



SPONSORED PROJECT TERMINATION/CLOSEOUT SHEET

Date 8/13/87

Project No. G-42-621

School/Lab Psychology

Includes Subproject No.(s) N/A

Project Director(s) Dr. Timothy A. Salthouse

GTRC / ~~XXX~~

Sponsor DHHS/PHS/NIH/NIA

Title Adult Age Difference in Reasoning and Spatial Abilities

Effective Completion Date: 7/31/87 (Performance) 9/30/87 (Reports)

Grant/Contract Closeout Actions Remaining:

☐ None no deliverables

☒ Final Invoice or Final Fiscal Report

☐ Closing Documents

☐ Final Report of Inventions

☐ Govt. Property Inventory & Related Certificate

☐ Classified Material Certificate

☐ Other \_\_\_\_\_

Continues Project No. \_\_\_\_\_

Continued by Project No. G-42-632

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SECTION IV PROGRESS REPORT SUMMARY		GRANT NUMBER AG06826-02	
PRINCIPAL INVESTIGATOR OR PROGRAM DIRECTOR Timothy A. Salthouse		PERIOD COVERED BY THIS REPORT	
NAME OF ORGANIZATION Georgia Institute of Technology		FROM 8/1/86	THROUGH 7/31/87
TITLE (Repeat title shown in item 1 on first page) Adult Age Differences in Reasoning and Spatial Abilities (SEE INSTRUCTIONS)			

## PUBLICATIONS:

## (CHAPTERS)

Salthouse, T.A. (in press). The role of processing resources in cognitive aging. In M.L. Howe & C.J. Brainerd (Eds.), Cognitive Development in Adulthood. New York: Springer-Verlag.

## (ARTICLES)

Salthouse, T.A. & Prill, K.A. (1987). Inferences about age impairments in inferential reasoning. Psychology and Aging, 2, 43-51.

Salthouse, T.A. (in press). Adult age differences in integrative spatial ability. Psychology and Aging.

Salthouse, T.A. (in press). The role of representations in age differences in analogical reasoning. Psychology and Aging.

Salthouse, T.A. (in press - invited paper). Initializing the formalization of theories of cognitive aging. Psychology and Aging.

## (PRESENTATIONS)

"Inferences about age effects in inferential reasoning." American Psychological Convention, Washington, D.C., August, 1986.

"Representational factors contributing to age differences in geometrical analogy tasks." Psychonomic Society Meetings, New Orleans, Louisiana, November, 1986.

"Sources of age differences in block design tasks." Gerontological Society Meetings, Chicago, Illinois, November, 1986.

"Do cognitive resources decline with age?" Department of Psychology Colloquium, University of Toronto, Ontario, January, 1987.

## Report

1. The long-term scientific goals of the project remain unchanged from the original proposal.

2. Progress has been made in three of the four phases of the project. A large scale study involving the previously used geometric analogies and mental synthesis tasks has been conducted to further investigate the relationships among age, measures of cognitive performance, and indices of processing resources. This study was combined with the earlier study in a lengthy in-press chapter titled "The role of processing resources in cognitive aging." The results generally indicated that statistical control of an index of processing resources, such as rate of processing, served to attenuate but not eliminate the effects of age on cognitive functioning.

Several follow-up studies were also conducted with the analogies and synthesis tasks after first implementing them on a microcomputer. The analogies studies were designed to determine the role of representational factors, as mediated by age-related processing resources, on geometric analogy performance. As expected from this perspective, age differences were greater when the representational demands were greatest by increasing the number of relevant elements in each term or delaying the presentation of successive terms. A report of this research is currently in-press in Psychology and Aging.

Research with the synthesis task is continuing, but results from an initial experiment are reported in an article to appear in Psychology and Aging. The major finding in this experiment, which has been replicated in recent as-yet-unpublished studies, was that young and old adults exhibited parallel effects on decision accuracy of the number of segments in the composite stimulus figure. This seems to suggest that aging reduces the ability to carry out transformations or manipulations of the to-be-remembered material, but has minimal influences on the amount of material that can be passively retained. Research is currently directed towards verifying this inference and examining its implications.

Two additional spatial and reasoning tasks have also been investigated in the past year. The spatial task was a computer-implemented block design task based on that used in the Wechsler Adult Intelligence Scales, and the reasoning task was a series completion task somewhat similar to that found in the Schaie-Thurstone Primary Mental Abilities Test. Results from both studies were interpreted in a manner consistent with the theoretical perspective developed in this proposal. A major finding in the block design experiments, with the manuscript currently under editorial review and a paper presented at the 1986 Gerontological Society Meetings, was that older adults



seemed to have difficulty constructing and accessing appropriate internal representations of the blocks compared to young adults. Results from the series completion studies, presented at the 1986 American Psychological Association convention and published in 1987 Psychology and Aging, indicated that older adults had much greater difficulty than young adults in detecting the pattern of elements in the series and in achieving the appropriate levels of abstraction needed to detect the invariant relationships. In both cases, therefore, evidence was found that at least some of the age differences in spatial and reasoning tasks was attributable to weaknesses in processing contributing to instable or incomplete internal representations.

This theme that something like a diminished quantity of processing resources contributes to representational weaknesses was also developed in a theoretical paper to appear as an invited article in Psychology and Aging. A major focus of this paper is the report of initial results from the computer simulation developed to help understand the mechanisms by which age exerts influences on cognitive processes.

3. Objectives for the coming year are to continue and extend the research initiated in the past year. Specifically, it is planned to: (a) carry out additional experiments with the synthesis task; (b) conduct studies with new prototypical reasoning and spatial tasks; and (c) continue explorations of the computer simulation approach to the modeling of age effects on cognitive functioning. Research with the synthesis task is considered important because the results described above suggest that this paradigm may yield valuable information about the precise nature of age differences in spatial tasks. Moreover, the simple nature of the task, i.e., participants are merely asked to determine whether a multi-line figure matches the composite of several discretely presented partial figures, lends itself to modeling efforts that may allow concrete tests of the simulation model. Programming of the new reasoning (logical comprehension) and spatial ability (paper folding) tasks is currently underway, and data collection is planned to begin in early summer. The initial study with these tasks will be similar to the study with the analogies and synthesis tasks, including an assessment of each participant's processing resources. And finally, the computer simulation modeling efforts will be extended to specific tasks in order to allow explicit predictions that will allow evaluation of the model.

4. The experimental procedures planned for the coming year are very similar to those employed in the past year, and consequently the human subject protocols will not differ substantially from those described when the proposal was competitively reviewed.