GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF RESEARCH ADMINISTRATION

RESEARCH PROJECT INITIATION

Date: __15 September 1972__

Project Title: "Interaction Between Human Aging and Memory"

Project No: G-42-619

Principal Investigator: Dr. A. D. Smith

Sponsor: Public Health Service, NIH

Agreement Period: From __1 September 1972__ Until __31 August 1973__

Type Agreement: Grant No. 1 R01 HD06885-01

Amount: $13,014 PHS Funds (G-42-619)
4,983 Ga. Tech Contribution (G-42-313)

$17,997 Total

Reports Required: Interim Progress Report

Sponsor Contact Person (s):

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Bethesda, MD 20014

Assigned to: __Psychology__

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Other _____

RA-3 (6-71)

GEORGIA INSTITUTE OF TECHNOLOGY

OFFICE OF RESEARCH ADMINISTRATION

RESEARCH PROJECT TERMINATION

Date: **October 1, 1974**

Project Title **Interaction Between Human Aging and Memory**

Project No: **G-42-619**

Principal Investigator: **Dr. A. D. Smith**

Sponsor: **DHEW/PHS/NIH/NICHHD**

Effective Termination Date: **8-31-73 (01 year)***

Clearance of Accounting Charges: **all have cleared**

Grant/Contract Closeout Actions Remaining: XXXXX **None**

***Follow-on project (for 02 & 03 years) is G-42-621.**

Assigned to School of **Psychology**

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Security - Reports - Property Office	
Patent and Inventions Coordinator	

RA—4 (5/70)

APPLICANT: REPEAT GRANT NUMBER SHOWN ON PAGE 1 ———→	GRANT NUMBER
SECTION IV—SUMMARY PROGRESS REPORT	HD06885 - 02

PRINCIPAL INVESTIGATOR OR PROGRAM DIRECTOR (Last, First, Initial)	PERIOD COVERED BY THIS REPORT	
Smith, Anderson D.	FROM	THROUGH
NAME OF ORGANIZATION	9/01/72	5/31/73
Georgia Institute of Technology		

TITLE (Repeat title shown in Item 1 on first page)

INTERACTION BETWEEN HUMAN AGING AND MEMORY

1. List publications: (a) published and not previously reported; (b) in press. Provide five reprints if not previously submitted.

2. List all additions and deletions in professional personnel and any changes in effort.

3. Progress Report. (See Instructions)

1. Smith, Anderson D. Input order and output interference with organized recall. *Journal of Experimental Psychology*, 1973, in press.

2. No changes.

3. Progress report:

    A. Objective. The objective of the current research is to further elucidate the nature of the interaction between human aging and memory. Effective memory involves both the proper storage of information into memory at the time of presentation and the subsequent retrieval of that information at the time of recall. Experiments are examining the possibility that the decrement in recall seen with aged subjects results from the failure of the retrieval process.

    One group of studies will separate storage and retrieval empirically and then examine the extent to which age interacts with the two processes. These studies occupy much of the second year of the project. The second year of the project will also test the validity of alternative explanations of the age-related memory deficit. The second group of experiments is investigating the possibility that the deficiency in recall reflects a specific kind of retrieval problem, heightened susceptibility to output interference, i.e., the effect of recalling information on subsequent recall.

    The specific goals for the current year were: (1) to determine whether age primarily influences the degree of output interference with short-term recall or long-term recall; (2) to examine possible output-interference effects in aged subjects relative to younger subjects when either organized recall is required or the discrete recall of single items is required; and (3) to analyze possible input-output interactions when organized recall is required.

    B. Summary report. The first months of the project were devoted to acquiring a subject pool for the experiments. Subjects were matched as closely as possible for educational level, socio-economic background, and test performance (vocabulary and digit span subtests of the WAIS). In the first experiment, the subjects were Georgia Tech alumni who volunteered in response to a direct

mail request.   The subjects in the second experiment were
selected from various civic clubs in the Atlanta area.

In the first experiment, the paired-associate probe technique
assessed the amount of output interference with the recall of
single items.   After practice, each subject received one trial on
each of eight different lists by the recall method of paired
association.   The stimuli in the lists were the digits 1-8; and
the responses were eight items from a single conceptual category.
The eight paired-associates, and the order of the eight lists
were varied systematically across subjects.   The input and output
sequences of the pairs within each list were determined by
balanced Latin squares.   The degree of interaction between input
and output demonstrated the relative susceptibility of the
different memory systems (short-term and long-term) to output
interference.   The results to date are presented in Figure 1.
The young group (below 50 years of age) and old group (above 50)
are plotted separately.   The data indicate that while the young
group is generally better than the old group, this difference
is only found for material assumed to be recalled from long-
term memory.   The Input-8 condition (lower-right graph) shows
identical recall performance between groups for the early output
positions; and this recall is assumed to be from short-term
memory.   The ability to use short-term memory declines after
the interpolation of recalls, and therefore, the age groups
separate at the later output positions.   The different asymptotes
in this graph indicate again that long-term memory, and not short-
term memory, is affected by age.   Output interference, seems
only to operate in the short-term memory portion of the input list
when recall of single items is required.   It should be pointed
out, however, that data are still being collected in this experiment.

In another experiment, subjects differing in age received
a 60-word list consisting of 12 items from each of 5 categories,
blocked at input and recalled successively by category at output.
Across subjects, each of the categories appeared equally often
in each input and output position, and each input position was
represented equally at each output position.   Each of the items
was presented for 2 secs. followed by a 2-min. recall interval for
each category.   The results of this experiment are presented in
Figure 2.   There were 182 subjects in the experiment;   117 between
the ages of 20 and 49; and 65 between the ages of 50 and 80.   The
main effects of age, $\underline{F}(1, 180)= 43.98$, $p<.001$, and recall output
position, $\underline{F}(4, 720)= 13.41$, $p <.001$, were found significant; but
the interaction between age and recall position as an indicant
of output-interference differences between the age groups failed
to reach significance ($p= .28$). While the slope of the output-
interference function is greater in the older group, the lack of
a significant interaction suggests that differential output
interference with organized recall is not the mechanism underlying
the retrieval deficiency seen in the aged.

The experiment aimed at the third specific objective is being
conducted during the summer of the current budget year (1973). The
experiment has already been conducted with young subjects and has

resulted in a publication (Journal of Experimental Psychology,
1973, in press). This experimental procedure allows an examina-
tion of input-output interactions with organized recall. In a
younger group (ages 18-30), output interference, as evidenced
by negatively sloped functions, is seen for all portions of the
input lists, and not dependent on the input position of the
information. These results are presented in Figure 3.

3. <u>Significance</u>. The ongoing research is investigating
a possible mechanism for the long-term memory problem seen in
old age. If the hypotheses made in this research are verified,
much of the memory problem will be attributed to faulty
retrieval. This suggests that techniques could be developed
(mnemonics) to improve retrieval at the time of recall and
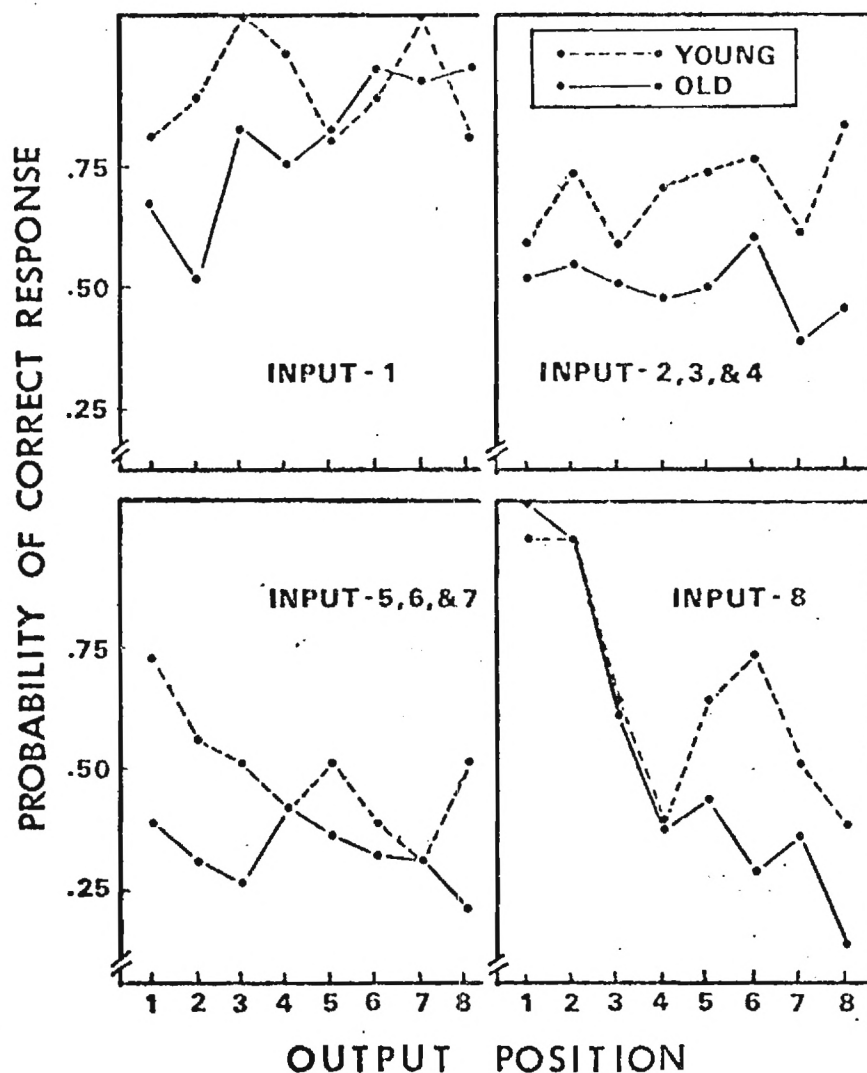thus eliminate much of the memory deficit.

4. <u>Objectives for the coming year</u>. In addition to
completing the experiments described in the report during the
summer, additional experiments will be conducted during the
coming year. The objectives of these experiments are: (1) to
determine the validity of a partial-learning hypothesis as an
alternative to the retrieval hypothesis by minimizing the
subject's use of partially learned information; and (2) to
systematically mainpulate several task variables which are
assumed to affect storage and retrieval differently and
examine any interactions between these variables and age.

       The undersigned agrees to accept responsibility
for the scientific and technical conduct of the pro-
ject and for provision of required progress reports
if a grant is awarded as the result of this application.

6/15/73
_____
Date

                       Principal Investigator or
                       Program Director

Figure 1. The probability of a correct response at each output position is plotted for different positions in the input list. The young group has an age range of 20-49; and the old group has an age range of 50-80.
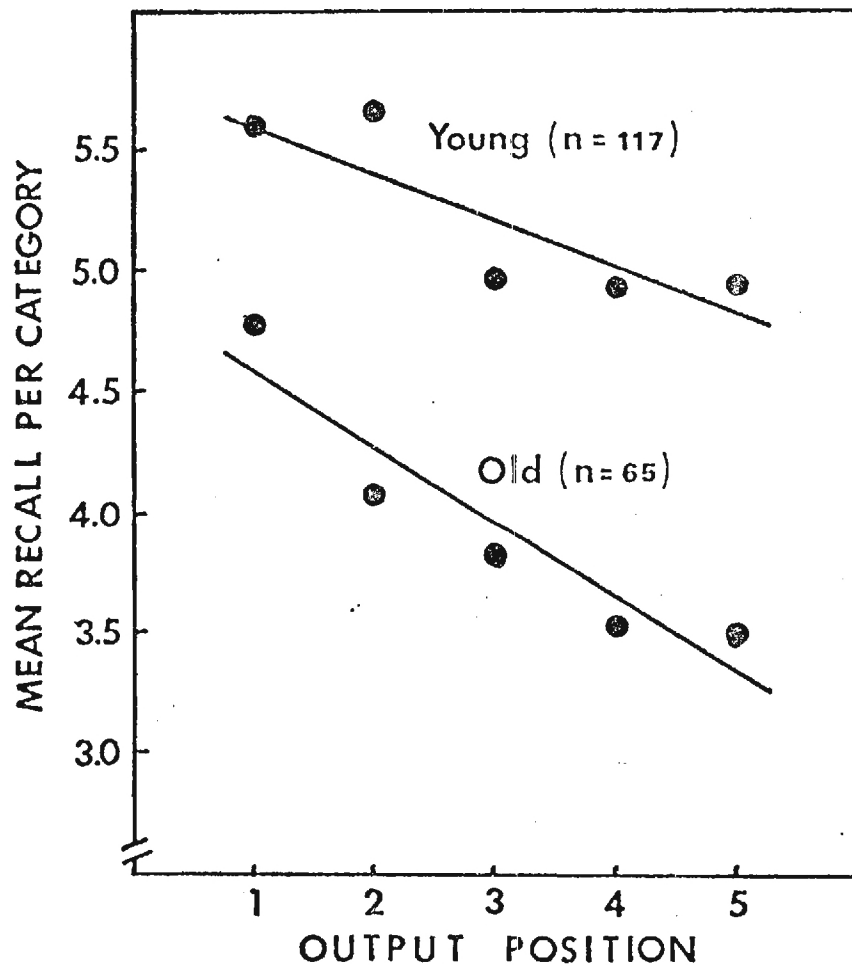
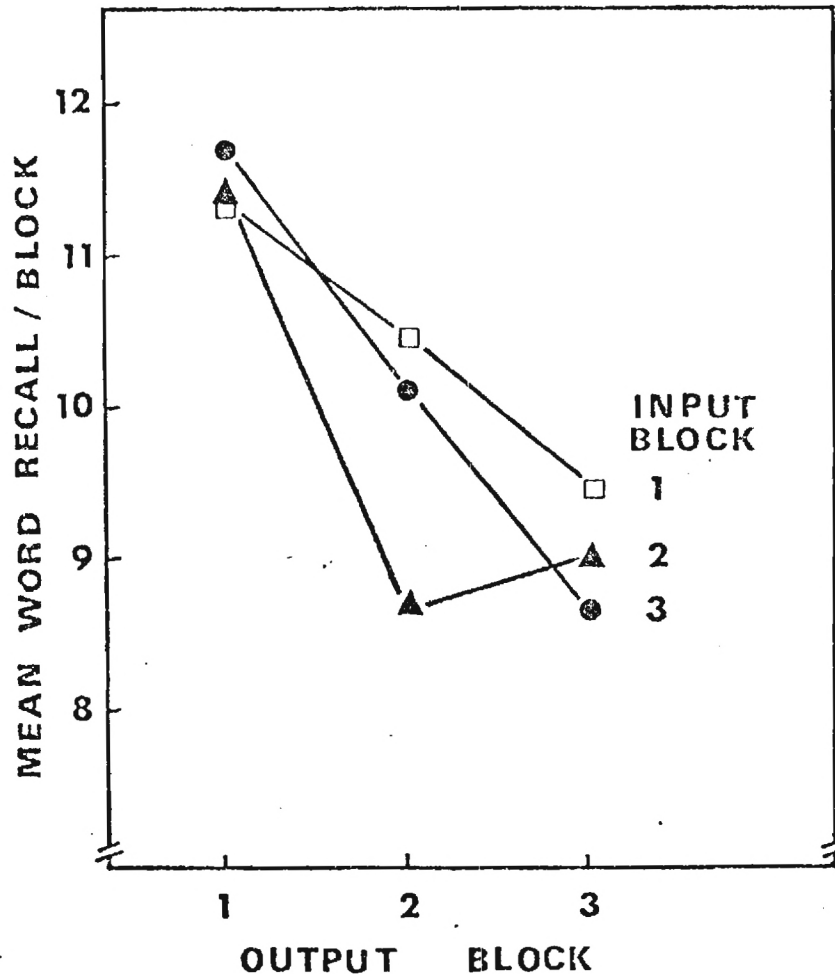Figure 2.   Output interference functions with organized recall are plotted for the two age groups.

Figure 3.   Output interference functions for the
three sections of the input list.   Input block 1
represents the first third of the presentation
list; input block 2 represents the second third;
and the input block 3 represents the last portion
of the list.   The data come from young subjects,
ages 18-30.