations, the mean number of words correctly recognized was higher for syntactically organized materials than for those presented randomly. Second, an interaction between word order (random or syntactic) and level of TA was obtained using measures of both recall and recognition. More false positive responses were recorded for the high TA distractors than for the low TA distractors following the syntactically ordered paragraph, but the difference was not significant with random order presentation. The implication is that when possible, information is stored as some type of "surrogate structure" (image, semantic core, etc.). This could explain the interaction between word order and level of TA. Utilization of a surrogate structure was only feasible with the syntactically organized material, supported by the high false positive recognition rate for this condition. Additionally, storage in the form of a surrogate structure improved the recall of subjects who were presented syntactically organized materials.

A result interpreted as a facilitative effect of imagery storage was also reported by Dooling and Lachman (1971). In their study they manipulated presentation or non-presentation of a thematic title prior to reading a concrete 77 word paragraph. Prior presentation of the thematic title resulted in superior recall, with the effect increasing

with higher syntactic constraint. As word order approached prose form, the effect of prefamiliarization with the theme of the material increased. Again, the results can be interpreted in terms of storing information in memory in the form of an imaginal representation which summarizes the meaning of the material and facilitates retention of prose material.

The effect of imagery on the storage of less concrete materials was approached by Yuille and Paivio (1967). They applied a mediational-latency paradigm to subjects learning concrete or abstract materials. Instructions encouraged the subjects to link the noun pairs using either imaginal or verbal mediators. The amount of time that it took each subject to determine when he had linked the noun pairs using the specified type of mediator was recorded. These latency measures varied with concreteness under imagery mediation but not under verbal mediation. That is, imagery mediation took significantly longer than verbal mediation with the abstract materials, whereas type of mediation did not affect the response latency with concrete materials. In a similar study, Paivio and Begg (1970) presented both abstract and concrete sentences to subjects and instructed half of the subjects to indicate when they had "imaged" each sentence; the other half were instructed to indicate when they had "comprehended" each sentence. Again, the amount of time that it took subjects

to image or comprehend each sentence was recorded. Using these latency measures, an interaction between mean comprehension and imagery latencies for abstract and concrete sentences was obtained, with the longer latency of "imaging" over "comprehending" more marked with the abstract than the concrete sentences.

More specific to the approach to imagery studies discussed in this paper, is a study by Yuille and Paivio (1969). Subjects were presented 79 word paragraphs which were at one of three levels of abstractness (abstract, concrete or moderately concrete). The level of abstractness was arrived at on the basis of prior subject rating. Although each paragraph was a description of a concrete scene, the abstractness of the individual words was varied for each level of abstractness. In addition, the words in these paragraphs were organized syntactically or randomly. Each subject was presented one paragraph, one word at a time. At the end of the presentation, four minutes were allowed to recall the words in any order. This procedure was then repeated for trial two. The results suggested that with syntactic order, recall improved with increasing concreteness. However, the degree of abstractness did not affect recall of the randomly presented material. The results support the notion that the more abstract a paragraph, the more difficult it is to generate an image to represent it in memory. With abstract material then, the facilitative effect of imagery is not realized.

Consistent with the results of Yuille and Paivio, that abstractness and imagery are inversely related. Paivio and Csapo (1969) proposed the following general model of memory coding for concrete words, abstract words, and pictures. Pictures are perceived spatially and thus are primarily imagery-coded. However, a secondary coding of pictures--a verbal coding--is available to the degree that a picture is unambiguous. In the case of words, perception is verbal, thus initial verbal coding of both abstract and concrete words is equally likely, but the availability of a secondary code--an imagery code--increases in likelihood as concreteness increases.

Sachs (1967a) reported evidence for a somewhat different coding process. She presented subjects with passages followed by a recognition task for a particular sentence heard in the preceding passage. The test sentence was either identical to the original, semantically changed, changed from active to passive voice or vice versa, or formally changed in a way that did not alter the meaning. When the test sentence was heard immediately after the original, there was no significant difference in percent correct among the four types of test sentences. But as the amount of interpolated material between the original and the test sentences increased, recognition for semantic changes did not significantly change, whereas recognition for the other three types of changes declined considerably.

These results suggest that the original form of a sentence is only stored for a brief period of time (presumably until comprehension occurs). Once the meaning or deep structure is ascertained, the semantic interpretation is stored. The two types of memory stores discussed up to this point are verbal storage and imagery storage. Sachs presents the possibility of a third type of memory store, the nature of which has not yet been discussed. Sachs suggested that by syntactic processing, a deep structure is derived from the surface structure of a sentence. A "semantic interpretation" which is made from the deep structure is in fact, "what is stored." It should be pointed out that an imagery storage notion would provide an equally viable explanation for Sachs' data, although imagery was not discussed as an alternative explanation to a semantic store.

Begg (1971), using a recognition procedure similar to that used by Sachs, found results compatible with Sachs' proposed coding process, and expanded her model to handle imagery and retrieval processes. Begg presented several hundred sentences to subjects, visually or auditorily. After several intervening sentences, the sentences were presented again, identical to the original or somewhat changed, and the subjects made judgments of whether the meaning and wording of the test sentences were old or new. Begg's results indicated that the accuracy of meaning

judgments declined as the number of intervening items between the original and the test sentence (lag) increased. The accuracy of meaning judgments however, was not correlated with either lag or accuracy of meaning judgments. On the basis of this evidence, Begg hypothesized a model of concrete sentence memory in which the meaning of the sentence is normally stored imaginably in long term store, and the actual words are available through reconstruction from the image at retrieval.

Begg and Paivio (1969) affirmed the result that semantic changes in concrete sentences are more readily recognized than wording changes which retain the same meaning but found that the reverse relationship prevailed when abstract sentences were used. Subjects were presented 20 sets of five individual sentences each. Fifty sentences were rated abstract. Fifty sentences were concrete. All sentences were constructed similarly in the form, "The (adjective) (noun) (past tense verb) a(n) (adjective) (noun)." After hearing each set of five sentences, one of the five was played back either identical to the original, semantically changed or lexically changed. The task of the subject was to recognize each test sentence as "identical" to the original or "changed" and then to indicate a confidence rating. Subjects were randomly assigned to each independent condition of the two by two design. The design included abstract and concrete sentences and semantic and lexical changes. The results indicated an interaction between



recognition of semantic changes and lexical changes for abstract and concrete sentences. The nature of the interaction was that lexical changes were recognized at a higher rate with abstract sentences, but the recognition rate for semantic changes was higher with concrete sentences. This is consistent with findings and interpretations of Yuille and Paivio (1969) and Pompi and Lachman (1967) that concrete sentences are primarily stored and coded non-sequentially as images, whereas abstract sentences are primarily stored and coded verbally in a sequential process. Several interpretations of these results were proposed by Begg and Paivio. One interpretation is that imaginal coding is more efficient in terms of reducing the number of memory units. Another possible explanation was that abstract sentences are treated as anomalous sentences.

One interpretation mentioned but discounted was that a sentence can only be coded as an image after it has been comprehended. Since, by their nature, abstract sentences are more difficult to comprehend, they are likely to be coded verbally in their original form. Begg and Paivio concede that concreteness and comprehensibility might have been somewhat correlated in their study. However, they argue that the differential-comprehension argument is not an important factor in their study on the basis of the absence of any main effect of sentence type. That is, looking at sentence type irrespective of type of change, there was no difference in recognition rate between abstract and concrete sentences.

The nature of this explanation is not clear. Because Begg and Paivio do concede that concreteness and comprehensibility may be correlated, it seems necessary to equate for comprehension of abstract and concrete sentences before attributing results solely to level of concreteness.

## RATIONAL FOR PROPOSED STUDY

Begg and Paivio's results, that lexical changes are recognized at a higher rate with abstract sentences, while the recognition rate for semantic changes is higher with concrete sentences, warrant further investigation to assess the role of comprehension in the interaction. The finding that the exact wording of abstract sentences is remembered significantly better than the meaning of the same sentences, is of particular interest. The present study attempted to insure comprehension of both concrete and abstract sentences and then determine if the same type of interaction between level of concreteness and type of test still occurred. If the recognition rates followed the same pattern as reported by Begg and Paivio, that is, if memory for the exact wording of abstract sentences exceeded memory for abstract sentence meaning, then the notion of an imagery store would still be viable. If however, the interaction did not result, and the direction of the difference between rate of recognition of wording and meaning changes was reversed for abstract sentences, then two explanations might be presented. One explanation is that comprehension increased the "imagability" of the abstract sentences and thus, as a result of the comprehension task, both types of sentences were stored similarly. If this occurred,

they would be equally accessible in memory. A second line of reasoning is that as a result of comprehension, both types of sentences were in fact stored as semantic units (as discussed by Sachs) rather than as images. The results of the present study would not be able to differentiate these two hypotheses.

The primary purpose of this study was to test the hypothesis that an essential variable that determines whether an idea is stored nonverbally and is coded as Begg and Paivio suggested, in a way which is consistent with the notion of imagery, is the degree to which that idea has been comprehended. Using modifications of the abstract and concrete sentences used by Begg and Paivio, a procedure experimentally comparable to that used by Begg and Paivio was employed. Each test session consisted of an acquisition phase followed by a recognition phase. During each of four acquisition phases, eight sentences (half rated by subjects to be concrete, half abstract) were presented via tape recording. Immediately after each presentation set, a recognition test on those eight sentences followed, again on tape. In each set of recognition sentences, two sentences were semantically changed from the original sentence; two involved lexical changes only; four were identical to the originals.

In an attempt to insure comprehension by the experimental group, a phenomenon previously found to be successful by Rohwer (1966) was used. Rohwer found that embedding word

pairs in a sentence resulted in better recall of the word pairs than simply presenting the pairs to be studied. The linking sentences seemed to improve recall by providing a context for the to-be-remembered material. Hyde and Jenkins (1969) also reported a facilitation effect of semantic manipulation of materials being learned by subjects. In the present experiment, the to-be-remembered materials were sentences. Context was provided by embedding each sentence in a short paragraph which more specifically indicated the meaning of that sentence.

In addition to the experimental group, two control groups were run. One control group received the same conditions as the experimental group with the deletion of the comprehension task. This control allowed an evaluation of the effect of the comprehension task. The second control group did not receive the comprehension task and in addition was presented sentences at the same rate used by Begg and Paivio, which is shorter than the rate for the other two groups. This control was designed to compare the results of the present experiment with the results of Begg and Paivio.

As a result of encouraging comprehension of concrete and abstract sentences, it was predicted that both types of sentences would be stored similarly as images (suggested by Begg and Paivio) or as semantic units (discussed by Sachs). By either model, it was predicted that subjects would have ready access to the meaning of sentences and would be able

to retrieve the exact wording only through reconstruction from the stored meaning. A reversal in the direction of the difference reported by Begg and Paivio between recognition rates for lexical and semantic changes for abstract sentences was thus expected. In this case, recognition rates were expected to be higher for semantic changes than for lexical changes for both abstract and concrete sentences.

## METHOD

Subjects

One hundred and twenty undergraduate students from the University of Massachusetts served as subjects. They were run in groups ranging in size from five to twenty subjects. Prior to testing, subjects were informed only that they were to participate in a verbal-memory task.

Materials

Sixteen abstract (A) and 16 concrete (C) sentences were presented to subjects. A constant structure was used for all sentences. This structure was, "The (adjective) (noun) (past tense verb) a(n) (adjective) (noun)." The sentences were modifications of those used by Begg and Paivio. Words in the abstract and concrete sentences were equated for frequency on the basis of the Thorndike-Lorge (1944) word count. The imagery level of the nouns was evaluated when possible, based on the scale of Paivio, Yuille and Madigan (1968). On the imagery scale of one to seven, the mean rating of concrete sentences was three points higher than the mean rating of abstract sentences.

Two types of changes were applied to the original sentences to produce the test sentences. These changes were semantic and lexical. The first type of transform, semantic change, occurred when the subject-noun and the object-noun were interchanged. The second type of

change was lexical and involved substituting a synonym with the same frequency and imagery rating for the subject-noun and leaving the rest of the sentence unchanged. An example of each type of change is included in Appendix B. For each sentence, lexical changes and semantic changes were equally plausible, although only one type of test was given on each original sentence for a given subject. This was determined in a pilot study in which subjects rated all original sentences and semantically changed and lexically changed transforms of each original sentence. Sentences not unanimately rated as "sensible and plausible" were rejected. This procedure prevented a possible response bias toward any one type of response.

The list of 32 sentences was subdivided into four sets of eight sentences. Within each set, four abstract and four concrete sentences were randomly arranged with the limitation that not more than two sentences of either type could occur in sequence. Each set of eight sentences was recorded on tape. A test session consisting of one test on each of the sentences in the preceding set was recorded after each new set. Each test set of eight sentences included two semantically changed sentences (S), two lexically changed sentences (L), and four identical sentences (I), arranged so that abstract and concrete sentences were equally represented in each type of test. As the task of the subject was to respond only "identical"



or "changed", the distribution of test types attempted to avoid a response bias. This process of ordering sentences and determining the type of test to be applied to each sentence was carried out twice to arrive at different sequences for Order<sub>1</sub> and Order<sub>2</sub>. Type of test (S, L, or I) and type of sentence (A or C) were within subject variables, so all test sentences from all subjects were included in the analysis.

### Design

Twenty subjects were randomly assigned to each condition in a two by three factorial design with between-subjects variables of list order (O<sub>1</sub> and O<sub>2</sub>) and treatment groups (E, C<sub>1</sub> and C<sub>2</sub>). Additional within-subject variables of type of test sentence (I, L, or S) and level of concreteness of sentence (A or C) were included. Table 1 outlines the design. Although all subjects heard the same 32 sentences, these sentences and the test type of each were arranged in two random orders to determine the extent of order-dependence in the outcome. The independent variable of particular interest was type of treatment. The experimental group (E) listened to a short paragraph, providing a context to each test sentence. The test sentence was always the last sentence in the paragraph. Each paragraph was presented within a 15 second time interval. The first control group (C<sub>1</sub>) was allowed 15 seconds following each presented



sentence to repeat and study the presented sentence. This control allowed for a comparison of conditions within this study. The second group ( $C_2$ ) had an inter-trial interval of five seconds to repeat and study the presented sentence. This condition was a control to allow a comparison of the experimental group in this study to that of Begg and Paivio.

## Procedure

### Familiarization Task

Subjects were instructed before the familiarization session as to the requirements of the task. The exact instructions are included in Appendix B. A practice set of six sentences was then presented after the instructions, to familiarize the subjects with the procedure and reduce any practice effect. The practice sentences were obtained by the same procedure by which the experimental sentences were arrived at. The familiarization session consisted of two phases, an acquisition phase followed by a recognition phase. In the acquisition phase, four abstract and four concrete sentences were presented on tape in a random order. Immediately after the presentation of the last sentence in the set, a recognition test on transforms of the original sentences followed, again on tape. The recognition sentences were either identical to the

original, semantically changed or lexically changed. The task of the subject was to listen to each test sentence, decide if the test sentence was identical to the originally presented sentence, semantically changed, or lexically changed, and mark the corresponding space on the response protocol sheet. In addition, subjects were asked to rate their confidence in making each response on a five-point scale. Subjects had seven seconds to respond to each test sentence.

In the acquisition phase, the sentences were recorded at 15 second intervals for groups E and C<sub>1</sub>, and at five second intervals for group C<sub>2</sub>. In the 15 second interval between sentences, the experimental group was instructed to listen to the presented paragraph in which the test sentence was always the last sentence. Experimental subjects were encouraged to listen to the entire paragraph, as it would help them to remember the last sentence. The control groups were instructed to study each sentence in the intervening interval.

### Experimental Task

The procedure in the experimental session was like the procedure rehearsed in the practice session. Four trial blocks, each consisting of an acquisition phase with eight sentences, followed by a recognition test on those eight sentences, were presented on tape in succession without interruption.

## RESULTS

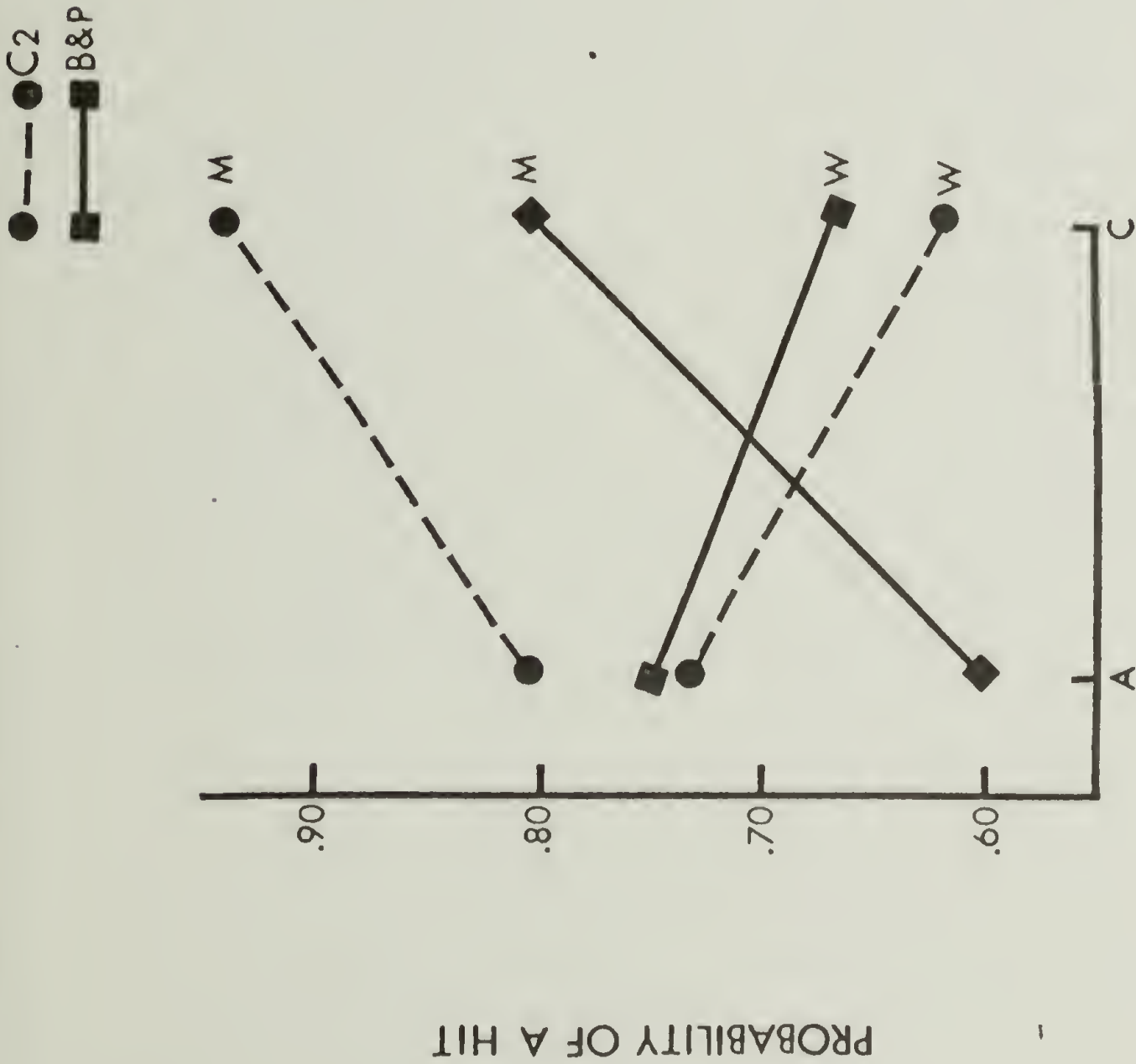
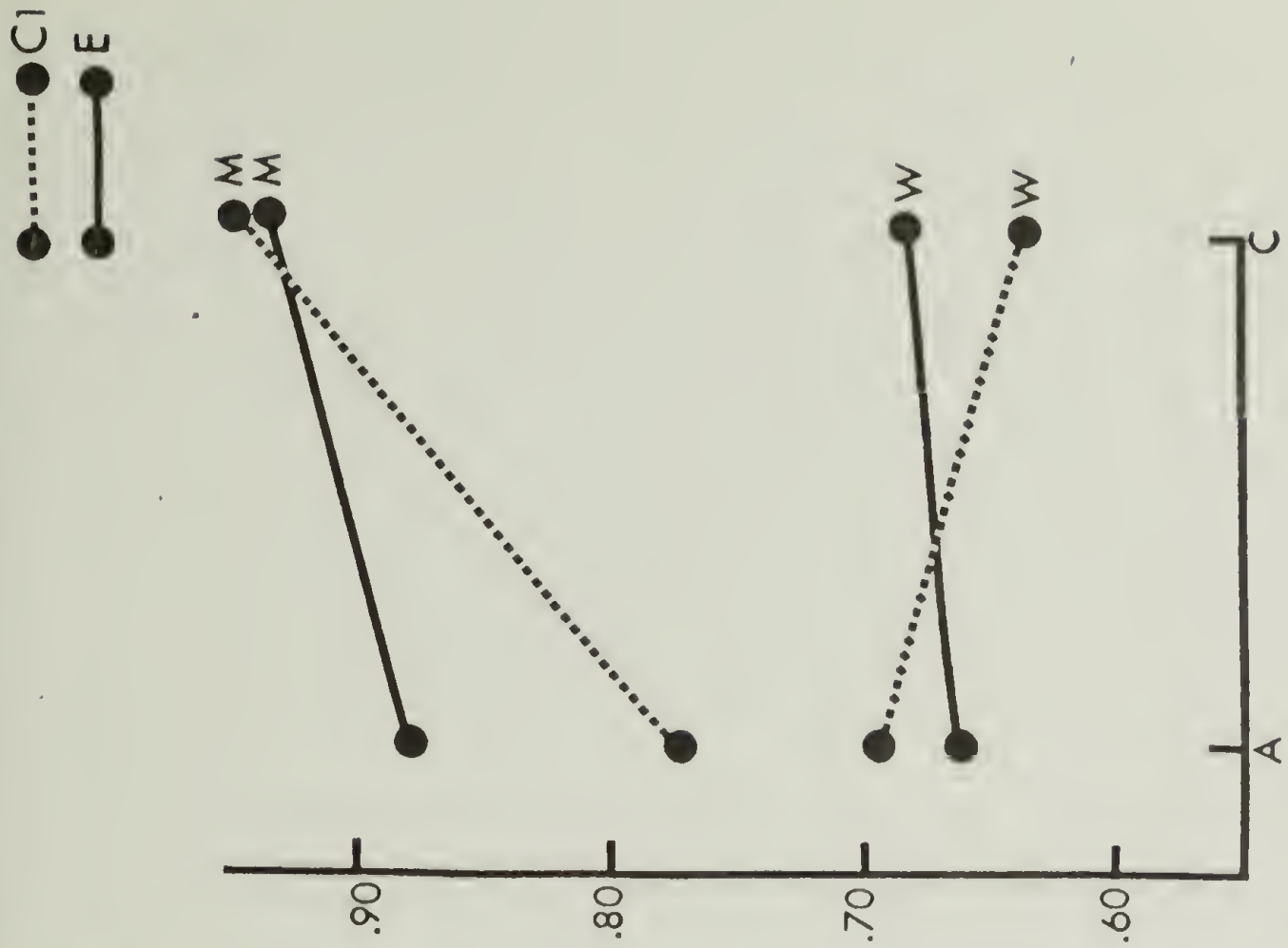
The results of the study were analyzed with several purposes in mind. First, to determine if the pattern of results obtained in the Begg and Paivio experiment was similar to that found in the present experiment. Second, to assess the comparability of the two control groups used in the study. And finally, to determine the effects of embedding the experimental sentences within context-paragraphs. In all of these comparisons the dependent variable of primary interest was the probability of a correct sentence identification (hit), defined as saying "changed" when a test sentence was changed. In addition, an analysis was performed on unchanged test items where a correct identification was defined as saying "identical" for the unchanged sentences. The independent variables were treatment groups (E, C<sub>1</sub>, and C<sub>2</sub>), order of the presented sentences (O<sub>1</sub> or O<sub>2</sub>), concreteness of the sentences (A or C) and type of test (Original, Meaning change, or Wording change).

Comparison with Begg and Paivio (1969)

Begg and Paivio reported that subjects had a higher hit rate for wording changes than they had for meaning changes when the sentences were abstract. When the sentences were concrete, they had a higher hit rate for meaning changes than they had for wording changes. The C<sub>2</sub> control group in the present experiment provided

a test of the generalizability of the Begg and Paivio results. It should be noted that the C<sub>2</sub> group was not a direct replication of the Begg and Paivio results because different stimulus sentences were used in the two studies. and because the present study used a within-subjects design, not a between-subjects design as used by Begg and Paivio.

The results from the Begg and Paivio study and the C<sub>2</sub> group from the present study are presented in Figure 1. It is apparent from examining the figure that the pattern of outcomes from the C<sub>2</sub> group in the present study is different from the Begg and Paivio study in that there was an effect for type of test sentence in the present study. That is, the meaning changes were recognized at a higher rate than wording changes for both concrete and abstract sentences. No such effect is present in the Begg and Paivio study. It is important to note, however, that after removing the main effect of type of test, the magnitude of the interaction between recognition of meaning changes and wording changes for abstract and concrete sentences was about the same for the two studies under consideration. The procedure for this calculation is specified in Appendix A. A significance test was not possible because the error variance is not available for Begg and Paivio's study. But the data indicates that



SENTENCE CONCRETENESS

Figure 2. Comparison of P(Hit) of meaning and wording changes as a function of sentence concreteness for the Experimental treatment and Control<sub>1</sub>.

Figure 1. Comparison of P(Hit) of meaning and wording changes as a function of sentence concreteness for Begg and Paivio's data and Control<sub>2</sub>.

the magnitude of the interaction of interest was 28% for Begg and Paivio and 25% in the present study.

### Comparison of C<sub>2</sub> with C<sub>1</sub>

An individual analysis of the two control groups in this study was necessary prior to assessing the effect of embedding the sentences within a paragraph context. The reason for this is that the previously reported C<sub>2</sub> group differed from group E by two factors, presentation time for each sentence and the context-paragraph treatment. The C<sub>1</sub> group differed from group E only by the absence of the context-paragraph treatment. Thus, an intermediate analysis of C<sub>2</sub> and C<sub>1</sub> was necessary to eliminate the possibility that the increased sentence presentation time was responsible for results of group E.

The results of the analysis of meaning and wording test changes in groups C<sub>2</sub> and C<sub>1</sub> are reported in Table 2. As can be seen in the table, there were significant main effects for test type, where meaning changes were recognized correctly more often than wording changes, and order of presentation, where the probability of a hit for O<sub>2</sub> exceeded that for O<sub>1</sub>. In addition to the main effects, several significant interactions occurred. The reliable concreteness x test type interaction was in the direction that meaning changes were recognized at a higher rate when the sentences were concrete, but the probability of a hit for wording changes declined



Table 2

Analysis of Variance for Groups  $C_1$  and  $C_2$ ,  
Recognition Rate Data

Source of Variance	df	MS	F
Groups (G)	1	.0070	.14
Order (O)	1	.5281	10.16 **
Concreteness (C)	1	.0945	1.66
Test Type (T)	1	3.0031	68.41 **
GO	1	.0781	.83
GC	1	.0383	.59
OC	1	.4500	7.92 **
GT	1	.0000	.00
OT	1	.0945	2.15
CT	1	1.1281	36.27 **
S(GO)	76	.0520	
GOC	1	.0031	.05
GOT	1	.3445	7.85 **
GCT	1	.0031	.26
OCT	1	.6570	21.125 **
SC(GO)	76	.0568	
ST(GO)	76	.0439	
GOCT	1	.0008	.03
SCT(GO)	76	.0311	

\* Significant at .05  $\alpha$  level

\*\* Significant at .01  $\alpha$  level

as concreteness increased. The order x concreteness interaction reflects that the probability of a hit increased with concreteness for  $O_2$  but decreased with concreteness for  $O_1$ . Significant second-order interactions were groups x order x test type and order x concreteness x test type. The lack of significant groups, groups x concreteness, groups x test type, and groups x concreteness x test type effects are of particular relevance to the intended function of group  $C_2$ . Extending the presentation time from five seconds to 15 seconds did not significantly alter any of the experimental effects of primary interest.

#### Comparison of Groups E and $C_1$

The effect of the context-paragraph treatment alone can be evaluated on the basis of the comparison of groups E and  $C_1$ . These groups differed only by one factor-- the presence or absence of the experimental treatment.

Table 2 presents the results of the analysis of groups E and  $C_1$  for wording and meaning test changes. The significant main effects were sentence concreteness, in the direction that concrete sentences were recognized correctly with a higher probability than were abstract sentences, and type of test sentence, where the probability of a hit with meaning changes exceeded that for wording changes. Other significant sources of variance were

Table 3  
 Analysis of Variance for Groups E and C<sub>1</sub>,  
 Recognition Rate Data

Source of Variance	df	MS	F
Groups (G)	1	.0633	1.22
Order (O)	1	.0781	1.50
Concreteness (C)	1	.1758	3.93 *
Test Type (T)	1	3.7195	75.91 **
GO	1	.0281	.54
GC	1	.0070	.16
OC	1	.4500	10.07 **
GT	1	.0383	.78
OT	1	.0031	.06
CT	1	.3445	9.14 **
S(GO)	76	.0520	
GOC	1	.0031	.07
GOT	1	.0500	1.02
GCT	1	.1758	4.66 *
OCT	1	.2531	6.71 **
SC(GO)	76	.0447	
ST(GO)	76	.0490	
GOCT	1	.0781	1.94
SCT(GO)	76	.0377	

\* Significant at .05  $\alpha$  level

\*\* Significant at .01  $\alpha$  level

order x concreteness, where the recognition rate increased with increasing concreteness for  $O_2$  but decreased with increasing concreteness for  $O_1$ , and concreteness x test type such that the hit rate for meaning test sentences was directly related to concreteness while the hit rate for wording test sentences was inversely related to concreteness. Significant second-order interactions were groups x concreteness x test type and order x concreteness x test type. The effect of concreteness was more marked with  $O_2$  than with  $O_1$ . The direction of significant results, excluding those involving order, can be seen in Figure 2. The remaining sources of variance were nonsignificant.

Begg and Paivio reported that the hit rate for wording changed and meaning changed test sentences was differentially affected by the level of concreteness of the sentences, to the extent that wording changes were more often noticed than meaning changes in abstract material and meaning changes were more often noticed than wording changes in concrete sentences. In an effort to determine if, in the present study, embedding the sentences in a context-paragraph had a differential effect on wording changed and meaning changed test items, a separate analysis of variance was performed on the two types of test sentences for groups E and  $C_1$ . The treatment groups x concreteness interaction was not significant for wording test

items,  $F(1,76)=1.11$ , but was significant for meaning test items,  $F(1,76)=5.97$ ,  $p=.05$ . Referring to Figure 2, it can be seen that embedding the sentences in a context-paragraph did have a differential effect on hit rate depending on the concreteness of the sentences. For wording changed test sentences, the difference between groups  $C_1$  and E for abstract sentences was not significantly different from the difference between the two groups for concrete sentences. For meaning changed test sentences, there was no difference between the groups on concrete sentences but a significant difference for abstract sentences. This result can also be seen in the significant main effect of concreteness for meaning changes,  $F(1,76)=15.87$ ,  $p<.01$ , due to the higher hit rate for concrete sentences than for abstract sentences, but a lack of a concreteness main effect for wording changes,  $F(1,76)<1$ . Figure 2 illustrates that for group E alone, meaning changes were recognized at a higher rate than wording changes at both levels of concreteness, and the increase in recognition rate from abstract to concrete sentences was similar for both types of tests. For group E, the magnitude of the interaction between meaning and wording changes for abstract and concrete sentences was 4%, compared with 28% reported by Begg and Paivio.

### Hit Rate for Original Test Sentences

The rate of correctly recognizing the original test sentences for each of the three treatment groups was analyzed separately. A significant source of variance in the analysis of original test items was sentence concreteness,  $F(1,114)=27.27$ ,  $p<.01$ . The higher hit rate for concrete sentences over abstract sentences accounts for this effect. The significant groups x concreteness interaction,  $F(2,114)=9.76$ ,  $p<.01$ , is illustrated in Figure 3. The main effect of order was significant,  $F(1,114)=5.93$ ,  $p=.01$ , with  $O_1$  obtaining a higher hit rate than  $O_2$ .

### Confidence Rating Data

In addition to the recognition data obtained in the present study, the subjects also made confidence ratings for their judgments of whether each test sentence was an original or changed item. Analysis of the confidence ratings in groups E and  $C_1$  for wording change and meaning change test items was of particular interest. The results of the analysis of variance of the confidence rating data were similar to the results of the analysis of recognition data, with the exception that order was a significant source of variance in the case of the former,  $F(1,76)=5.27$ ,  $p<.05$ , but not in the case of the

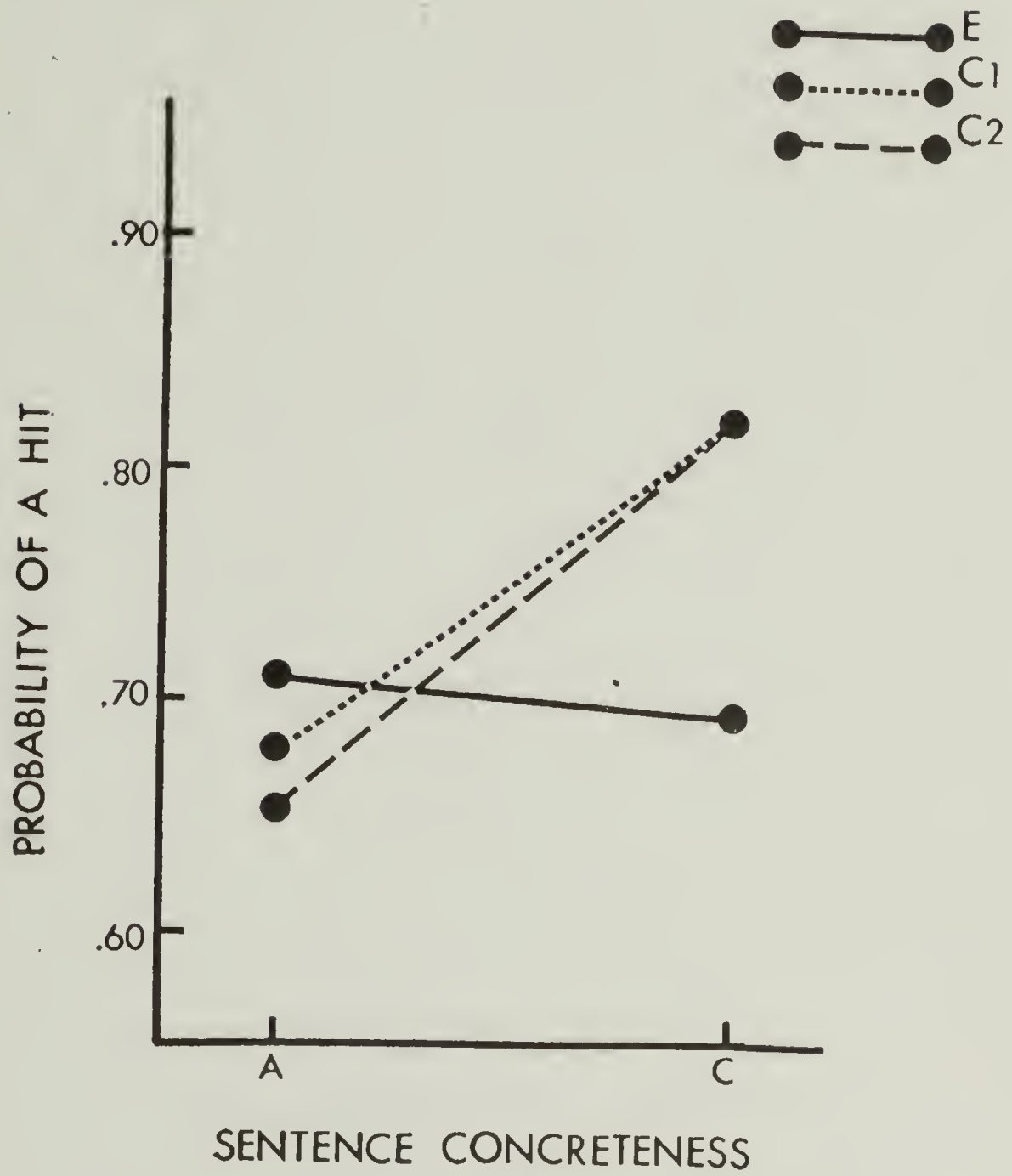


Figure 3.  $P(\text{Hit})$  of original test sentences as a function of the concreteness of sentences.

latter. The direction of this effect was that confidence ratings for  $O_2$  exceeded ratings for  $O_1$ . The second-order interaction of order x concreteness x test type was a significant source of variance in the confidence data,  $F(1,76)=6.71$ ,  $p=.01$ .

The three treatment groups were then analyzed together, with the results being similar to those reported for E and  $C_1$  alone. Order was not a significant source of variance in the recognition data,  $F(1,114)=2.03$ , but was significant in the confidence rating data,  $F(1,114)=4.92$ ,  $p<.05$ . The order x concreteness x test type interaction was also significant in the confidence data,  $F(2,228)=4.92$ ,  $p<.01$ .

A finding consistent with the differences between recognition rates noted in the previous section was the significant main effect of test type when all three test types of the three treatment groups were analyzed together,  $F(2,228)=47.04$ ,  $p<<.01$ . On a five-point scale, unchanged test items were rated with the least confidence (Mean=3.69), wording changes were rated next in confidence (Mean=3.91), and meaning changes were rated with the highest confidence (Mean=4.17). A significant main effect of concreteness was also obtained with concrete sentences rated with higher confidence than abstract sentences,  $F(1,114)=199.50$ ,  $p<.01$ . A surprising outcome was the nonsignificance of treatment



groups,  $F(2,114) < 1$ . The confidence of subjects did not vary systematically due to either extending the sentence presentation duration or embedding the sentences in a context-paragraph. The groups x concreteness x test type interaction was also nonsignificant,  $F(4,228) = 2.28$ .

### Signal Detection Analysis

A signal detection analysis was performed on cell means in an attempt to separate response bias from sensitivity to change. A value of  $d'$  was computed for each group for each combination of treatment, order, sentence concreteness and test type. This information is presented in Figure 4. In each case  $d'$  is greater for meaning changes than for wording changes. Furthermore, the interaction of test type x sentence concreteness is observable in both control groups, but is lacking in the experimental group. The nature of the interaction for the control groups is that the difference between  $d'$  for meaning and wording changes is greater for concrete sentences than for abstract sentences. An additional point worth noting is that  $d'$  does not appear to be order-dependent, as previous analyses suggested.

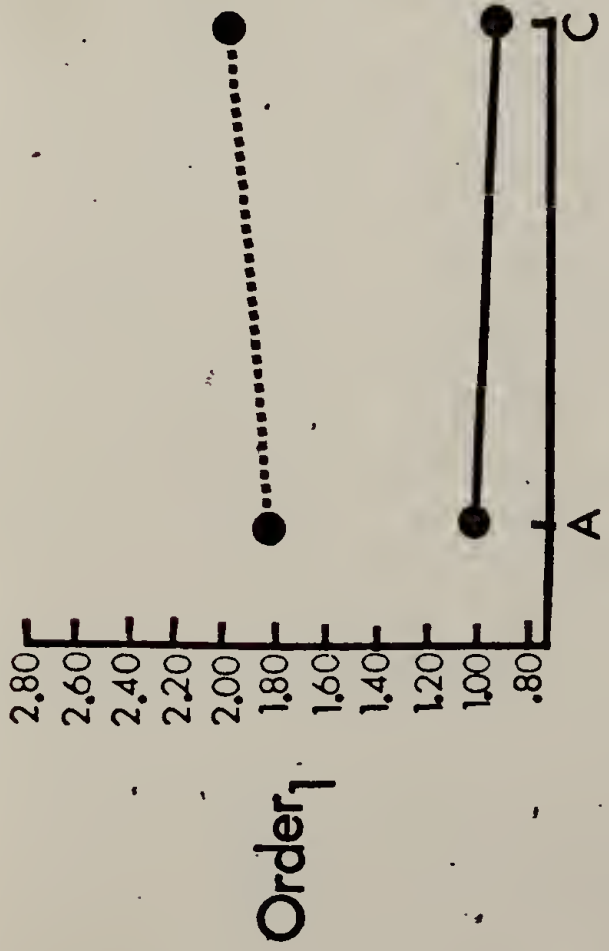
Criterion or cutoff measures were computed for each group for each combination of treatment group, order and sentence concreteness. These measures are reported in Table 4. The notion that order did affect the decision criterion but did not influence  $d'$  is supported by two findings. First, the presence of a concreteness x test type interaction with group

$C_1$  but no such interaction with group  $C_2$ . Second, the cutoff increased with concreteness for Order<sub>2</sub> of Control<sub>1</sub> but decreased with concreteness for Order<sub>2</sub> of the Experimental group.

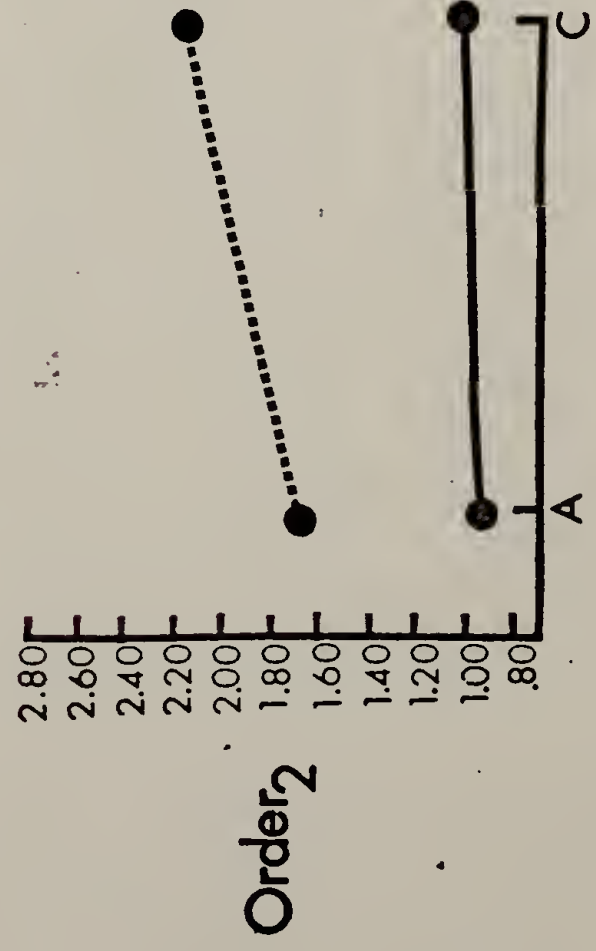
EXPERIMENTAL

CONTROL<sub>1</sub>

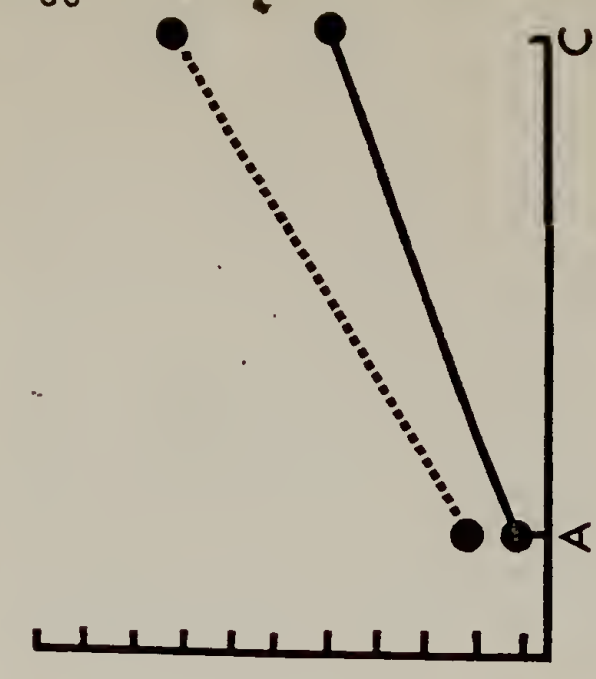
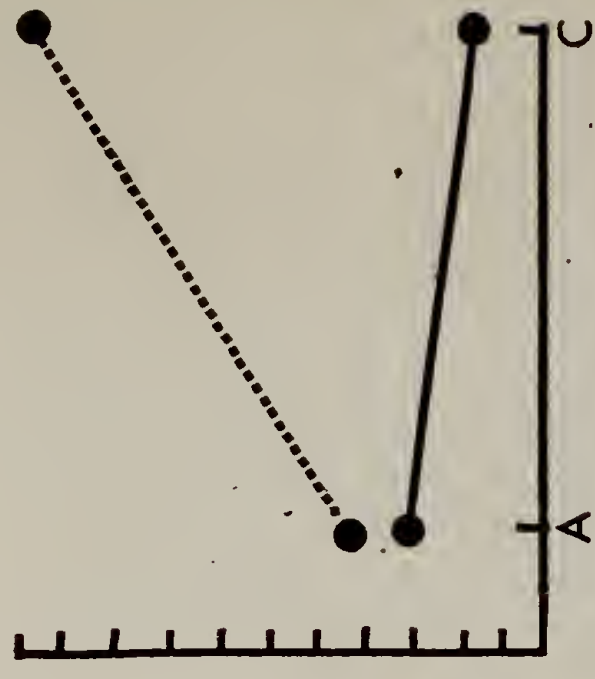
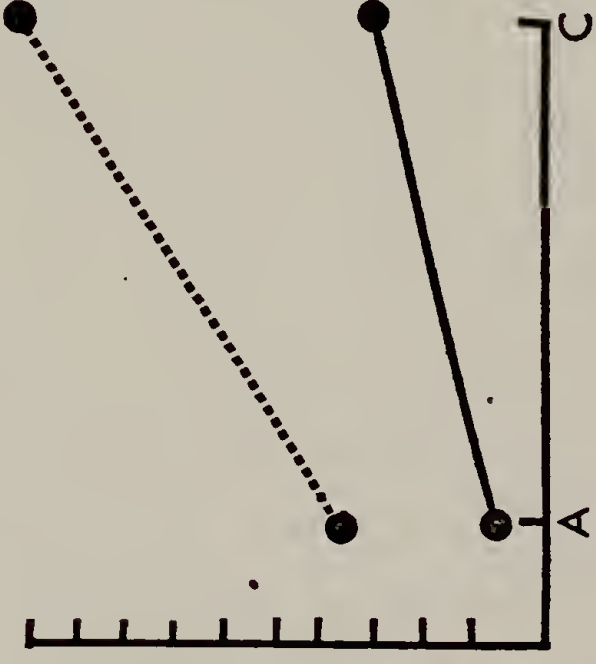
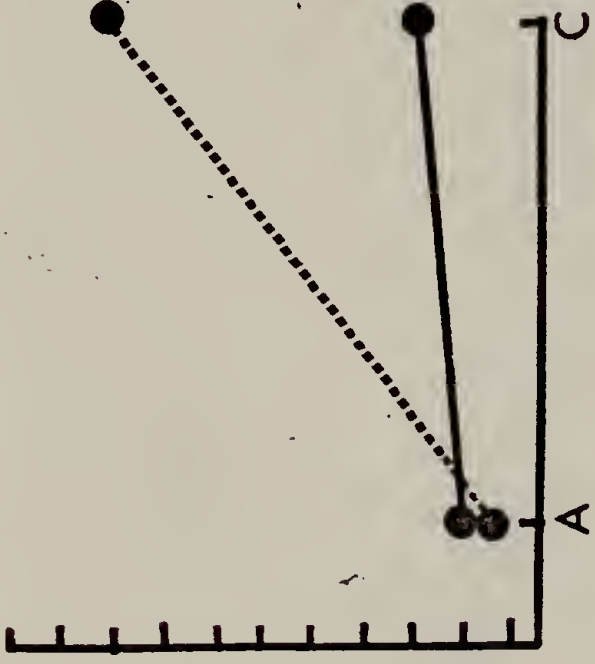
CONTROL<sub>2</sub>



Order<sub>1</sub>



Order<sub>2</sub>



WORDING  
 MEANING

SENTENCE CONCRETENESS

Figure 4. d' values for groups defined by conditions of treatment group, order, sentence concreteness and test type.

Table 4

Criterion Values for Groups Defined  
by Conditions of Treatment Groups,  
Order and Sentence Concreteness.

## Treatment Groups

	Experimental		Control <sub>1</sub>		Control <sub>2</sub>	
	A	C	A	C	A	C
Order <sub>1</sub>	.47	.64	.33	1.08	.67	1.23
Order <sub>2</sub>	.64	.39	.58	.81	.15	.67

## DISCUSSION

The major purpose of the present study was to examine the effect on sentence recognition due to embedding abstract and concrete sentences in a context-paragraph. Begg and Paivio have argued that concrete sentences are stored as spatial representations in memory, whereas abstract sentences are stored as verbal representations. The results of their study tended to support this position since subjects had better recognition for wording changes when the sentences were abstract, and better recognition for meaning changes when the sentences were concrete. An alternative explanation for this outcome, which Begg and Paivio discounted, was that the subjects in their study had difficulty comprehending the abstract sentences and therefore simply tried to remember the words making up the sentences. The intent of the paragraph embedding in the present study was to provide a context for the sentences and therefore increase the comprehension of the sentences.

Before proceeding to a discussion of the context-paragraph results, the generalizability of the Begg and Paivio results will briefly be considered. The present study included a control group designed to determine the generalizability of Begg and Paivio's results to this study ( $C_2$ ). The similarity of the magnitude of the

test type x concreteness interactions for Begg and Paivio's results and results of group  $C_2$  upholds the general comparability of the two studies. In addition, the analysis of groups  $C_2$  and  $C_1$  together revealed no significant effects due to groups. The extended presentation duration for  $C_1$  had no significant effect on the magnitude or direction of the results. Thus, a direct comparison of groups  $C_1$  and E was appropriate to ~~evaluate~~ the effect of providing a context-paragraph, and (2) compare the results of this treatment effect to the results of Begg and Paivio.

The purpose of the embedding treatment was to increase the comprehension of abstract sentences. If increased comprehension due to paragraph embedding did occur, meaning changes of abstract sentences should be recognized at a higher rate by group E than by group  $C_1$ . In other words, for group E, the direction of the difference between rate of recognition of wording and meaning changes would be expected to be reversed from the Begg and Paivio results for abstract sentences following the comprehension task.

The most noteworthy result of embedding sentences in a context-paragraph, as can be seen in Figure 2, was that the recognition rate for meaning changes for abstract sentences was significantly increased as a result of the comprehension task. The provided context, interpretable as encouraging comprehension, served to reverse the

direction of the difference reported by Begg and Paivio between recognition rates for lexical and semantic changes for abstract and concrete sentences. The almost parallel plots of group E for wording changes and meaning changes for both concrete and abstract sentences is suggestive of the notion that when comprehension of the sentences occurs, the form of the storage units for the two types of sentences is similar. The similarity of storage of abstract and concrete sentences following the comprehension task, is further supported by the result that the recognition rate for wording changes is practically the same for abstract and concrete sentences for group E. Furthermore, a differential effect on the recognition rate of embedding sentences in a paragraph as opposed to simply presenting the sentences was revealed in the separate analyses of variance of wording change and meaning change test sentences for groups E and  $C_1$ . This differential effect was dependent upon the concreteness of the sentence. The direction of this effect can be noted in Figure 2, where the experimental treatment had its greatest effect on raising the recognition rate for meaning changes of abstract sentences. The increased recognition rate for meaning changes of abstract sentences is of particular interest to the present study.

One possible explanation for these results is that the nature of the storage unit is such that subjects have

ready access to the meaning of the sentences, but retrieval of exact wording only occurs through reconstruction from the stored meaning. The dual-coding hypothesis avails another viable model which provides an interpretation of the process involved. The dual-coding interpretation proposes that the meaning of a sentence is stored separately and independently from the wording of the sentence (Paivio and Csapo, 1969). The assumption of Begg and Paivio that concrete but not abstract sentences are amenable to unitization or coding which included the "gist" of a sentence in a succinct unit, now seems questionable. As a result of encouraging comprehension of the sentences in the present study, the recognition rate for meaning changes was practically the same for abstract and concrete sentences. This suggests that abstract sentences are in fact capable of being stored in some unitized form similar to that utilized with concrete sentences. The results of this study imply that comprehension is a condition necessary to unitized storage of either concrete or abstract sentences. However, abstract sentences are, per se, normally less comprehensible, so the effect of the comprehension task on abstract sentences in the present study was more dramatic than the effect on concrete sentences. This would account for the increased recognition rate for meaning changes in abstract sentences, and the lack of an effect with concrete sentences.



As noted in the Results section, a significant main effect of test type occurred in the present study. Begg and Paivio found no differences between wording and meaning changes in their study. The superior recognition rate for meaning changes over wording changes in the present study may be accounted for by the fact that different sentences were used in the two studies and the development of the test sentences seems somewhat specific to the original sentences used. The rules used to change each original sentence to a wording changed or meaning changed test sentence were identical to the rules used by Begg and Paivio. The application of these rules, however, is quite general such that it seems likely that the changes would be of consistent difficulty only for a given type of test change on a specific set of sentences. The result of this type of rule is that although a given type of test change is likely to be of consistent difficulty on a specific set of sentences, exact matching of difficulty should not be expected between the wording changed items and the meaning changed items, nor between studies utilizing different sentences. The fact that subjects consistently rated meaning changes with more confidence than they rated wording changes implies that the two types of test changes were not constructed to be of equal difficulty in this study.

The signal detection analysis provided a possible explanation for the significant effects due to order of

presentation reported in the analysis of probability of a hit data. The variability in the decision criterion, despite the consistency in the corresponding  $d'$  values, suggests that the order of presentation effects the placement of the decision cutoff but does not effect the actual sensitivity to changes in test items.

The results of analyzing the hit rate for original test sentences seems consistant with the notion that once comprehension has occurred, sentences are stored similarly whether they are abstract or concrete. For group E, the probability of a hit for abstract sentences was practically the same as the probability of a hit for concrete sentences (Figure 3). Over the other two treatment groups however, the effect of concreteness was significant. The result that unchanged items were rated with the least confidence but received the second highest recognition rate (next to meaning changes ) was surprising. A comparison of the hit rate for responses to unchanged items is not possible between the present study and that of Begg and Paivio because Begg and Paivio did not analyze the unchanged test sentences in their study.

The confidence rating data provided support for conclusions based on the recognition rate results. In particular, the higher confidence rating of meaning changed test sentences over wording changed test sentences is congruous with the notion that the meaning

of a sentence is what is actually stored in memory and retrieval of the exact wording is available only through reconstruction from the stored meaning.

## SUMMARY

The results of the present study raise doubts about the interpretation of the outcome of Begg and Paivio's study. Begg and Paivio proposed that sentence concreteness was an important variable which determined how a sentence is stored in memory. The present study investigated the notion that providing a context for sentences increases the comprehension of the sentences and resultingly minimizes the effect of concreteness. As a result of embedding the sentences in a context-paragraph, the recognition rate for meaning changes of abstract sentences was increased to the level of being nonsignificantly different from the rate for concrete sentences.

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## Footnotes

1. This research was supported by an Office of Education grant, OEG-1-71-0109(508). The author wishes to thank Jane Perlmutter, in addition to the members of her committee, for patient and valuable suggestions throughout the course of this study.



## LIST OF APPENDICES

- Appendix A. Magnitude of Specific Sources of Variance.
- Appendix B. Instructions To Subjects.
- Appendix C. Presentation Sentences Used in the Present Study with Lexical and Semantic Test Sentences.

## Appendix A

## Magnitude of Effects of Specific Sources of Variance

The procedure used to evaluate the magnitude of effects of specific sources of variance is put forth in Section 5.3.2 of Myers, Fundamentals of Experimental Design. This procedure, as applied to the specific problem on page 23 of the present study is as follows:

The set of sample means is layed out in a table:

	Begg & Paivio		$\bar{Y}_{.j.}$	$(\bar{Y}_{.j.} - \bar{Y}_{...})$
	Meaning Test	Wording Test		
A	60	75	67.5	-3
C	80	67	73.5	+3
$\bar{Y}_{..k}$	70	71	$\bar{Y}_{...} = 70.5$	
$(\bar{Y}_{..k} - \bar{Y}_{...})$	-.5	+.5		

	Control <sub>2</sub>		$\bar{Y}_{.j.}$	$(\bar{Y}_{.j.} - \bar{Y}_{...})$
	Meaning Test	Wording Test		
A	80	73	76.5	-.75
C	94	62	78.0	+.75
$\bar{Y}_{..k}$	87	67.5	$\bar{Y}_{...} = 77.25$	
$(\bar{Y}_{..k} - \bar{Y}_{...})$	9.75	-9.75		

The variability due to concreteness is indicated in the sum of  $(\bar{Y}_{.j.} - \bar{Y}_{...})$  over levels of concreteness. In the above sets of data, then, no main effect of concreteness is present. The variability due to type of test is indicated in the sum over levels of tests of  $(\bar{Y}_{..k} - \bar{Y}_{...})$ . No main effect of test type is present in the above data sets. If after subtracting

$\bar{Y}_{...}$  from each cell mean, the variability due to concreteness,  $(\bar{Y}_{.j.} - \bar{Y}_{...})$ , is subtracted from the cell mean at each level of concreteness, and the variability due to test type,  $(\bar{Y}_{..k} - \bar{Y}_{...})$  is subtracted from the cell means at each level of test type, the result, in which there are no df for rows or columns is the following:

<u>Begg &amp; Paivio</u>			<u>Control<sub>2</sub></u>		
	Meaning	Wording		Meaning	Wording
A	-7.0	+7.0	A	-6.25	+6.24
C	+7.0	-7.0	C	+6.25	-6.25

The entries in the above matrices are the estimates of the concreteness x test type interaction. The fact that the entries are not all zero indicates that variability remains among the effects of treatment combinations even after removing the variability due to the individual treatment effects.

The magnitude of the interactions reported above can be computed based on an interpretation of an interaction as "the difference of differences." In each case the difference between meaning tests and wording tests on concrete sentences is subtracted from the difference between meaning tests and wording tests on abstract sentences. This method is as follows:

	$(M_A - W_A) - (M_C - W_C) = \text{Magnitude of Interaction}$
B & P	$(60 - 75) - (80 - 67) = -28$
C <sub>2</sub>	$(80 - 73) - (94 - 62) = -25$

Because the direction of the interaction is the same, the signs provide no information necessary to the comparison.

## APPENDIX B

## Instructions to Subjects

"The purpose of this experiment is to find out how well people can remember what they have just listened to. The experiment will take about one half an hour. You will hear four trials of eight sentences each.

E: Each sentence you will be tested on will be embedded in a short paragraph. The purpose of the paragraph is to give a context to the presented sentence so as to make it more meaningful to you. Each paragraph will consist of three sentences. The last sentence in each paragraph is the one you will be tested on, but you should listen carefully to each sentence as it will help you remember the last sentence.

C<sub>1&2</sub>: In the time interval between hearing sentences, you should rehearse and study the sentences.

At the end of each set of eight sentences, you will hear the word "test", and then the eight sentences will be played back to you one at a time, separated by ten seconds. Sometimes it will be repeated with exactly the same words as the original. But sometimes it will be changed in some small way. Either the meaning of the sentence will be changed ~~or only the words~~ in the sentence will be changed. For example, if you had heard 'The whiskered priest entered an ornate temple,' and then 'The bearded priest entered an ornate temple,' this would be a change in wording. If you had heard 'The innocent occasion promoted a useless illusion,' and then 'The useless occasion promoted an innocent illusion,' this would be a change in the meaning. If the ~~w~~ords are just as they were in the original sentence from the set,

put a black line through the word "Identical" on your response sheet. If there is any change at all, mark a black line through the word "Changed." Listen normally to the sentences. They go too fast to try to memorize anything, and anyway, you must attend to the meaning fully, as well as to the words used. On your response sheet there is also a place to mark how confident you are in your judgment. Rating "1" is for very low confidence--you are making a complete guess. Rating "5" is for very high confidence--you are absolutely sure you are right. Circle one of the confidence ratings each time you make a judgment. Try to use the five rating categories equally often. Sometimes you will have to guess, but always be sure to mark one alternative under "Identical" or "Changed" and mark low confidence if you do have to guess. Do not be disturbed at the difficult ones. Just listen normally, and judge the sentences on whether or not they sound right to you, even if you can not remember. Remember to pay close attention to both the meaning of the sentences and the words used in the sentences.

To familiarize you with the procedure, a practice set of eight sentences will be presented before the experimental session. Remember, listen to the first eight sentences. Then the next eight sentences will be test items.

Are there any questions before we begin?"

## Appendix C

Presentation Sentences Used in the Present  
Study with Lexical and Semantic Test SentencesAbstract Sentences

1. The final reason supplied the adequate motivation.  
L. The final consideration supplied the adequate motivation.  
S. The final motivation supplied the adequate reason.
2. The solemn congregation encouraged an impressive service.  
L. The solemn gathering encouraged an impressive service.  
S. The solemn service encouraged an impressive congregation.
3. The foreign faith aroused an enduring interest.  
L. The foreign belief aroused an enduring interest.  
S. The foreign interest aroused an enduring faith.
4. The introductory statement promised a logical treatment.  
L. The introductory assertion promised a logical treatment.  
S. The introductory treatment promised a logical statement.
5. The simple mechanism reflected an outdated technology.  
L. The simple machinery reflected an outdated technology.  
S. The simple technology reflected an outdated mechanism.
6. The vague concern survived a renewed enthusiasm.  
L. The vague opinion survived a renewed enthusiasm.  
S. The vague enthusiasm survived a renewed concern.
7. The complex review revealed an objective position.  
L. The complex summary revealed an objective position.  
S. The complex position revealed an objective review.
8. The strange situation altered the accepted conclusion.  
L. The strange circumstance altered the accepted conclusion.  
S. The strange conclusion altered the accepted situation.
9. The unpleasant factor caused a dismal silence.  
L. The unpleasant element caused a dismal silence.  
S. The unpleasant silence caused a dismal factor.
10. The complicated proof explained a limited formula.  
L. The complicated calculation explained a limited formula.  
S. The complicated formula explained a limited proof.
11. The original condition implied an essential balance.  
L. The original provision implied an essential balance.  
S. The original balance implied an essential condition.

12. The recent pact made an approved solution.  
 L. The recent accord made an approved solution.  
 S. The recent solution made an approved pact.
13. The required duty involved a standard payment.  
 L. The required task involved a standard payment.  
 S. The required payment involved a standard duty.
14. The ridiculous mistake nullified a prior commitment.  
 L. The ridiculous error nullified a prior committment.  
 S. The ridiculous commitment nullified a prior mistake.
15. The alternative version modified an established custom.  
 L. The alternative copy modified an established custom.  
 S. The alternative custom modified an established version.
16. The actual quotation lacked a rational idea.  
 L. The actual expression lacked a rational idea.  
 S. The actual idea lacked a rational quotation.

### Concrete Sentences

1. The hungry boar attacked a sleeping coyote.  
 L. The hungry hog attacked a sleeping coyote.  
 S. The hungry coyote attacked a sleeping boar.
2. The pompous monarch confronted the triumphant queen.  
 L. The pompous king confronted the triumphant queen.  
 S. The pompous queen confronted the triumphant monarch.
3. The hollow tree housed an old tomb.  
 L. The hollow trunk housed an old tomb.  
 S. The hollow tomb housed an old tree.
4. The unfamiliar helper accused a reckless prisoner.  
 L. The unfamiliar assistant accused a reckless prisoner.  
 S. The unfamiliar prisoner accused a reckless helper.
5. The carefree merchant annoyed the timid woman.  
 L. The carefree dealer annoyed the timid woman.  
 S. The carefree woman annoyed the timid merchant.
6. The white truck passed a rickety automobile.  
 L. The white van passed a rickety automobile.  
 S. The white automobile passed a rickety truck.
7. The young author cherished the homely girl.  
 L. The young writer cherished the homely girls.  
 S. The young girl cherished the homely author.

8. The crippled forger killed the tortured slave.  
L. The crippled blacksmith killed the tortured slave.  
S. The crippled slave killed the tortured forger.
9. The enthusiastic professor welcomed the familiar doorman.  
L. The enthusiastic instructor welcomed the familiar doorman.  
S. The enthusiastic doorman welcomed the familiar professor.
10. The delicate maiden watched the great dreamer.  
L. The delicate damsel watched the great dreamer.  
S. The delicate dreamer watched the great maiden.
11. The strong painter bullied the seedy beggar.  
L. The strong artist bullied the seedy beggar.  
S. The strong beggar bullied the seedy painter.
12. The overgrown stalk shaded a delicate mushroom.  
L. The overgrown stem shaded a delicate mushroom.  
S. The overgrown mushroom shaded a delicate stalk.
13. The polite servant introduced an intolerant doctor.  
L. The polite slave introduced an intolerant doctor.  
S. The polite doctor introduced an intolerant servant.
14. The smooth rock struck a heavy pot.  
L. The smooth stone struck a heavy pot.  
S. The smooth pot struck a heavy rock.
15. The poor scoundrel called a sluggish policeman.  
L. The poor villain called a sluggish policeman.  
S. The poor policeman called a sluggish scoundrel.
16. The alert laborer pursued the talkative student.  
L. The alert worker pursued the talkative student.  
S. The alert student pursued the talkative laborer.



Contextual Material Presented to the Experimental Treatment Group

Wild animals seldom abuse territorial boundaries except for self defense. The need for food can explain many aggressive acts which would not otherwise occur. THE HUNGRY BOAR ATTACKED A SLEEPING COYOTE.

After much argueing, the young child could still not understand why he could not play in the mud. When his mother threatened punishment, he changed his mind. THE FINAL REASON SUPPLIED THE ADEQUATE MOTIVATION.

The king had never felt threatened by another man, not to mention a woman. The victorious queen tried to avoid him on her trip through his kingdom, but he found a way to talk to her anyway. THE POMPOUS MONARCH CONFRONTED THE TRIUMPHANT QUEEN.

The woodsman had died long ago in the middle of a severe winter. Because the ground was too hard to bury him, his body was placed inside a huge rotted tree. THE HOLLOW TREE HOUSED AN OLD TOMB.

The minister had always had a difficult time attracting the town's people to church. The night of the assassinated governor's funeral was an exception. THE SOLEMN CONGREGATION ENCOURAGED AN IMPRESSIVE SERVICE.

The foreign-exchange student from India spoke at an attentive high school assembly Wednesday. Much of her talk revealed the fact that Buddhism was a major guiding force in her life. THE FOREIGN FAITH AROUSED AN ENDURING INTEREST.

Because the convict frequently broke tools which he borrowed from the prison shop, he often was blamed for others' mistakes. A new prison aid found that using the man as a scape-goat for his own short-sightedness was often profitable. THE UNFAMILIAR HELPER ACCUSED A RECKLESS PRISONER.

The president was anxious to study the committee's review of the welfare program. They had outlined their proposal to him that morning. THE INTRODUCTORY STATEMENT PROMISED A LOGICAL TREATMENT.

The first job of the Peace Corp engineer was to replace the horse-driven well pump with a small electric pump. The old type pump was too slow and was holding up irrigation of the field. THE SIMPLE MECHANISM REFLECTED AN OUTDATED TECHNOLOGY.

The jolly man was selling fruit at the market at the booth usually occupied by the butcher. He only laughed when one quiet but obviously disoriented shopper scurried around in front of him. THE CAREFREE MERCHANT ANNOYED THE TIMID WOMAN.

For months no one really took a stand on how they felt about environmental legislation. When a sanitary land-fill area was planned for the outskirts of the city, everyone was up in arms. THE VAGUE CONCERN SURVIVED A RENEWED ENTHUSIASM.

Driving along the turnpike is particularly trying when you are stuck behind a slow car. A truck was anxious for a chance to pull into the passing lane. THE WHITE TRUCK PASSED A RICKETY AUTOMOBILE.

The jury tried to express their feelings without showing signs of emotional involvement in the case. After a one hour oration, they stated their decision. THE COMPLEX REVIEW REVEALED AN OBJECTIVE POSITION.

The gentleman was noted for the compassion he revealed in his novels. That is why no one doubted that he would marry the poor maiden whom he loved. THE YOUNG AUTHOR CHERISHED THE HOMELY GIRL.

After weeks of debate, the equal-rights committee voted unanimously in favor of a female president. Unexpectedly, the only eligible female was hospitalized as a result of a serious accident. THE STRANGE SITUATION ALTERED THE ACCEPTED CONCLUSION.

The brawny man could not run and had only his strength to defend himself with. The mad servant had not seen the anvil in his hand. THE CRIPPLED FORGER KILLED THE TORTURED SLAVE.

The excited ski team was suddenly quieted by the news that one of their team-mates had fallen during the slalom race. This disaster would ruin any chance of a gold medal for the team. THE UNPLEASANT FACTOR CAUSED A DISMAL SILENCE.

The couple was anxious to revisit the people they had met the previous summer in London. When they pulled up to their favorite restaurant, the friendly face they had remembered was there to greet them. THE ENTHUSIASTIC PROFESSOR WELCOMED THE FAMILIAR DOORMAN.

The statistics class was convinced that they were wasting their time going through such a long proof. The formula they were deriving would not even be very useful to any of them. THE COMPLICATED PROOF EXPLAINED A LIMITED FORMULA.

Any changes that were attempted in the factory threw the whole system off. The old routine, with all of its faults, still ran smoother than any innovative plan. THE ORIGINAL CONDITION IMPLIED AN ESSENTIAL BALANCE.

The young girl was infatuated by her friend who gazed idly toward the sky. She sat silently by him and hesitated to disturb him. THE DELICATE MAIDEN WATCHED THE GREAT DREAMER.

The United States agreed to offer financial assistance to Turkey if in turn Turkey would discourage exportation of Morphine to the U. S. The U. S. did not want Morphine smuggled into this country and Turkey needed financial aid. THE RECENT PACT MADE AN APPROVED SOLUTION.

The noted master was insensitive in his treatment of others. When a helpless derelict stumbled into him and asked for money, the villager was annoyed. THE STRONG PAINTER BULLIED THE SEEDY BEGGAR.

Forest mushrooms flourish in areas which receive a moderate amount of sun light. Some underbrush which grows faster than the mushrooms stifles the growth of mushrooms. THE OVERGROWN STALK SHADED A DELICATE MUSHROOM.

The butler did not look forward to presenting the doctor to the host. Although guests were often abrupt with him, the butler performed his job admirably. THE POLITE SERVANT INTRODUCED AN INTOLERANT DOCTOR.

The importation laws required that jewelry being shipped over the border be accounted for according to its weight. All jewelry, regardless of its worth was considered on the basis of the same criterion. THE REQUIRED DUTY INVOLVED A STANDARD PAYMENT.

The teacher had promised the class a field trip as a reward for their attendance. He remembered too late that he had neglected to reserve a bus, and therefore had to cancel the trip. THE RIDICULOUS MISTAKE NULLIFIED A PRIOR COMMITMENT.

The child was not aware of the value of the utensils he had pulled out of the kitchen cabinet. He threw a home-made paperweight toward the cabinet. THE SMOOTH ROCK STRUCK A HEAVY POT.

The old man knew that he was considered to be a rather shady character and never thought that he would have to rely on civil authority for protection. One night the fellow lost his way in the city and helplessly sought assistance. THE POOR SCOUNDREL CALLED A SLUGGISH POLICEMAN.

The woman on the committee refused to pass the bill until a phrase pertaining to woman's rights was included in it. The committee had never heard such a demand, but was forced to reword the bill. THE ALTERNATIVE VERSION MODIFIED AN ESTABLISHED CUSTOM.

The union member was curious as to the views of college students on the Vietnam war. He was thrilled when he overheard a co-ed avidly discussing the topic with a friend. THE ALERT LABORER PURSUED THE TALKATIVE STUDENT.

It was popular for people to quote Mark Twain in regards to his statement on old age. As would be expected of the humorous writer, his comments on old age reflected a make-believe sinility on his own part. THE ACTUAL QUOTATION LACKED A RATIONAL IDEA.

