

# Verbal paired-associate transfer as a function of practice and paradigm shift

RANDALL B. MARTIN, SEYMORE SIMON AND RAYMOND DITRICHS  
NORTHERN ILLINOIS UNIVERSITY

Two studies investigated the effects of practice and paradigm shift on three transfer paradigms: A-B', A-B; A-C, A-B; and C-D, A-B. Ss were administered the same paradigm for three successive sets of paired associates after which they were either continued with the same paradigm for a fourth set or shifted to a different paradigm. Performance under the A-B' paradigm tended to diverge from the other paradigms as a function of sets. Paradigm shift did not affect performance beyond that expected on the basis of the nature of the paradigm shifted to.

In studying the relationship between practice and transfer variables in verbal paired-associate learning, Postman (1964) recently compared a positive transfer paradigm involving synonymous responses (A-B', A-B) and two negative transfer paradigms involving unrelated and repaired responses (A-C, A-B; A-B, A-Br) with a reference condition of unrelated stimuli and responses (C-D, A-B). Each of the four groups learned three sets of two paired-associate lists. Relative to the reference condition, there was a progressive increase in positive transfer over successive sets under the A-B' paradigm and a decrease in negative transfer under the A-C and A-Br paradigms.

The increase in positive transfer in the A-B' paradigm was assumed to have occurred as a consequence of increased use of mediational chaining. It was also suggested that the reduction in negative transfer in the A-C paradigm may have reflected the development of a strategy of rejecting old associations and/or the development of mediational chaining strategies even though the responses were unrelated. Assuming the latter, progressive increases in transfer under the A-B' and A-C paradigms would reflect differences in the nature of the mediational chains rather than the development of different strategies.

In the present study, the effects of practice with A-B', A-C and C-D paradigms were studied for three sets of paired associates after which Ss were either continued with the same paradigm for a fourth set or shifted to a different paradigm. On the assumption that the development of a general mediational strategy underlies performance changes in both the A-B' and A-C conditions, it would be expected that performance under A-C test conditions would be better following A-B' training than following C-D training and that performance under an A-B' paradigm would be better following A-C training than following C-D training.

## EXPERIMENT 1

### Method

Three paradigms were used in the present experiment: A-B', A-B (mediation); A-C, A-B (interference); and

C-D, A-B (learning to learn). For any given S the paradigm was the same for the first three sets; on the fourth set S was shifted to another paradigm or continued with the same paradigm depending on the group to which he was assigned. The experiment was essentially a 3 by 3 factorial with one variable representing type of paradigm over the first three sets (training) and the other variable representing type of paradigm on the fourth set (test).

The design, procedure and materials were essentially the same as those employed by Postman with the exception that in the present experiment Ss learned four rather than three sets. The four sets were administered in four different sequences equally often. The B'-B pairs were 32 synonyms; 17 were selected from Haagen's list (1949) with a mean similarity rating of 1.3, 13 were selected from Melton and Safir's lists (Hilgard, 1951) with a mean rating of 2.6 and two additional pairs were constructed which did not appear in either of these lists.

The materials were made into slides and presented by means of a Carousel projector. Four different random orders of each list were constructed and were presented at a 2:2 sec. rate with an 8 sec. intertrial interval. The first list of each set was learned to a criterion of 7/8 and the second list was presented for five successive trials. With three training paradigms, three test paradigms, four sequences and two experimenters, there were a total of 72 groups, three Ss being assigned at random to each group. A total of 216 female Ss from Introductory Psychology classes served in the experiment.

### Results and Discussion

An analysis of variance on the number of trials to criterion on the first lists of each set yielded a significant main effect of Sets,  $F=334.31$ ,  $df=3/432$ ,  $p<.001$ . The means were 12.18, 5.79, 5.31, and 5.23 for Sets 1-4 respectively. In agreement with Postman's results there was a reduction in trials to criterion as a function of sets, the greatest reduction occurring from the first to the second set. However, all possible interactions among Sets, Training paradigms, and Sequence were significant (all  $p$ 's  $< .05$ ) reflecting inconsistent trends among the second, third and fourth sets in some groups. There was also a significant main effect of Experimenter ( $p < .05$ ).

Figure 1 presents the mean number of correct responses on the second lists as a function of sets for the different training and test paradigms. An analysis of variance on these data indicated that all main effects and interactions among Training paradigms,

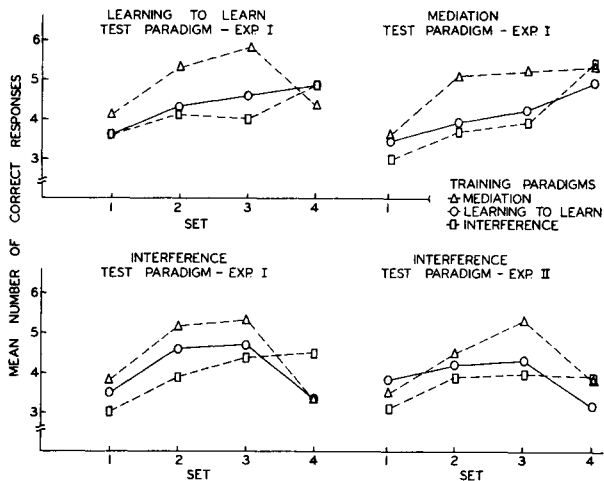


Fig. 1. Mean number of correct responses per trial on second lists as a function of sets and paradigms.

Test paradigms, and Sets were highly significant ( $p < .001$ ), with the exception of the Training paradigm by Test Paradigm by Sets interaction which approached significance  $F=1.66$ ,  $df=12/432$ ,  $.10 > p > .05$ . Since for any given group the paradigm was constant over the first three sets the finding that performance under the A-B' paradigm tends to diverge from the other paradigms over these three sets may be considered a replication of the Postman experiment.

The question of primary interest is whether test paradigm performance is dependent upon the nature of previous training experience. Therefore, an analysis of variance was conducted on the fourth set. The main effects of Training paradigms,  $F=3.92$ ,  $df=2/144$ ,  $p < .02$ , and Test paradigms,  $F=19.46$ ,  $df=2/144$ ,  $p < .001$ , were the only significant sources of variance. The latter effect indicates that, consistent with previous research in paired associate learning, the nature of the learning paradigm differentially affects performance, i.e., relative to the C-D reference paradigm the A-B' paradigm produces positive transfer and the A-C paradigm produces negative transfer. The mean number of correct responses per trial on the fourth set were 5.22, 4.65 and 3.68 for the A-B', C-D and A-C test paradigms respectively.

The significant main effect for Training paradigms also indicates that regardless of the test paradigm, training under the A-C paradigm results in better performance on the fourth set ( $M=4.92$ ) than does training under either the A-B' ( $M=4.31$ ) or C-D paradigms ( $M=4.32$ ). Since this finding was somewhat unexpected particularly in the absence of obtaining similar effects for Ss receiving the A-B' paradigm in training, a second experiment was conducted to determine its reliability. Inasmuch as Fig. 1 suggests that the

superiority of A-C training was most pronounced under A-C test conditions, only A-C test conditions were employed in the second experiment.

## EXPERIMENT 2

### Method

The same procedure was used as in the first experiment. There were three main groups representing three training paradigms on the first three sets: A-B', A-C, and C-D. On the fourth set all groups received the A-C paradigm. Four sequences and two experimenters yielded a total of 24 groups, with three female Ss per group.

### Results and Discussion

The mean number of trials to criterion on the first lists were 12.06, 6.42, 5.93, and 5.58 for Sets 1-4 respectively. The only effect to reach statistical significance was Sets,  $F=82.79$ ,  $df=3/144$ ,  $p < .001$ .

Figure 1 presents the mean number of correct responses on the second lists as a function of Sets for the three groups. There were significant ( $p < .001$ ) main effects of Trials and Sets, and significant interactions of Training Paradigms by Sets,  $F=7.12$ ,  $df=6/144$ ,  $p < .001$ , and of Paradigms by Sets by Trials,  $F=1.61$ ,  $df=24/576$ ,  $p < .05$ . As in the first experiment, the divergence over the first three sets of the A-B' from the other two paradigms is apparent.

An analysis of variance on the fourth set failed to yield a significant main effect of Training  $F=1.43$ ,  $df=2/48$ , or a significant Training by Trial interaction,  $F < 1$ . Thus these results do not support the finding in Experiment 1 of the superiority of A-C training for A-C test conditions. However, it should be noted that for groups receiving the A-B' and C-D training paradigms the decrement in performance under the A-C test paradigm was obtained in both experiments.

The results of Experiments 1 and 2 suggest that, within the limits of the number of training sets employed, test performance is primarily a function of the nature of the test paradigm and does not interact with conditions of training. Thus there is no evidence to support the hypothesis that relative to training under C-D conditions, the development of general mediational chaining strategies under A-B' and A-C training paradigms will facilitate performance under the alternate A-C and A-B' test paradigms.

### References

- Haagen, C. H. Synonymity, vividness, familiarity, and association value ratings of 400 pairs of common adjectives. *J. Psychol.*, 1949, 27, 453-463.
- Hilgard, E. H. Methods and procedures in the study of learning. In S. S. Stevens (Ed.), *Handbook of experimental psychology*. New York: Wiley, 1951.
- Postman, L. Studies of learning to learn II. Changes in transfer as a function of practice. *J. verbal Learn. verbal Behav.*, 1964, 3, 437-447.