Free recall of categorized and unrelated words under serial or grouped presentation¹

PHYLLIS GREENHOUSE
ADELPHI UNIVERSITY

Sixty Ss were presented a list of 52 categorized or unrelated words for three free recall trials. The items of the list were read either serially or temporally grouped. The initial effect of the temporal procedure was to depress number of categories in recall. By Trial 3 it had facilitated both the number of words and clusters in the recall of unrelated words and the number of categories of related words.

When Ss are asked to recall words in the free recall (FR) situation, the E assumes that organization will take place and that the categories or clusters of words occurring in the FR omissions are indicative of organizing schemas that had been employed by S. Research on subjective organization in FR initially centered on the clustering phenomenon, in which the analysis was dependent upon pre-experimentally determined relations between the words (Bousfield, Cohen, & Whitmarsh, 1958; Jenkins & Russell, 1952; Deese, 1959; Cohen, 1963a, b). These clusters were found to have been formed on the basis of membership in taxonomic or conceptual categories or due to inter-item associations. They clearly demonstrated the imposition of an organizing principle or strategy which resulted in a greater number of items recalled.

When lists of "unrelated" words are presented (unrelated in any sense that can be attributed by E to identifiable word relations), little can be said about organization. Tulving's (1962, 1966) work has shown that sequential patterns of unrelated words do become evident in a multi-trial situation, indicating subjective organization. Since these sequences generally appear idiosyncratic, explanations for their formation are as yet unclear. Although explanatory concepts are lacking for unrelated words, and are available for related words, the phenomenon of clustering appears to be common to both.

The present study was designed to explore whether variables other than word relations can affect the incidence of clustering regardless of the particular nature of the word list, and if such clustering can be altered by a temporal grouping of words during presentation, in contrast to the more usual serial presentation.

The predictions were that temporal grouping of a list of unrelated words would have a facilitative organizing effect but would interfere with the strong associative relations in the random presentation of a list of categorized words.

Subjects

Sixty introductory psychology students in groups of 15 served as Ss.

Lists

Three random orders of two word lists consisting of 52 words each were constructed. The categorized word list (C) consisted of categories of three or four words each, selected from Cohen's (1963b) exhaustive categories. The unrelated word list (U) consisted of words having no known categorical association.

Procedure

Paced by an electric metronome, E read the appropriate list to groups of 15 introductory psychology students at a rate of 3 sec per word for the serial presentation (S), or 2 sec per word, in groups of three or four words, and with a 5 sec interval between each grouping for the grouped presentation (G). Four independent groups resulted: CS, CG, US, UG. The total presentation time for all lists was kept constant at 156 sec per list, with a total of three list presentations and a 90 sec written recall after each.

Results and Discussion

The 2 by 2 by 3 analysis of variance of type of word list by type of presentation over the three trials yielded a significant trials by words interaction ($F=31.45$, $df=2/112$, $p<.001$). As can be seen in Fig. 1, the effects were due to the significantly greater recall on Trials 1 and 2 by the Ss getting the CS and CG lists. On Trial 3, the number of words recalled by the UG condition no longer differed from the CS and CG conditions, while the US recall remained significantly less. It appears that on the first two trials the type of word list was the significant variable influencing the number of words recalled, while by the third trial, method of presentation differentially affected the U word recall but not the C recall.

Fig. 1. Mean number of words recalled for all conditions over trials.

Under the supposition that items that are organized into a unit or cluster tend to occur in close temporal contiguity in recall, US and UG recalls were analyzed for clusters. The operational definition of a cluster was any group of two words occurring contiguously, or separated by no more than one word, and that had previously been recalled contiguously. The mean proportion of such clusters relative to the total number of words recalled for Trials 2 and 3 respectively were: US, .05, .06; UG, .07, .14. The difference between the conditions was significant only on Trial 3 ($t=3.07$, $p<.01$). For the UG group the increase in the number of words recalled on Trial 3 had therefore occurred concomitantly with a significant increase in the proportion of clusters. The occurrence of more clusters with the grouped than with the serial presentation raises the possibility that, while the formation of clusters may be attributable to idiosyncratic coding, the stability of these clusters may be due to the opportunity to rehearse them once they have been formed, as was possible in the 5 sec between word groups.

For the CS and CG conditions a cluster was defined as any group of two or more words occurring contiguously and belonging to the same category. A test of the proportion of clusters to number of words recalled per trial revealed no significant differences between the groups, thus indicating no interference due to the temporally grouped presentation, as had been predicted.

The CS and CG groups were scored for category recall if at least one member of the category were recalled. The number of categories recalled for Trials 1, 2, and 3, respectively, was: CS, 8.16, 9.6, 9.45; CG, 7.7, 9.25, 10.25. A 2 by 3 analysis of variance yielded a significant interaction between trials and type of presentation ($F=4.85$, $df=2/56$, $p<.05$) and a significant trials effect ($F=22.69$, $df=2/56$, $p<.001$). The effects were due to a significant difference between the groups on Trial 1, with the CS condition recalling significantly more categories. The temporal grouping presentation thus appears to have interfered with category but not word recall. On Trial 2 there was no difference, but on Trial 3 the CG group recalled more categories. While this trend was only suggestive

($.05 < p < .10$), in consideration with the results of Trial 1, it is apparent that the grouped presentation was influencing recall with the initial effect interfering and a subsequent change by Trial 3 to facilitating. If the Ss of the grouped presentation used the 5 sec interval of silence for rehearsal, then on Trial 1 they would have been rehearsing unrelated words until they were able to discover the categorized nature of the list. By Trial 3, with full knowledge of the categorized structure of the list, the 5 sec interval could have been used for rehearsal of categories.

Since a category in recall is sometimes considered as equal to a unit in recall (Cohen, 1963b), an analysis was performed in which the mean number of categories for the categorized word conditions was compared to the mean number of words for the unrelated word conditions. For all trials and comparisons there was a significant difference ($p<.01$) between the groups, with the unrelated word conditions recalling more units. The likelihood of recalling more units of unrelated words as compared to categories of words is not probable, and questions the validity of considering each unrelated word as a unit. The need for a more sensitive measure of organization for unrelated words is underscored by these results and, in particular, the need for some measure of the organization that occurs on the first trial.

References

- Bousfield, W. A., Cohen, B. H., & Whitmarsh, G. A. Associative clustering in the recall of words of different taxonomic frequencies or occurrence. *Psychol. Rep.*, 1958, 4, 39-44.
- Cohen, B. H., & Burton, H. An investigation of recoding in free recall. *J. exp. Psychol.*, 1963a, 65, 368-375.
- Cohen, B. H., & Burton, H. Recall of categorized word lists. *J. exp. Psychol.*, 1963b, 66, 227-234.
- Deese, J. Influence of inter-item associative strength upon immediate free recall. *Psychol. Rep.*, 1959, 5, 305-312.
- Jenkins, J. J., & Russell, W. A. Associative clustering during recall. *J. abnorm. soc. Psychol.*, 1952, 47, 818-821.
- Tulving, E. Subjective organization in the free recall of "unrelated" words. *Psychol. Rev.*, 1962, 69, 344-354.
- Tulving, E. Subjective organization and effects of repetition in multitrial free-recall learning. *J. verbal Learn. verbal Behav.*, 1966, 5, 193-197.

Note

1. Adapted from paper presented to Eastern Psychological Association at Boston on April 6, 1967.