

# Pseudomediation effects with no intertrial intervals<sup>1</sup>

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*Employing four paired-associate transfer paradigms, (A-B, B-C, A-E; A-B, D-C, A-E; A-B, B-E, A-E; A-B, D-E, A-E), an attempt was made to replicate Mandler & Earhard's pseudomediation study with group B-E serving as a control for possible mediational effects. Stage III results supported the pseudomediation hypothesis and no additional significant effects were attributable to mediation factors. However, differences between groups in degree of A-B unlearning were not found.*

Mandler & Earhard (1964) have suggested that learning B-C in the three-stage paired-associate chaining paradigm (A-B, B-C, A-C) may cause the A-B association to be disrupted; this could leave A relatively dissociated in a B-C group and subsequently more free to be associated with C than the A term in a group which learns D-C in stage II. Their test of this "pseudomediation" mechanism involved training an A-E association in stage III. As predicted, A-E was learned faster in the B-C group than in the D-C group in spite of there being no chance for facilitation due to mediation in this design.

However, subsequent attempts at replication of these findings by Schulz, Weaver, & Ginsberg (1965), Jenkins & Foss (1965), and Goulet & Postman (1966) have been unsuccessful. While the Schulz et al experiment employed procedures substantially different from Mandler & Earhard's, the latter two studies differed primarily in their use of intertrial intervals. In addition, Jenkins & Foss administered recall tests of the strength of A-B following stages II and III which did not reveal the unlearning in the B-C group predicted by the pseudomediation hypothesis. But a later study by Earhard & Mandler (1965) employing a matching test did indicate A-B dissociation in a B-C group following stage II.

In view of the differing procedures and results of the foregoing investigations, the present study was designed to: (1) replicate the Mandler & Earhard study employing no intertrial intervals or interpolated tasks; (2) assess the extent to which mediational mechanisms might still be operating by inclusion of a B-E group; (3) compare the sensitivities of matching and recall tests to the strength of the A-B association in each group following stage III.

## Method

Ninety six female undergraduates were randomly assigned to four equal groups. All Ss learned lists of six paired associates in each of three successive stages. The four paradigms were: A-B, B-C, A-E (pseudomediation experimental group); A-B, D-C, A-E (pseudomediation control group); A-B, B-E, A-E (mediation

experimental group); A-B, D-E, A-E (mediation control group).

Lists were composed of the 30 words used by Mandler & Earhard (1964). All pairing methods used in that study were employed except that 18 random orders were generated for each list. Four experimenters were assigned an equal number of Ss in each group.

The word pairs were presented in a Lafayette memory drum (2:2 rate) with no intertrial intervals. Standard Minnesota paired-associate learning instructions (Hakes, 1961) were used. Beginning every stage, each S read aloud the six pairs of words in a familiarization trial, then learned by the anticipation method to a criterion of two successive correct trials. Interstage intervals were approximately 1 min. in length. (Ss who did not learn the first list in 35 trials or less were excluded; the experiment was continued until 96 Ss had completed the task. All Ss were given at least 10 trials in stage III.)

Following stage III (employing the Jenkins & Foss instructions), half the Ss in each group were presented the A stimulus terms on 3 by 5 cards and asked to attempt to recall the pairs from the first task. The remaining Ss were asked to try to match the first-task response words which appeared in scrambled order at the top of a test paper with the (A) stimulus terms below them.

## Results

The means for four variables were analyzed for stages I, II, and III. Employing error terms based upon mean within-cell variances, the differences cited below appeared significant at least at the .05 level. In the analysis of mean number correct over the first six trials (NC), both experimental groups indicated faster learning than their respective controls in stage III. Analyses of trials to one correct (C-1), two correct (C-2), and two successive correct (C-2s), all revealed faster learning in the pseudomediation experimental group (B-C) than in its control (D-C) in stage III; but only in C-1 did the mediation experimental group (B-E) show significantly faster acquisition than its control (D-E) in the third stage. However, since in variables C-2 and C-2s an inequality in stage I learning was apparent between groups B-E and D-E, subsequent analyses of covariance of these variables using stage I as the covariate were applied; here the stage III differences between the mediation groups did reach significance ( $p < .05$ ,  $df = 47$ ). In all variables in the third stage, differences between the pseudomediation and mediation experimental groups and differences between their controls were nonsignificant. The only additional

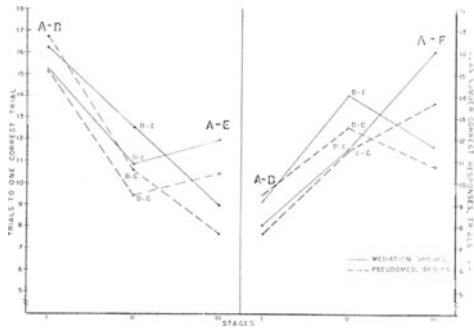


Fig. 1. Mean trials to one correct trial (C-1) and mean correct responses in six trials (NC) for all groups in the three stages.

significant comparisons appeared in stage II between the mediation groups in variables C-2 and C-2s where, in both instances, D-E learned faster. Figure 1 depicts group performances in terms of variables C-1 and NC.

Figure 2 illustrates performance in the final stage. It is apparent that the greatest divergence between the mediation groups occurred in trials 4-9 (trials 2, 4-9 significant,  $p$  at least  $< .05$ ), while that between the pseudomediation groups was in trials 3-8 (trials 3, 5-8, 10 significant,  $p$  at least  $< .05$ ). In this figure, scores of Ss reaching criterion by trial 10 were extrapolated for the remaining trials.

Finally, both the matching and recall analyses of A-B retention revealed negligible differences in all of the group comparisons.

### Discussion

The faster learning of both of the experimental groups in stage III supports the predictions of the pseudomediation hypothesis. Lack of significant differences between the control groups renders direct comparisons of the experimental groups valid. And the failure to obtain reliable differences between the mediation and pseudomediation experimental groups suggests that factors other than mediation may indeed be operating in the chaining paradigm when no intertrial intervals are employed.

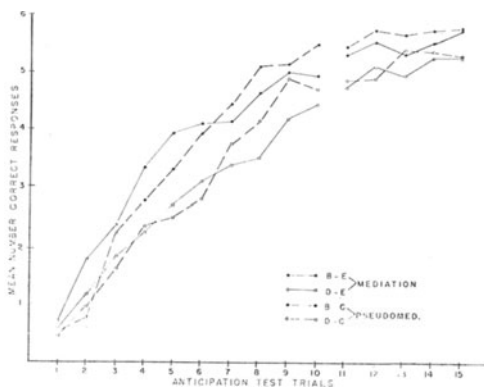


Fig. 2. Mean number of correct responses by trials in third-stage (A-E) learning for all groups.

However, with regard to the latter conclusion, first, neither tests of A-B strength following stage III revealed the A-B unlearning upon which the pseudomediation mechanism is based. Moreover, this result accords with that of Jenkins & Foss. (Earhard & Mandler's test of unlearning cannot be compared with the present one since it was given only following stage II.) Of course, it is possible that any test of A-B strength following stage III might not detect differences attributable to second-stage associations due to the high A-E association strength by the end of training.

Second, the fact that the only consistent difference between the procedures of the positive and negative investigations of pseudomediation lies in the intertrial intervals used in the latter is in agreement with Earhard & Mandler's suggestion that pseudomediation phenomena may best be manifested when task complexity and memory load are optimal. However, an explanatory mechanism to account for this possibility has yet to be devised. Meanwhile, the restrictive conditions under which pseudomediation is apparently produced (Earhard & Mandler, 1965) must not be underemphasized.

Finally, two departures of the results of this study and more common findings are notable. One is the lack of significant interference in the experimental groups in the second stage (with two exceptions, noted above). This result is especially unfavorable to the pseudomediation hypothesis which is based upon interference between the A-B and B-C (or B-E) associations. The other interesting finding is in the analysis of stage III (Fig. 2) where both sets of groups revealed greatest effects in the middle portion of that training. Since mediation groups have typically shown facilitation immediately in this stage, this is further evidence that nonmediational factors may have been operating in this study in the absence of intertrial intervals.

### References

- Earhard, B., & Mandler, G. Pseudomediation: A reply and more data. *Psychon. Sci.*, 1965, 3, 137-138.
- Goulet, L. R., & Postman, L. An experimental evaluation of the pseudomediation hypothesis. *Psychon. Sci.*, 1966, 4, 163-164.
- Hakes, D. T. The role of stimulus and response familiarization in paired associate learning. Unpublished doctoral dissertation, University of Minnesota, Minneapolis, 1961.
- Jenkins, J. J., & Foss, D. J. An experimental analysis of pseudomediation. *Psychon. Sci.*, 1965, 2, 99-100.
- Mandler, G., & Earhard, B. Pseudomediation: Is chaining an artifact? *Psychon. Sci.*, 1964, 1, 247-248.
- Schulz, R. W., Weaver, G. E., & Ginsberg, S. Mediation with pseudomediation controlled: Chaining is not an artifact! *Psychon. Sci.*, 1965, 2, 169-170.

### Notes

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