Similarity among the implicit stimuli and responses in mediated paired-associate learning

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In an A-B, B-C, A-C mediation paradigm similarity among the Bs was varied over four conditions. The effect on paired-associate performance in the A-C stage was as predicted from studies concerned with the effect of intralist similarity in conventional paired-associate learning. Performance facilitation in the A-C stage decreased as the similarity of the Bs increased.

In a theoretical and review article by Jenkins (1963) the suggestion was advanced that the next phase of research on mediation should be an experimental analysis of the conditions of mediation. One approach to the investigation of the conditions of mediation in paired-associate learning would be to compare the effects of variables on overt performance in conventional paired-associate tasks with the effects of the same variables on the implicit performance thought to be involved in mediation. If the implicit stimuli and responses of, for example, the chaining mediation paradigm are to be treated theoretically the same as explicit stimuli and responses, then it might be very helpful to have data directly concerned with the extent of this functional equivalence.

The present experiment was concerned with the effect of intralist similarity among the Bs in an A-B, B-C, A-C chaining paradigm. The theoretical explanation of performance facilitation in the A-C stage is that an implicit response, r_B , with implicit stimulus concomitants, s_B , is mediating the effects of practice in the A-B and B-C stages. The effect of formal similarity among stimuli and responses in conventional paired-associate studies (Levitt & Goss, 1961; Underwood, 1953) would lead one to expect a decrease in the extent of A-C facilitation as similarity of the Bs in the A-B and B-C stages increases.

Method

The experiment employed an A-B, B-C, A-C paradigm in which the As and Cs were consonant-vowel-consonant syllables with meaningfulness values of 47-53 (Glaze, 1928). Intralist letter duplication was minimized. The Bs were pure tones distributed along the mel scale (Stevens & Volkman, 1940), a scale of pitch. Six mel values, 500, 550, 600, 650, 700, 800, were used. The corresponding frequency values of 400, 438, 480, 528, 577, and 693 cps were estimated by linear interpolation from a function relating mels and log frequency (Stevens & Volkman, 1940). All of the tones were presented at 60 db sensation level.

The mediation and control conditions were varied within Ss. In the A-B and B-C stages of the experiment

tones were paired with four of the syllables of the eight item list. The pairing of the syllables and tones was such that the A-C stage performance would be facilitated if mediation occurred. A tone of a specific mel value paired with a given A in the A-B stage was paired with the "appropriate" C in the B-C stage. The appropriate C was the one paired with A in the A-C stage. The difference among the tones was varied over three groups of 20 Ss each. In one group the tone difference was 100 mels; values of 500, 600, 700, and 800 were used. In another group the difference was 50 mels; values of 550, 600, 650, and 700 were used. In a third group there was no difference among the tones. A tone at one of the mel values was paired with each of the four syllables for a given S. The six mel values were used an approximately equal number of times over the 20 Ss. A fourth group was given the tones of 100 mel difference, but the pairing was such that performance in the A-C stage would be inhibited if mediation occurred. The syllables and tones were systematically mismatched from the A-B to the B-C stages. The set of four syllables which were paired with tones was varied within pairs of Ss such that all eight syllables were equally often tone-paired over the 20 Ss within a group.

In the A-B stage Ss were told that some of the syllables would be followed by a tone and that they were to try to learn the correct tone for a given syllable. The syllables were projected on a screen for 5 sec. For the appropriate syllables, the latter 2 sec. of the presentation period was accompanied by the tone. The Ss were instructed to spell each syllable as it appeared on the screen. In the B-C stage Ss were told that some of the syllables would be preceded by tones and that they were to learn the correct pairing. On appropriate items the tone came on for 2 sec. and was followed immediately by a 3-sec. presentation of the syllable. The Ss were instructed to spell each syllable as it appeared on the screen. In both phases 10 trials were given and three different orders of the list were used. The A-C stage consisted of 12 trials of paired-associate learning by the anticipation method with a 2.5:2.5-sec. rate of presentation. Three different orders of the list were used.

The slides were presented by a Kodak Carousel slide projector. The tones were produced by an Eicho audio oscillator and delivered to the Ss through a headset. Presentation times of syllables and tones were controlled by two Hunter electronic timers. Ss were randomly assigned to groups from a pool of 80 introductory psychology students who participated in the experiment as part of the course requirement.

Results and Discussion

Six scores were calculated for each S by tabulating the number of correct responses for each block of four trials for the set of syllables paired with tone (Paired) and the set not paired with tone (Unpaired). A three-way analysis of variance was performed on these scores with the four groups as the between-Ss variable and trial blocks and Paired-Unpaired as within-Ss variables. Two of the significant effects of the analysis were trial blocks ($F=391.68$, $df=2/152$, $p<.01$) and the interaction term for trial blocks and Paired-Unpaired ($F=7.92$, $df=2/152$, $p<.01$). The form of the interaction was that the increase in performance from the first trial block to the second was somewhat greater for the Unpaired condition than for the Paired. The absolute differences were not large. Average performance in the Paired condition went from 6.54 correct responses on the first trial block to 10.14 on the second; corresponding values for the Unpaired condition were 5.70 and 10.65.

Major interest was focused on the interaction of groups with Paired-Unpaired since the experimental hypothesis predicted that the difference between performance on the Paired set of syllables and the Unpaired set should decrease as the difference between the tones decreases. It was further expected that an actual reversal in performance on the Paired and Unpaired sets would occur with the group for which the tones were mismatched. The interaction effect for groups by Paired-Unpaired was significant at the .01 level ($F=4.30$, $df=3/76$). Since the three-way interaction was statistically nonsignificant ($F=1.64$, $df=6/152$, $p>.05$), the data was collapsed over trial blocks. A plot of the average number of correct responses in 12 trials by groups and Paired-Unpaired appears in Fig. 1. The pattern of the means in Fig. 1 is clearly in line with expectations from the experimental hypothesis.

The upward trend of the means in the Unpaired condition from the 50 mel tone-difference condition to the Mismatch condition suggests the operation of a set factor which may be peculiar to experiments in which the mediation and control conditions are within-Ss. It

Fig. 1. Mean number of correct responses as a function of tone-difference and whether the syllables were paired or not paired with the tone.

may be that Ss tended to concentrate on Unpaired items when mediation led to incorrect responding.

The results have established that there is a certain degree of functional equivalence between explicit stimuli and responses in paired-associate learning and their implicit counterparts in mediation. Further research directed at an assessment of the extent of such functional equivalence appears useful to the development of mediation theory.

References

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