Memory loss with age: A test of two strategies for its retardation

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Two experiments were conducted to study the effectiveness of two different strategies in overcoming the short-term memory deficiencies typically observed in the elderly. Opportunity to rehearse material related to that which subsequently would appear in the test list proved of no benefit in augmenting recall. Significant higher recall was found however when elderly Ss had a cue available at the time of recall to aid retrieval of a particular item.

In the context of free recall verbal learning studies it is a well established fact that the elderly typically attain lower recall scores than do younger Ss. McNulty & Caird (1966, 1967) have sought to explain this in terms of the greater difficulty experienced by the elderly in getting things into memory storage in the first place, whereas Schonfield (1965, 1966) has tended to think of difficulties in retrieval from storage as the crux of their problem. He suggests two strategies which may be invoked to overcome the retrieval problem: (a) preparation in advance of need for a subsequent retrieval task, i.e., rehearsal, and (b) an increase in the number of cues which can lead to a particular stored item at the time of the test for retrieval. It is the purpose of this paper to concentrate on Schonfield's explanation and, in two separate but similar studies, to examine the relative effectiveness of these two tactics in overcoming the problem of lower recall scores experienced by the elderly in comparison with those achieved by younger Ss.

Subjects

Ss were 58 elderly persons from the alumni of the University of Toronto classes of 1914 to 1916 (mean age 75 years) who had agreed, in response to a mail appeal, to participate in a study of human learning. There were also 58 University of Toronto freshman who were fulfilling a course requirement to serve as Ss (mean age 20 years). Thirty Ss from each age group served in Experiment 1 and 28 Ss in Experiment 2.

Design and Procedure

Ss in both experiments were given one free recall learning trial on a 36 word list composed of six words in each of six different categories—flowers, trees, birds, formations of nature, vegetables, and countries. Serial position of each word in the list was determined by lot with the restriction that no more than two words from any one category should be in juxtaposition.

Experiment 1—Prior Rehearsal

For purposes of this study, Schonfield's rehearsal strategy consisted in giving 15 Ss in each age group a cue card before the list was presented. On it were listed the category names for the words S would shortly be seeing. Ss were told that all words would belong to one or another of these categories and to study the cue card for whatever assistance this prior knowledge of category names might afford to their subsequent recall. It is recognized that this is a very conservative rehearsal device, utilizing, as it does, not the same words as will be learned later but superordinate terms only for these words. It was hypothesized, however, that knowledge of the category names could serve as an organizer for the word input when it subsequently came, and that, if organized as they were put into storage, items might be more readily recalled when the recall test proper came. Before actual presentation of the list, the cue card was withdrawn from S. Fifteen other Ss in each age group got no such opportunity to rehearse category names in advance.

Experiment 2—Cue at Recall

The other 28 Ss in each age group were told nothing about the list's makeup in advance of list presentation. Immediately before the test for recall, however, 14 Ss in each age group were given the cue card with the six category names on it and were told that all the words which they had just seen belonged to one or another of the categories. They were free to consult the cue card at any point during the recall period. The other 14 Ss in each age group received no such aid to retrieval.

There were thus four experimental groups, the first two in Experiment 1 and the second two in Experiment 2.

(1) Prior rehearsal group—permitted rehearsal of category names in advance of list presentation (15 Ss in each age group)
(2) No prior rehearsal (15 Ss)
(3) Cue at recall group—category names for words in list available at time of recall (14 Ss)
(4) No cue at recall (14 Ss)

Groups 2 and 4 are identical in that neither received any help at any point in the procedure and serve a replication function in the study. In all cases, the test list was presented at a rate of 2 sec per word on a Stowe memory drum. All Ss were tested individually and each wrote his own recall immediately after all the words on the list had been presented.

Results and Discussion

In Table 1 are displayed the mean number of words recalled by each age group under each condition in the two experiments. It will be noted that the performance of the two no cue groups is virtually identical, so it is presumed that the difference in the scores of the other

Table 1

Mean number of words recalled by age groups in Experiments 1 and 2

	Experiment 1 N=15 per cell			Experiment 2 N=14 per cell		
	Cue at present.	No cue at present.	t	Cue at Recall	No cue at Recall	t
Young Adults	17.2	15.0	NS	16.6	14.9	NS
Elderly Adults	12.6	11.7	NS	15.7	11.6	<.02

groups is attributable to the presence of the specific cue variable.

Experiment 1–Prior rehearsal. Analysis of variance of the data in Experiment 1 reveals no statistically significant effect of having had the prior rehearsal opportunity ($F = 1.52$, $df = 1/56$, NS) but there is the usually observed age effect—young Ss recalled significantly more words than did the elderly Ss under both rehearsal and no rehearsal conditions ($F = 9.78$, $df = 1/56$, $p < .005$). No significant interaction between age and rehearsal opportunity was demonstrated. Separate t tests to compare the mean recall scores within each age group were also nonsignificant (17.2 vs 15.0 and 12.6 vs 11.7 for the young and old adults, respectively).

Two possibilities suggest themselves to account for the failure of the elderly to utilize profitably the cue given in advance of list presentation. (1) There may simply not have been sufficient time spent in rehearsal. Since there were only six category names on the card, a few seconds typically sufficed to read them before the card was returned. It would not be unreasonable to assume that rehearsal in the true sense of the word had not occurred at all. The minimal difference in score between the cue at presentation group and the no cue group suggests that this interpretation has some merit. Further support for this same view may be found in the fact that, in the later free recall, a few Ss failed to recall a single instance of one or more of the categories, thus suggesting that they may not even have learned the category names which were supposed to help retrieval of member words, let alone the member itself. Some objective measure of S's rehearsal activity is obviously necessary to ensure that he indeed has involved himself in rehearsal and is not simply ignoring the presence of this variable in the design. (2) The presentation rate may have been too fast to permit S to use the cue effectively. For the elderly, especially, a 2 sec rate represents quite rapid, and not always dependable, input (Laurence, 1966) and it might well be that, at this rate, there is simply not enough time available to permit S to perceive the word and then hook it to the appropriate category label before the next word is upon him. Clearly the effectiveness of the rehearsal strategy has not been tested adequately by the definition of the term as given here, and a further exploration of its utility as a device for maintaining short term memory efficiency in the elderly is necessary.

Experiment 2–Cue at recall. A similar analysis of variance of the recall scores of Ss in both age groups and experimental conditions of Experiment 2 reveals a different pattern. There is a significant effect of having a cue available at time of recall over not having one ($F = 5.44$, $df = 1/53$, $p < .02$). This significant F derives mainly from the behavior of the elderly Ss whose mean recall scores of 15.7 and 11.6 (for the cue and no cue at recall conditions, respectively) are different on t test at a significant level ($t = 2.24$, $df = 26$, $p < .02$), whereas the comparison of the 16.6 vs 14.9 words recalled by the young adults in the same two conditions fails to produce a significant difference ($t = 1.00$, NS). The datum of particular interest, however, is the absence of any significant difference between the scores of the young and elderly Ss (age effect $F = 2.72$, $df = 1/53$, NS). This is at variance with the usual finding of inferior performance by the elderly, and shows that marked deterioration need not be an inevitable aspect of their performance if appropriate strategies to aid short term memory are invoked. The results of Experiment 2 are of significance, therefore, on two counts. They attest not only to the special efficacy for the elderly of having a cue at recall available to aid retrieval of a particular item over not having such a cue, but they also demonstrate that implementation of such a strategy enables the elderly person to sustain his recall at a level commensurate with that attained by young adults.

The findings of these studies do not, of course, permit one to conclude that all the short term memory difficulties of the elderly can be localized as being problems in retrieval from storage or that they can all be solved by invoking a cue-at-recall strategy. There are almost certainly problems associated with input as McNulty & Caird contend, and as the presentation rate data alluded to earlier (Laurence, 1966) imply. The results do show, however, that the retrieval part of the problem can be substantially reduced by implementation of one, if not both, of Schonfield's strategies. Given the inadequacies of Experiment 1 as outlined above, it remains for further work to assess the effectiveness of the rehearsal strategy in this context.

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