The effect of unidirectional primary word associations on A-B, C-A paired-associate transfer¹

RICHARD M. SCHULMAN

HUMAN RESOURCES RESEARCH OFFICE, THE GEORGE WASHINGTON UNIVERSITY

A paired-associate transfer experiment compared 3 variations of the A-B, C-A paradigm to the A-B, C-D control. Four separate groups of 20 Ss each learned both lists to a criterion of one errorless trial. In two of the experimental groups, the stimulus of List II was the primary word association to the response of List I. These were more difficult to learn than the control, but easier than the A-B, C-A paradigm without the inter-list primary word-associations.

Evidence from recent studies in which unmixed lists were utilized indicates that the resulting difference in magnitude of transfer compared to the A-B, C-D control is not large (Houston, 1966; Schulman, 1967a, b). Transfer in the positive direction observed in the latter two studies can be interpreted as indicating that there is some source of facilitation to List 2 learning in the A-B, C-A paradigm that operates through the repeated term. The present experiment represents an attempt to further facilitate List 2 learning in comparison to the A-B, C-D control. In this case, the mechanism of facilitation to List 2 learning is believed to involve the nonrepeated terms. It was hypothesized that this would occur due to having the stimuli of List 2 as the primary word associations (Palermo & Jenkins, 1964) of the response items from List 1. In order to determine whether the mechanism of facilitation involved backward List 1 learning, a further group was used in which the R-S learning might bring about interference to List 2 learning. For this group, the stimulus and its corresponding primary response were not paired with the same repeated term.

Method

Eighty Army enlisted men were the nonvolunteer Ss. They were selected nonsystematically from the available population on the basis of having a VE (Verbal Effectiveness) score on the Army Classification Battery (ACB, Dept. of Army, 1961) of over 100. The four groups of Ss may be schematized as follows:

- I. A-B, C-D
- II. A-B, C-A
- III. A-B, C-A ($R_1 \rightarrow S_2$)
- IV. A-B, C-A ($R_1 \rightarrow S_2$)_r

The six stimulus words of each pair are listed on the left with their frequencies of occurrence (Thorndike & Lorge, 1944) in parentheses:

- (AA) ocean—water (AA); (AA) dream—sleep (AA);
(AA) yellow—color (AA); (46) cottage—house (AA);
(38) eagle—bird (AA); (39) stem—flower (AA)

It appeared that the relationship between the List 1 responses and their respective primary word associations was unidirectional.

The additional list of words required for List 1 of Groups I and II in place of the word association stimuli above are: (AA) chair; (AA) square; (AA) light; (AA) music; (A) justice; (A) anger.

Standard anticipation instructions, modified by not pronouncing the stimuli, were taped and played to each S. The verbal materials were presented by means of a Kodak Carousel projector, each slide being visible for 2.25 sec; the screen was blank for .75 sec because of the change time. There were 6 sec between trials and 30 sec between List 1 and List 2. Both lists were learned until one errorless recitation was given.

Results

The analysis of variance of List 1 learning failed to reveal a reliable difference between the List 1 learning functions ($F=1.72$, $df=3/76$). However, the interaction between paradigms and List 1 criteria was statistically reliable ($F=1.87$, $df=15/380$).

As shown by the List 2 learning functions (see Fig. 1), the expected positive transfer failed to materialize for the three experimental paradigms. The A-B, C-D control reached the final learning criterion first; the A-B, C-A paradigm without the between-lists word association relationship was the slowest learning group. The main effect of differences between paradigm learning functions was statistically reliable ($F=3.21$, $df=3/76$). Also significant ($F=2.09$, $df=15/380$) was the interaction between paradigms and successive criteria. Separate analyses, performed at the List 2 criteria of 1/6, 3/6, and 6/6, failed to reach the .05 level ($F=.65$, 2.04, and 2.06, respectively, $df=1/3$). Duncan's multiple range test was computed, to compare the four paradigms in terms of number of trials to complete learning. Only the difference between the slowest (A-B, C-A) and the fastest (A-B, C-D) was reliable in magnitude. As additional indices of the speed of List 2 learning, the four paradigms were compared in terms of the number of correct responses on Trial 2 and the number of correct responses on Trials 2-4. For Trial 2, the nonsignificant $F=1.55$; for Trials 2-4, $F=1.98$.

Discussion

It was not expected that negative transfer would occur for the three experimental groups. One possible explanation for this outcome is that it might be due to the use of the numbers 1-6 as the repeated terms.

Fig. 1. Mean trials to reach successive criteria during List II learning.

In the two previous experiments which found the direction of the transfer to be positive, low meaningfulness CVCs were used as the repeated terms. The inference may be drawn that a list of successive digits used as S_1 , and then repeated as R_2 , gain little if anything at all which facilitates List 2 learning in comparison to a list of CVCs repeated in the same manner. In the experiments using CVCs, it would seem that the List 2 facilitation due to the repetition of S_1 as R_2 was greater in the magnitude of its effect on List 2 learning than the opposing associative interference.

One important aspect of the results was an approximately equal magnitude of List 2 transfer effect for the two groups in which the stimulus of List 2 was a primary word associate of the response of List 1. This outcome does not support the possibility that backward List 1 learning was involved in the slight facilitation brought about by the between-list primary word associates. The faster of these two groups, where both halves of the normative associative relationship were paired with different digits, should have resulted in interference to List 2 learning if backward List 1 learning were involved. There is left an unanswered question regarding the nature of the facilitating effect responsible for the advantage

which Groups III and IV had in comparison to Group II. One possible hypothesis might be that the overall load imposed by the learning task was reduced through the use of interlist primary associative relationships.

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Note

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