Free recall of nouns presented in sentences[1]

GORDON WOOD, Michigan State University, East Lansing, Mich. 48823

The results of two experiments indicated that the presence of sentences as context has a deleterious effect on the recall and clustering of related nouns, even when the method of complete presentation is used and the nouns are underlined. There was weak evidence that the sentence-context effect was due to the presence of context words and not to the ordering of the context words as sentences.

Cofer (1968) conducted three experiments to demonstrate that the recall of nouns belonging to conceptual categories is influenced by sentence context.Each sentence contained one noun from each of four categories. The major finding was that the free recall of nouns after presentation in sentences was poorer than the free recall of the same nouns not presented in sentences. Cofer suggested that including the nouns in sentences may have disrupted their category membership or their internoun associations.

The present two experiments attempted to replicate the Cofer finding with a different procedure and to clarify why sentence context produced a decrement in the recall of nouns. The method of complete presentation was used instead of the one-at-a-time method that was used by Cofer. The use of the method of complete presentation was expected to make it easier for Ss to ignore the sentence context and to recognize the conceptual similarity of the nouns. The evidence for the influence of sentence context on the free recall of nouns would be more convincing if the effect was not dependent on the piecemeal presentation of the material to be recalled.

EXPERIMENT 1

Method

The Ss, 100 students from undergraduate psychology courses at Michigan State University, were assigned randomly to the five conditions so that there were 20 Ss in each condition. The design was a 2 by 2 factorial, plus an additional group to assess the influence of underlining the nouns in the sentences. Context (sentences vs no sentences) and presentation order (constrained vs random) of the nouns were factorially manipulated. The sentences for the random-presentation context condition contained one noun from each of four different categories. These sentences were identical to the ones used by Cofer in his first two experiments. Each sentence for the constrained-presentation context condition contained six nouns from the same category. The nouns were underlined for these two sentence conditions. The nouns were presented in the same position on the study sheet for the context and no-context Ss. A fifth group received the random-presentation context condition sentences, but the nouns were not underlined. All Ss received the same 24 nouns.

A booklet that contained a cover page, instruction page, filler sheet, study sheet, filler sheet, and answer sheet, in that order, was prepared for each S. The use of booklets made it possible to present all conditions at the same time. In addition to the standard free-recall instructions given to all Ss, the Ss who received the sentence context were told that they would not be asked to recall the sentences. All Ss were told that they would be given 48 sec to study the 24 nouns and 3 min to recall as many of the nouns as possible. A random order of the booklets was prepared, with the restriction that each condition was represented in each block of five booklets.

Results and Discussion

The mean number of nouns correctly recalled was 16.95, 14.10, 18.15, 16.70, and 12.10 for the sentence constrained, sentence-random, no sentence-constrained, no sentence-random, and sentence-random not-underlined conditions, respectively. Comparisons of the effect of sentence context and presentation order (omitting the sentence-random not-underlined condition) revealed that both variables had a significant influence on recall, $Fs = 5.56$ and 7.12, $df = 1/95$, $p < .05$, respectively. Although more words were recalled in the sentence-random condition than in the sentence-random not-underlined condition, this difference was not significant, $F = 3.08$, $df = 1/95$, $p > .05$.

A cluster score was counted every time Ss recalled two words of the same conceptual category consecutively during free recall. The maximum number of clusters for any category is one less than the number of words recalled from that category. The mean ratio of obtained clusters to maximum possible clusters was 86%, 66%, 85%, 75%, and 43% for the sentence-constrained, sentence-random, no sentence-constrained, no sentence-random, and sentence-random not-underlined conditions, respectively. The Ss who received the constrained presentation order (omitting the sentence-random not-underlined condition) had higher cluster ratios than the Ss who received the random orders, $F = 8.01$, $df = 1/95$, $p < .01$. The context effect and the Context by Presentation Order interaction were not significant, $F < 1$. The cluster-ratio scores were higher for the Ss in the sentence-random condition than they were for those in the sentence-random not-underlined condition, $F = 9.77$, $df = 1/95$, $p < .01$. That is, sentence context seems to have a marked influence on clustering when the nouns to be recalled are not underlined but very little, if any, effect when the nouns are underlined.

The results extend Cofer's finding in that the effect of sentence context was still obtained when the method of complete presentation was used and the nouns were underlined. The fact that the cluster scores were considerably lower when the nouns appearing in sentences were not underlined than when they were underlined is consistent with Cofer's view that sentence context disrupts category membership or internoun associations. However, sentence context was expected to disrupt the internoun associations when related words were presented in different sentences but not when the related words were presented in the same sentence. The fact that the context effect did not depend on presentation order suggests that the presence of context words and not the ordering of the context words was responsible for the effect. Cofer tested this hypothesis and found that the influence of sentence context was not due to the fact that Ss in the sentence conditions received more words. However, since Experiment 1 did not give clear support for the view that sentence context disrupts category membership, another test of the hypothesis that the effect of sentence context is due to the presence of additional words seemed warranted.

EXPERIMENT 2

Method

A three-group experiment was conducted. Nouns were presented in the context of sentences, in scrambled sentences, or without context words. Each S received two lists of nouns. The nouns were selected to be conceptually related in one case and "unrelated" in the other. If sentence context breaks up the internoun associations, there should be less difference between the recall of related and "unrelated" nouns for the sentence-context Ss than for the scrambled-sentence no-context Ss. If the presence of context words is the important variable, there should be little difference between the scrambled-sentence and sentence conditions.

The procedure was very similar to that of Experiment 1. Each S was given a booklet that contained an instruction page, two study-trial pages, two test-trial pages, and a filler sheet between the first test-trial

page and the second study-trial page. All Ss were told that their task would be to memorize a list of 24 nouns. They were given 48 sec to study the nouns and 3 min to recall them. The Ss in the sentence-context and scrambled-sentence context conditions were told that there would be other words on the study page in addition to the underlined nouns. They were assured that they would not be asked to recall the additional words. The conceptually related words were identical to the ones used by Cofer in his first experiment. The "unrelated" nouns were selected randomly from the Thorndike-Lorge (1944) norms, with the restriction that the words were high-frequency nouns (A and above). The words were separated into six groups of four each so that a sentence could be constructed that used all four words. It is probable that some of the nouns in the "unrelated" list were related, but the list was "unrelated" in comparison to the list composed of six nouns from each of four categories. Seven Ss in each condition received the related list first, and eight Ss received the unrelated list first. A total of 45 students from undergraduate psychology courses at Michigan State University were assigned randomly to the three conditions so that there were 15 Ss in each condition.

Results and Discussion

The mean number of words correctly recalled for the sentence, scrambled-sentence, and control conditions was 14.33, 14.53, and 14.40, respectively, for the "unrelated" list of nouns, and 14.87, 15.67, and 17.80, respectively, for the related list of nouns. An analysis of variance revealed that the only significant effect was due to the nature of the lists, $F = 4.82$, $df = 1/42$, $p < .05$. If only the related words are considered, as a check of the reliability of the findings of Experiment 1, the orthogonal comparison between the sentence and control conditions yields a significant effect, $F = 5.80$, $df = 1/42$, $p < .05$. The mean ratio of obtained clusters to maximum possible clusters, based on concept categories, was 59%, 69%, and 83% for the sentence, scrambled-sentence, and control Ss, respectively. The only significant effect was the orthogonal comparison between the sentence and control conditions, $F = 4.41$, $df = 1/42$, $p < .05$. Thus, once again, the presence of sentences as context had a deleterious effect on the recall and clustering of related nouns. Yet, the failure to find much of a difference between the sentence context and scrambled-sentence context conditions does not provide much support for the view that the ordering of the context words as sentences is the important factor. Moreover, if the ordering of the context words was important, the cluster scores based on the sentences (i.e., the four nouns in each sentence would be a category) should have revealed greater clustering for the sentence condition than for the scrambled-sentence condition. However, this was not the case since the mean ratio of obtained clusters to maximum possible clusters for the related list was 22% and 24% for the sentence and scrambled-sentence conditions, respectively.

In conclusion, the present study extends Cofer's finding that sentence context has a deleterious effect on the recall of nouns when conceptually related nouns are presented in different sentences. The context effect was obtained even when the method of complete presentation was used and the nouns to be recalled were underlined. There was weak evidence that the sentence context effect was due to the presence of additional words and not to the ordering of the additional words as sentences.

REFERENCES

COFER, C. N. Free recall of nouns after presentation in sentences. Journal of Experimental Psychology, 1968, 78, 145-152.

THORNDIKE, E. L., & LORGE, I. *The teacher's word book of 30,000 words.* New York: Bureau of Publications, Teachers College, Columbia University, 1944.

NOTE

1. This investigation was supported by Grant MH 16991 from the National Institute of Mental Health and by a Biomedical Sciences Support grant from Michigan State University. Thanks are due to Joyce Pennington for assistance during all phases of the investigation.

Short-term memory: Effects of type of trigram isolated and position of isolation

RICHARD S. CIMBALO and MARGARET S. MAHONEY, Rosary Hill College, 4380 Main St., Buffalo, N.Y. 14226

The effects of five different types of trigram units, embedded in three positions (beginning, middle and end) of an eight-item list of consonants, were investigated. The five types of trigrams were: letter repetitions (GGG), meaningful-pronounceable (FIB), meaningful-unpronounceable (FBI), unmeaningful-pronounceable (BIF), and unmeaningful-unpronounceable (BGF). Voice differences were used to achieve isolation, and a free recall procedure was employed. The data indicated an inverse relationship between both overall list performance and isolated trigram performance and the other items in the list.

This study was designed to investigate the effect of varying the type of isolated unit upon recall performance for the unit and performance on the other items in a serial list. If a meaningful-pronounceable (MP) trigram were somehow made more perceptually distinct in a list of consonants, would the performance for that unit and for the other items in the list differ from performance on a list where an unmeaningful-unpronounceable (UU) trigram occurred as a distinct item in a list? The MP item would be easier to encode and/or rehearse (Laughery & Pinkus, 1968), and it seems tenable to assume that performance for the MP trigram and for the unisolated items in such a list to be superior when compared to the UU condition. However, besides the ease of the processes of encoding and rehearsal, the attention-getting value of the stimulus and its effects upon the S's strategy must be taken into consideration (viz, Gregg & Simon, 1967). The MP condition may utilize more of the S's processing time because of its structural distinctiveness (i.e., vividness in a list).

METHOD

The Ss were 50 female undergraduate students from Rosary Hill College who volunteered their time and service. A 3 by 5 factorial design was employed. Position of the chunk was a within-S variable with three levels: isolated unit at the beginning of a list (i.e., Positions 1, 2, and 3), middle (i.e., Positions 5, 6, and 7), or end (i.e., Positions 9, 10, and 11). The type of chunk was a between-S variable consisting of five levels: letter repetitions (LR), meaningful-pronounceable (MP), and meaningful-unpronounceable (MU), unmeaningful-pronounceable (UP), and unmeaningful-unpronounceable (UU). Examples of each of the preceding types of chunks are: GGG, FIB, FBI, BIF, and BGF, respectively.

Each S was given 18 11-item lists (i.e., 6 lists with the isolated unit at each of the three positions). The position variable was randomized within a set of 18 lists, and this same random order was used for all five type-of-chunk conditions. Eight letters of each list were generated randomly from the 20 consonants of the alphabet (Y was considered a vowel) without replacement.

The MU, MP, and UP units were taken from a recent study by Laughery & Pinkus (1968). The LR units were consonants chosen at random. The UU chunks were randomized consonants.