14:45:02 OCA PAD INITIATION - PROJECT HEADER INFORMATION 02/18/88

Active

Project #: G-42-601 Cost share #: G-42-328 Rev #:
Center # : R6260-1A0 Center shr #: F6260-1A0 OCA file #:
Work type : RES
Contract#: 5 R01 AG06123-04 Mod #: Document : GRANT
Prime #: Contract entity: GTRC

Subprojects ? : N
Main project #:

Project unit: PSYCH Unit code: 02.010.154
Project director(s):
HERTZOG C K PSYCH

Sponsor/division names: DHHS/PHS/NIH / NATL INSTITUTES OF HEALTH
Sponsor/division codes: 108 / 001

Award period: 880201 to 890131 (performance) 890430 (reports)

Sponsor amount	New this change	Total to date
Contract value	206,931.00	206,931.00
Funded	206,931.00	206,931.00
Cost sharing amount		12,967.00

Does subcontracting plan apply ?: N

Title: AGING AND COGNITIVE CORRELATES OF INTELLIGENCE

PROJECT ADMINISTRATION DATA

OCA contact: E. Faith Gleason 894-4820

Sponsor technical contact

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BETHESDA, MD 20892

Security class (U,C,S,TS) : ONR resident rep. is ACO (Y/N): N
Defense priority rating : N/A N/A supplemental sheet
Equipment title vests with: Sponsor GIT X

Administrative comments -
* INITIATION. INCLUDES SUBCONTRACT TO PENNSYLVANIA STATE UNIVERSITY

12 / 88

GEORGIA INSTITUTE OF TECHNOLOGY
OFFICE OF CONTRACT ADMINISTRATION

NOTICE OF PROJECT CLOSEOUT

Date 2/7/89

roject No. G-42-601 Center No. 246R62601A0

roject Director C.K. Hertzog School/Lab Psychology

ponsor DHHS/PHS/NIH

ontract/Grant No. 5 R01 AG06123-04 GTRC XX GIT ____

rime Contract No. ____

itle Aging and Cognitive Correlates of Intelligence

ffective Completion Date 1/31/89 (Performance) 4/30/89 (Reports)

loseout Actions Required:

___ None
_X_ Final Invoice or Copy of Last Invoice
___ Final Report of Inventions and/or Subcontracts
___ Government Property Inventory & Related Certificate
___ Classified Material Certificate
___ Release and Assignment
___ Other ____

ncludes Subproject No(s). ____

ubproject Under Main Project No. ____

ontinues Project No. G-42-627 Continued by Project No. G-42-639

istribution:

_X_ Project Director
_X_ Administrative Network
_X_ Accounting
_X_ Procurement/GTRI Supply Services
_X_ Research Property Management
__ Research Security Services

_X_ Reports Coordinator (OCA)
_X_ GTRC
_X_ Project File
_X_ Contract Support Division (OCA) (2)
___ Other ____

SECTION IV **PROGRESS REPORT SUMMARY**	GRANT NUMBER AG06123-05	
PRINCIPAL INVESTIGATOR OR PROGRAM DIRECTOR Christopher Hertzog	PERIOD COVERED BY THIS REPORT FROM	THROUGH
APPLICANT ORGANIZATION Georgia Institute of Technology	2/1/88	1/31/89

TITLE OF PROJECT *(Repeat title shown in item 1 on first page)*
Aging and Cognitive Correlates of Intelligence

(SEE INSTRUCTIONS)

Please see attached sheet.

Hertzog, Christopher
527-02-7848

1. Plans for next year of support

(a) complete large cross-sectional study of intelligence in Atlanta, using new psychometric battery;

(b) complete analysis and writeup from longitudinal psychometric and microcomputer study conducted at Penn State;

(c) continue speed/accuracy tradeoff experiments for mental rotation task;

(d) conduct microcomputer task study of spatial visualization, spatial relations, and visual memory.

2. Description of current studies:

(a) age differences in speed and accuracy of mental rotation (MR) task. Results from Hertzog & Yuasa (1988), summarized in the last progress report, indicated age differences in MR intercepts, slopes, and error rates. We began a cluster analysis to further elucidate these effects. In the process of doing so, we found that the cluster results were dominated by outlier effects -- individuals with very slow intercepts and slopes forming small clusters. This finding, plus critical reviews of the unpublished Hertzog & Yuasa (1988) manuscript, led us to conduct a further analysis of the original MR task data. The new analysis shows: (1) significant Education effects on MR parameters; (2) skewed distributions of MR slope and intercept parameters, with a small proportion of older persons showing a high degree of slowing, and a major disparity between group means and group medians of the MR intercept and slope parameters; (3) large individual differences in the fit of the linear function relating RT to Angle of rotation. In particular, a substantial proportion of the sample had low R^2 for Different trials. The latter finding is important, for it turns out that the magnitude of age differences in MR Different slopes is greatly affected by including subjects with low degrees of fit to the linear function. The education effects were a problem for the original analyses reported by Hertzog & Yuasa (1988); an education-heterogenous adult sample had been compared to college students. Subsequent comparisons involving the student groups restricted the adult sample to individuals with at least some college experience. This residual sample was then used to examine the effects of heterogeneous linear fits and skewed distributions of RT parameters. These results were reported at the recent Psychonomic Society Meetings in Chicago. Tables 1 & 2 reports the effects of excluding subjects with low R^2 from the MR intercepts and slopes, respectively: the MR parameters change dramatically, but the discrepancy between age group means and medians

remains. Table 3 reports the results of trimming from the adult sample individuals with extremely slow RTs (intercepts and/or slopes greater than 2 standard deviations away from the group mean). Age differences were dramatically attenuated. From this pattern we deduced that: (1) qualitative individual differences in MR task performance, reflected in variations in fit of the linear function, impact estimated age differences; (2) a substantial proportion of the observed age differences in MR slopes and intercepts can be attributed to a few older individuals performing poorly on the task. Although the central tendency of the distribution shifts with advancing age, the distribution is skewed, and the age effects are influenced by a stretching of the tail of the distribution (increased frequency of slow spatial processors) in the old groups.

(b) Speed/accuracy tradeoffs in mental rotation performance. The Hertzog & Yuasa (1988) manuscript was criticized because age differences in accuracy (MR error rates) might indicate that age differences in MR slopes and intercepts are an artifact of speed/accuracy tradeoffs. A brief report by Sharps & Gollin (1987) suggested speed/accuracy tradeoffs to be operating in performance on the Vandenberg mental rotation test items. There are several problems with this latter study; moreover, the fact that older persons were less accurate than younger persons would indicate that slower RTs for old cannot merely be speed/accuracy artifacts. Nevertheless, we are conducting a series of speed/accuracy experiments to study the issue. First, we reanalyzed data from the Penn State study, blocking on accuracy level. Figure 1 charts the MR intercepts for different age groups, blocked so as to have equivalents accuracy levels. There is no suggestion of smaller age differences at lower levels of accuracy. Similar results are found for MR slopes. We just completed data collection of an instructional manipulation mirroring the Sharps & Gollin (1987) design for our MR task, but treating instructions as a within-subjects variable. Data analysis is in progress. A new experiment using a deadline method for generating actual speed/accuracy tradeoff functions is in preparation.

(c) Hertzog, Uhlman, & Sandifer completed the analysis of the simple, nonverbal choice, and semantic RT tasks from the information processing battery. Like the mental rotation analysis, we reanalyzed the data to examine the presence of education effects in the adult sample. Results indicate similar rates of cognitive slowing across different types of RT tasks, but this rate of slowing is much less than that found for the MR task. Like the MR task, age differences in semantic RT are influenced by a few slow responders, but there are robust age differences on the semantic RT tasks even when very slow responders are trimmed from the sample.

Consistent with data on vocabulary test scores, age differences are somewhat attenuated on synonym matching RT, suggesting a relative sparing of the speed of verbal processing. A manuscript describing these findings is currently being drafted.

(d) Hertzog recently reported the first LISREL model relating performance on the different RT tasks to psychometric intelligence, using a latent variable perspective. These results were reported at the 2nd Georgia Tech Cognitive Aging Conference and at the 1988 American Psychological Association meeting. The analysis showed (1) a strong general RT factor, (2) a semantic RT factor, independent of the nonverbal simple and choice RT tasks, (3) a strong relationship of both these factors to a general intelligence factor, (4) a specific relationship of synonym RT to vocabulary test performance, independent of general intelligence. Figure 2 shows the LISREL model used to make these inferences. The results suggest that some of the relationships between semantic RT tasks and verbal intelligence reported by Hunt and colleagues may reflect speed/intelligence relationships determined by general intelligence. The analysis then examined whether age differences in general intelligence can be modeled as being determined solely by age differences in the speed of information processing. A model forcing mediation of age differences through the RT factors was rejected in favor of a model having additional age differences in general intelligence independent of speed. Although a substantial proportion of the age differences is speed-related, some residual age differences remain. A draft manuscript of these results has been completed.

(e). We successfully completed a two-year longitudinal retest of 61 of the 77 microcomputer subjects from the Penn State study and 154 of the 182 microcomputer subjects from the second Penn State study. These data have been stored on the computer, and verified for accuracy. Analysis of the longitudinal psychometric data is underway, with analysis of the longitudinal microcomputer data to follow.

(f). We have completed a pilot study testing our spatial visualization tasks (based upon the Form Board and Surface Development tests) with Georgia Tech undergraduates. The tasks used were minor modifications of task developed by Earl Hunt, Jim Pellegrino, and associates. Results showed our parameter estimates to be very similar to those reported by Hunt for a sample of over 100 undergraduates from two West Coast Universities. These results pave the way for the use of these tasks with adult subjects in Atlanta.

3. There have been no changes in human subjects protocols.

4. Not Applicable.