Learning and retention as a function of organizational factors and method of presentation

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The effects of list organization and method of presentation on both learning and retention were investigated in this study. Ss were asked to anticipate trigram responses in a paired-associate task using lists varying in degree of S-R relationship. Two methods of presentation were employed. Ss in the experimental group were given two phases of exposure (S-R, R-S) to the assigned items, while the control group received an equivalent number of trials using the first phase (S-R). Significant results indicated that structural similarity facilitated list learning while meaningful context improved list retention. Method of presentation had no reliable effect upon either the learning or recall performance.

Goss (1961) has discussed the facilitating effects of conceptual schemes which permit the acquisition and recall of greater amounts of information. Mayzner & Gabriel (1963) showed that informational organization increased storage and enlarged the retention capacity. Peterson, Peterson, & Miller (1961) emphasized the importance of meaningfulness of the material. Gibson, Bishop, Scheff, & Smith (1962) found that pronunciability was more important for perception and acquisition of material, but that meaningfulness made the greater contribution to retention.

The present study focused on S-R organization and its influence on learning and retention. The 12 responses for List 1 were sequential abbreviations of the stimulus nouns, e.g., juror—JUR. List 2 employed trigram responses that were structurally related to the stimulus labels, e.g., crest—CET. Identical unrelated S-R items were used for Lists 3 and 4, e.g., break—POH. However, Ss assigned to List 4 were first presented with 12 sentences where the stimulus appeared as the subject and the trigram response, underlined and blocked in color, was contained in a predicate adjective. It was proposed that the closer the structural similarity between stimulus and response, the faster learning should occur. Lists 1 and 2 should be learned in a significantly shorter number of trials than Lists 3 or 4. It was also proposed that meaningful context would improve retention. Recall for List 4 should be significantly better than that for List 3.

Method

Forty-eight female college freshmen, whose College Entrance Examination Board scores ranged within stanines 4, 5, and 6, served as Ss in a 45 min session which included a practice trial, a learning task, an interim task, and recall. Eight typewriter symbols, arbitrarily matched with numerical labels, served to acquaint the Ss with the anticipation procedure of paired-associate learning.

Four different lists, composed of 12 meaningful nouns paired with CVC trigrams in a S-R paradigm, were arranged from a high degree of relatedness to no relatedness. All items in the study, controlled for frequency (Thorndike-Lorge norms), for association level (Archer norms), and for pronunciability (Underwood and Schulz norms), were presented to the Ss on a Stowe memory drum with a 3 sec exposure for both stimulus and response. Ss were also assigned to either the experimental (S-R, R-S) or to the control (S-R) method of presentation.

On the first exposure of the test trials employing the sequential abbreviations of List 1, the structurally related responses of List 2, and the unrelated trigrams of List 3, the Ss were instructed to study the S-R items. List 4, where the stimulus and response were syntactically related, utilized the same items as List 3, but paired-associate learning was preceded by the presentation of the items in a meaningful context. For subsequent trials, all Ss anticipated the proper response by spelling the trigram.

The 24 Ss in the experimental group continued anticipating the CVC trigrams until they reached a learning criterion of 75 percent correct, i.e., 9/12 responses for both Phase 1 (S-R) and Phase 2 (R-S). After calculating the average number of trials required by the experimental group for each of the list conditions over both phases, the E presented Ss in the control group with an equivalent number of S-R trials according to their respective lists. This procedure permitted uniform exposure for the two methods of presentation.

All 48 Ss, regardless of their assignment to conditions, completed a series of geometric designs during the 10 min interim which immediately followed learning. Retention was subsequently assessed by asking the Ss to reproduce the original nouns and trigrams. The total number reported served as a measure of recall.

Results

Two-way analyses of variance were used to assess the data for both learning and retention. List organization was significant (.01 level) for learning. Since the method of presentation was not significant, the experimental and control groups were combined in subsequent considerations of the differential effects of list organization.

The mean number of trials to reach learning criterion for each of the four list conditions is shown in Fig. 1. List 1, whose trigram response was a sequential abbreviation of the stimulus noun, reflected the smallest mean number of trials for learning. Ss achieved learning in 1.08 mean number of trials. Employing a related

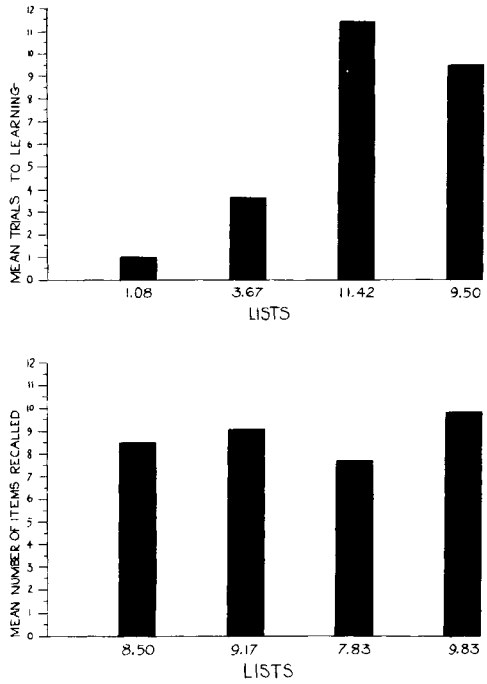

Fig. 1. Mean number of trials for learning and mean number of items recalled with lists varying in S-R relationship. N=12; T=48.

abbreviation of the stimulus as their response, the Ss exposed to List 2 required 3.67 mean number of trials to attain criterion. List 3 was the most difficult to learn with a mean number of trials at 11.42, while List 4, employing the same items as List 3, but presenting them first in syntactical context, required 9.50 mean trials for learning.

The main effect of list organization was also significant (.05 level) for retention. Although method of presentation did not significantly differentiate the recall scores of experimental and control groups, a facilitating trend was evident when method of presentation interacted with list organization. Figure 1 contrasts learning and retention scores for the four lists. The highest mean number of items was 9.83 for the syntactical organization of List 4. The lowest number recalled was 7.83 for the unrelated S-R of List 3. Mean recall for List 1 was 8.50, and for List 2, 9.17.

Planned comparisons were built into the experimental design to identify specific differences among the four lists. List 3, exhibiting no S-R relationship, was significantly more difficult (.05 level) to learn than Lists 1, 2, and 4, which provided either structural or syntactical associations. The structurally unrelated S-R items of List 4 demanded a significantly greater number of trials (.05 level) to reach the learning criterion than did the related paired-associates of Lists 1 and 2. Recall for List 3, where there was no S-R mediation, was significantly different (.01 level) from Lists 1, 2, and 4, where there was S-R mediation.

Discussion

This experimental study employed two independent variables—organization composition and method of presentation. The dependent variable for learning was expressed in terms of the number of trials required to meet the learning criterion of 75 percent. The number of S-R items recalled served as the dependent variable for retention.

Relatedness facilitated learning and structural similarity provided for ready acquisition. The sequential and related abbreviations used in Lists 1 and 2 testified to ease of learning. Items quickly acquired were not recalled at a comparable rate. By providing a syntactical context for the items of List 4, recall was equivalent to that of Lists 1 and 2, and significantly better than that of List 3. Such evidence indicates the need for overlearning if retention is to be successful. The recall performance of Ss on List 4 illustrated the value of both multiple exposure and syntactical structure. Overlearning assisted retention while meaningful context aided in the storage and retrieval of information.

Subjective reports given after the testing established that once the participant became aware of how the trigram response was related to the stimulus noun, her performance immediately improved and a strategy for solution became increasingly effective. Ss assigned to the unrelated S-R condition of List 3 attempted to discover, and then to impose, some relationship on the paired items. They were impeded, both in learning and recall, by the independence of stimulus and response.

The study confirms that Ss receiving any mediation perform better than those receiving no mediation. In addition, those using structural mediation learned more readily, while those utilizing syntactical mediation exhibited better retention.

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