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# Training in Paired-Associate Mediation for Elderly Subjects

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# TRAINING IN PAIRED-ASSOCIATE MEDIATION FOR ELDERLY SUBJECTS

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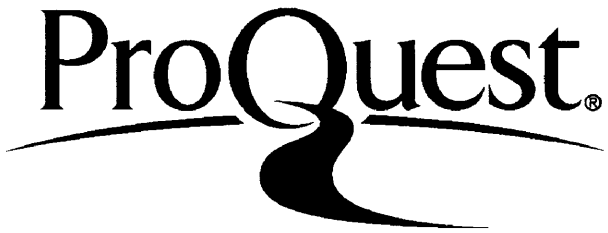

APPROVAL SHEET

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## ABSTRACT

This study investigated the possibility of improving older Ss' paired-associate learning (PAL) by training them in mediation. The purpose was to provide a preliminary test of the hypothesis that much PAL deficit associated with aging results from less frequent practice with mediational techniques by older Ss. Three groups of elderly male Ss received pre- and posttraining PAL tasks. Ss in one treatment, the Mediational Training Treatment (MTT), received training in mediation during two intervening training tasks. Ss in a second treatment, the Mediational Instructions Treatment (MIT), received instructions to mediate during these training tasks, but no training in mediation. Ss in a third treatment, the Control Treatment (CT), received neither instructions to mediate nor training in mediation during the training tasks.

In terms of errors to criterion, each of the treatments differed significantly from the other two in the final training task. MTT resulted in the fewest errors; MIT resulted in an intermediate number of errors; CT resulted in the greatest number of errors. On the posttraining task MTT resulted in fewer errors than MIT, although not significantly fewer. CT resulted in more errors than either of the other two treatments. The experiment thus fails to provide support for the hypothesis that much PAL deficit associated with aging may be the result of less frequent practice with mediational techniques by older Ss. Considerations for further tests of the hypothesis are suggested.

# TRAINING IN PAIRED-ASSOCIATE MEDIATION FOR ELDERLY SUBJECTS

Older Ss do not perform as well in paired-associate learning (PAL) as younger Ss (Ruch, 1934; Gilbert, 1941; Korchin and Basowitz, 1957). A partial explanation may derive from newer work on mediational techniques in PAL. A number of investigators have demonstrated that mediational techniques are pervasive in the PAL of younger Ss (e.g. Underwood and Schultz, 1960) and that these techniques can be beneficial (Bastian, 1961; Bugelski and Sharlock, 1952; Gruber, Kulkin, and Schwartz, 1965; Martin and Dean, 1964; McGehee and Schultz, 1961; Russell and Storms, 1955; Wismer and Lipsitt, 1964). Some investigators even speculate that most PAL is accomplished by mediational techniques (e.g. Miller, Galanter, and Pribram, 1960; Mandler, 1967). Wallace, Turner and Perkins (1957) demonstrated how well younger Ss can employ mediational techniques: they produced virtually perfect PAL with only one self-paced presentation per word pair. As reported by Miller, Galanter, and Pribram, (1960), "starting with lists of twenty-five pairs they (the Ss) worked up to lists of 700 pairs of words. Up to 500 pairs, the Ss were remembering about ninety-nine percent." The Ss were instructed to form an image between the

objects denoted by the words of each pair. Initially Ss required about 25 seconds, but with practice they used only five seconds.

Apparently older Ss can not use mediational techniques with anywhere near the efficiency of younger Ss. Older Ss improve their performance in PAL when instructed to mediate, but they remain inferior to younger Ss who receive the same instructions (Hulicka, 1965; Hulicka and Grossman, 1967). They report many more word pairs as being too odd to put together in images and make much more use of verbal mediators. Verbal mediators have been found by at least some investigators to be less effective than visual ones (Paivio et al, 1965; Hulicka and Grossman, 1967). A number of investigators have reported an associative impoverishment among older Ss (Bromley, 1956; Prados and Fried, 1947; Chesrow, Wosika, and Reivitz, 1949). Jones (1959) reports a reduction in the ability of older Ss to form and integrate new connections. Talland (1965) and Reigel (1965) have also found that association time for the aged S is greater than for the younger S.

The purpose of the present research was to assess the effect of mediational training on PAL in elderly Ss. Canestrari (1967) has hypothesized

that much of the PAL deficit associated with aging may be the result of less frequent practice with mediational techniques rather than the result of aging, per se. If a brief training session can induce nearly perfect or even improved one-presentation PAL, this hypothesis would be strengthened.

In the final form of the training procedure used in this experiment for every word pair used, the S (a) was asked to visualize the object denoted by the stimulus word and describe it, and then (b) to fit the object denoted by the response word into or onto that image in either one or more meaningful and/or bizarre ways; finally (c) he was shown a number of ways to link the words if incapable of doing this himself. The procedure seemed to have a number of advantages over simply asking the S to link paired associates with an image or simply giving Ss standardized mediators. The final form of the training procedure was determined by five major considerations. First, Cofer's (1967) summary of the literature on the effects of context on word associations shows that compound stimuli (Howes and Osgood, 1954; Amster, 1964; Podell, 1963) can have different associative effects than separate words making up the compound stimulus do alone. If image associations to word stimuli function the same way as word associations to word

stimuli, the effect of first forming an image to both words of a pair on a learning trial and then on a recall trial forming an image to the stimulus word alone could result in two entirely unrelated images being formed. The results of Wallace, Turner, and Perkins (1957) indicate that confusion of stimulus imagery does not occur with young Ss, but informal observation of older Ss in PAL indicates that it sometimes does with them. Second, the training procedure emphasized specific examples for all nouns (only nouns were used in the experiment) whether concrete or abstract. Paivio (1965) and Paivio and Oliver (1965) have done work indicating that nouns of high specificity are more easily learned than more general nouns. In any case, it seems intuitively clear that only specific things have images. Third, the training procedure emphasized visual mediation to the exclusion of verbal mediation. Fourth, the training procedure emphasized many linkages. For some Ss some linkages might function better than others. Furthermore, providing the S many linkages after he has admitted a difficulty in forming them should demonstrate to him that many linkages are indeed possible for any word pair and that they assist him in recall. Finally, the training procedure permitted greater success in the training situation

which should have favorably affected motivation. Informal observation suggests that older Ss tend to invest less effort in tasks they feel they will do poorly on.

## Method

### Subjects

Of 60 male Ss from the domiciliaries at the Kecoughtan Veterans Administration facility, the first 40 drawn were randomly assigned to two experimental treatments; the last 20 were assigned to a control treatment. All Ss were 50 years old or older. The Ss of the respective experimental treatments had average ages of 69.2 years (SD = 7.7) and 66.0 years (SD = 8.8). The Ss of the control treatment had an average age of 70.3 years (SD = 9.0). None of the Ss had previously participated in any mediational experiments.

### Procedure

All Ss were tested in counterbalanced pre- and posttraining PAL tasks which were identical for all treatments. Both of these tasks contained ten pairs, each pair constructed by matching a stimulus noun from Palermo and Jenkins' Word Association Norms (1964) with an idiosyncratic, noun associate as response. The word pairs used in both tasks are in Appendix A. Pairs were dropped when given once correctly, and Ss continued the tasks until either

they had given all pairs correctly or until they had had four recall trials. Both stimuli and responses were presented verbally, and self-pacing was used throughout. Total errors were recorded for all Ss.

The three treatments differed only in the presentation of two training tasks between the pre- and posttraining tasks. Word pairs used in these tasks were constructed as were the word pairs of the pre- and posttraining tasks. The first training task had only five pairs; the second had ten. The pairs used in the training tasks are presented in Appendix B. For each task only one recall trial was used; all pairs were presented verbally.

In the Mediational Training Treatment (MTT) Ss were told that images could be used to connect all the pairs and that these images would help them remember the pairs. Ss were told they should (a) visualize the object denoted by the stimulus word; then (b) visualize the object denoted by the response word; and (c) fit the two images together in a joint image which could be either meaningful or ridiculous. The procedure was demonstrated with a few pairs from the pretraining task, and the fact was emphasized that there were many ways to fit any pair together. Ss were asked to follow this procedure aloud for each pair in the training tasks. If they had difficulty

in visualizing a specific instance of the stimulus word, E drew them out with questions; if they had difficulty fitting stimulus and response together, E presented them with a number of possibilities. The joint images used by E are given in Appendix B.

In the Mediational Instructions Treatment (MIT) Ss were advised to mediate just as the Ss of MTT had been. The first few times Ss found particular pairs too difficult to link with images E demonstrated that they were not. No other aid was given.

In the Control Treatment (CT) Ss were given neither mediational assistance nor instructions to mediate. The inclusion of this treatment permitted a comparison for the other two treatments in terms of absolute improvement.

## Results

A summary of the performance of the three treatment groups is presented in Table 1. In all instances the group receiving mediational training (MTT) performed better than the other groups. Since the level of performance in the initial task differed between groups, treatment effects were tested by analysis of covariance.

The analysis of treatment effects on the second training task indicated that the overall treatment

TABLE 1

Data Summary Table: Errors in Treatments by Tasks

| | Pre- | Tasks Training #1 | Tasks Training #2 | Post- |
|---|---|---|---|---|
| MTT | | | | |
| Mean | 18.3 | 1.55 | 3.1 | 11.5 |
| SD | 9.9 | 1.23 | 1.85 | 9.7 |
| MIT | | | | |
| Mean | 17.3 | 2.15 | 5.0 | 14.9 |
| SD | 11.2 | 1.70 | 3.05 | 11.4 |
| CT | | | | |
| Mean | 23.0 | 3.65 | 8.4 | 24.3 |
| SD | 11.3 | 1.64 | 3.04 | 11.2 |

TABLE 2

Analysis of Variance: Training Task #2

| Source | df | MS | F |
|---|---|---|---|
| Treatment | 2 | 144.72 | 19.76** |
| Error | 57 | 7.23 | |
| Total | 59 | | |

Analysis of Covariance: Training Task #2

| | | | |
|---|---|---|---|
| Treatment | 2 | 102.19 | 21.64** |
| Error | 56 | 4.72 | |
| Total | 58 | | |

Adjusted Treatment Means

| MTT | MIT | CT |
|---|---|---|
| 3.29[a] | 5.28[b] | 7.88 |

a Different from MIT ($F$ = 8.47**) and CT ($F$ = 43.23**).
b Different from CT ($F$ = 13.54**).
** $p < .01$

TABLE 3

Analysis of Variance: Posttraining Task

| Source | df | MS | F |
|---|---|---|---|
| Treatment | 2 | 879.20 | 7.41** |
| Error | 57 | 118.61 | |
| Total | 59 | | |

Analysis of Covariance: Posttraining Task

| Source | df | MS | F |
|---|---|---|---|
| Treatment | 2 | 435.81 | 7.15** |
| Error | 56 | 60.92 | |
| Total | 58 | | |

Adjusted Treatment Means

| MTT | MIT | CT |
|---|---|---|
| 12.37[a] | 16.48[b] | 21.85 |

a Different from CT ($F = 14.28^{**}$) but not from MIT ($F = 2.77$, $p \sim .10$).
b Different from CT ($F = 4.52^{*}$).
* $p < .05$
** $p < .01$.

effects were significant in the training situation (Table 2). Furthermore, the tests for simple effects indicated that the group receiving mediational training (MTT) performed better than both the group receiving instructions to mediate (MIT) and the group which received no assistance (CT). Finally, Ss of MIT performed better than Ss of CT.

The analysis of covariance on the final task, to determine whether or not there was any posttraining improvement as a function of the training, indicated a significant treatment effect (Table 3). Tests for the significance of simple effects indicated that while MTT and MIT led to significantly better performance than did CT, MTT did not lead to significantly better performance than MIT.

## Discussion

This study replicated the findings of Hulicka (1965) and Hulicka and Grossman (1967) in finding that instructing older Ss to mediate improves their PAL performance, and further demonstrated that this improvement is maintained over time. However, the study failed to demonstrate ($p \tilde{=} .10$) differentially better PAL for elderly Ss who had been trained in mediation (MTT) than for Ss who had merely been instructed to mediate (MIT). The results do not

permit the conclusion that PAL performance of elderly Ss cannot be improved by training in mediational techniques. There are virtually limitless possibilities for strengthened mediational training, provided that mediational difficulties of older Ss can be specified and provided these difficulties are at least partially remediable. Chief among these possibilities are (a) practice with specific skills thought to be involved in PAL mediation, such as making connections, forming images to stimulus words, or recalling imagery to stimuli; (b) practice with specific classes of mediators; (c) various mixtures of practice with specific skills interspersed with participation in the PAL task, so as to allow integration of the separate skills involved in mediated PAL. There is little enough understanding of mediational technique (Mandler, 1967) at present that wide latitude in choice of training techniques seems justified. Even for younger Ss no one has demonstrated that the mnemonic procedure ostensibly used by the Ss of Wallace, Turner, and Perkins (1957) is the best or most efficient possible.

However, a demonstration of improved performance for Ss of MTT over Ss of MIT would not have been sufficient to prove that age-related decrement in PAL is a result of less frequent practice with mediational

techniques by older Ss rather than a result of aging, per se. There is a question of how much PAL decrement must be removed before older Ss can be said to be performing on the same level as younger Ss. The results of Wallace, Turner, and Perkins (1957) establish perfect performance as a preliminary criterion which must be achieved in order to demonstrate removal of PAL deficiency in older Ss.[1] Even if older Ss achieve perfect performance there is question whether their PAL deficiency has been removed. Older Ss may require mnemonic techniques to achieve perfect learning that younger Ss do not find necessary. Therefore, in order to demonstrate the absence of PAL deficit for older Ss one must demonstrate not only that older Ss can achieve perfect learning, but that they can do so while using the same mnemonic techniques as younger Ss.

On the other hand, the fact that it may be impossible to improve the PAL of some elderly Ss regardless of what training procedures are used or how much practice is administered is not sufficient to prove that age-related decrement is a result of

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[1] At least in this experimental situation perfect learning should be the preliminary criterion. Six young Ss run under MTT conditions performed perfectly in the training tasks and made very few errors in the posttraining task ($\bar{X}$ = 0.66; SD = 0.82).

aging, per se, rather than a result of less frequent practice with mediational techniques. Many changes detrimental to PAL correlate with chronological age but are not attributable to "aging". Most gerontologists employ "aging" as a construct to explain age-related change (usually decrement) only when all other possible explanations have been ruled out. The late Robert Kleemeier takes a representative position: "if upon close analysis an observed change cannot be attributed to illness, trauma, specific genetic or environmental factors, experience, motivation, learning or to any other such factor; then and only then, can it be considered an age change. Furthermore if any phenomenon, now identified as an age change can be attributed to some other specific cause, such as disease...it ceases to be an age change."[2] Following this line of reasoning to its logical conclusion, Birren (1959) points out that age as an explanatory concept may be "infinitely eliminable". Obviously, any conclusive determination of the worth of Canestrari's hypothesis (1967) awaits more detailed knowledge and in-task measurement both of PAL processes and of processes related to chronological age.

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[2]Unpublished study entitled "The Interaction of Aging and Illness as a Psychological Problem," 1963.

# APPENDIX A

## WORD PAIRS USED IN PRE- AND POSTTRAINING TESTS

| | |
|---|---|
| 1. table-kettle | 1. priest-tag |
| 2. music-bird | 2. ocean-tide |
| 3. man-sand | 3. head-eyes |
| 4. mountain-climbers | 4. stove-night |
| 5. house-colors | 5. whisky-uncle |
| 6. hand-moth | 6. child-key |
| 7. fruit-feet | 7. hammer-toy |
| 8. butterfly-zebra | 8. city-jail |
| 9. chair-worm | 9. square-hair |
| 10. whistle-kid | 10. butter-burn |

# APPENDIX B

## WORD PAIRS AND LINKAGES USED IN TRAINING TASKS

### TRAINING TASK 1

| PAIRS | LINKAGES |
|---|---|
| 1. river-elk | elk drinking from river<br>elk swimming in river<br>elk walking in river |
| 2. spider-nail | nail driven in spider<br>spider with web around nails<br>spider biting nail |
| 3. carpet-ink | ink spot on carpet |
| 4. girl-enemy | girl being chased by enemy |
| 5. earth-farmer | farmer plowing field |

### TRAINING TASK 2

| PAIRS | |
|---|---|
| 1. soldier-ladder | soldier climbing ladder<br>soldier using ladder to scale obstacle<br>soldier crossing stream with ladder |
| 2. cabbage-hole | planting cabbage in a hole<br>big hole in a cabbage<br>burying cabbages to store in wintertime<br>burying cabbages as in a depression |
| 3. eagle-worm | eagle pulling worm from hole<br>eagle eating worm<br>eagle carrying worm to its young<br>worms eating eagle |
| 4. stem-ant | ant on a plant stem<br>ant in or on a pipestem<br>ant with stem between fore and hind quarters |

| | | |
|---|---|---|
| 5. | lamp-limb | lamp hung on limb<br>lamp made of limb |
| 6. | bread-whiskers | man eating bread with crumbs in his whiskers<br>man eating whiskers with his bread |
| 7. | boy-tail | boy with little devil's tail<br>boy obtaining favors of a young lady |
| 8. | sheep-tire | counting sheep jumping through a tire<br>ram butting tire<br>sheep being run over |
| 9. | bath-dog | giving dog a bath<br>dog in bath tub |
| 10. | stomach-cage | stomach with bars holding animals<br>stomach in a cage<br>stomach roaring like animals in a cage |

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