THE IMPACT OF RETIREMENT, OCCUPATION, AND ACTIVITY ON THE COGNITIVE PROCESSES OF THE ELDERLY

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This study examines the impact of retirement, occupation, and activity on the cognitive processes of the elderly. Specifically, advertising stimuli are used to test memory function as measured by aided recall and recognition. Retirement status was not found to influence memory function. White- and blue-collar retirees exhibited similar recall abilities while white-collar retirees were found to demonstrate a greater degree of recognition with previously exposed stimuli than their blue-collar counterparts. Finally, seniors who remain actively engaged in cognitive activities tended to exhibit greater levels of recall than less cognitively active persons. However, the degree of recognition was unaffected by the level of cognitive activity. The marketing implications, limitations, and directions for future research are explored.

INTRODUCTION

NEWSFLASH FOR IMMEDIATE RELEASE: The U. S. Census Bureau reports that the number of elderly Americans (that is, those sixty-five and older) is expected to more than double by the year 2050 to a number exceeding 80 million persons.

The above "press release" demonstrates a key fact of life for today's marketers: The American marketplace continues to undergo great demographic change. In particular, the number of older Americans will dramatically increase in the future. A number of reasons exist for this phenomenon, including improved medical science diagnostics and treatment, and the aging of the Baby Boom (those 80 million persons born between 1946 and 1964). With this aging population, marketers expect increased demand for such things as health-care services, recreation, tourism, retirement housing, and selected skin care products (Pride and Ferrell 1998, p. 42).

The demographic transformation of the marketplace is forcing marketers to evaluate long-held notions of consumer behavior and expectations. A key question for marketers is: What changes are occurring in the consumer's affective (what we feel), cognitive, (what we think), behavioral (what we do) systems and in the surrounding environment and what are the implications for marketing strategy?

The purpose of this manuscript is to examine the cognitive processes of elderly consumers. Specifically, the study examines the impact of retirement, occupation, and activity level on the cognitive processes of the elderly. The function of the cognitive system is to interpret and understand significant aspects of one's interaction with the surrounding environment. In essence, the cognitive system creates personal, subjective meanings to represent the stimuli encountered. Further, the cognitive system supports higher mental processes of thinking, understanding, evaluating, planning

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and deciding how to process these interpretations (see Peter and Olson 1994). Thus, we seek to identify characteristics which will help us to cluster consumers based upon similarities in their cognitive processes for a more targeted marketing effort.

A REVIEW OF THE LITERATURE

A new stream of research has evolved which focuses on the cognitive processes of the elderly. This wave of research in both the marketing and psychological literature has established one clear fact: **An age-related information processing deficit does exist**. Empirical evidence has repeatedly shown that the elderly do not recall (aided or unaided) or recognize stimuli to the same extent as younger adults (see Stephens 1982; Cavanaugh 1983; Hess 1985; Roedder-John and Cole 1986; Cole and Houston 1987; Hess, Donley, and Vandermaas 1989; Cole and Gaeth 1990; and Hess and Tate 1991). What is less clear, however, is "*Why* do young adults recall and recognize stimuli better than elderly adults?"

One line of research has focused on the encoding and retrieval processes employed by the elderly. This research has shown contradictory findings. Madden (1985) found that a deficit in the ability to retrieve information from long-term memory is responsible for the age-related learning deficit. Other authors, however, have found a deficit in encoding as the source of the age-related deficit (Drachman and Leavitt 1972).

Other studies have focused on situational variables such as message pace and the amount and complexity of information as causes of the age-related learning deficit. Stephens (1982) found that the pace of the message has an effect on the size of the age-related learning deficit. That is, information that is externally paced (i.e., watching television commercials) tends to overwhelm the elderly. However, when information is presented in a format that is self-paced by the respondent (i.e., reading print advertisements) the age-related recall gap declines. Additionally, John and Cole (1986) found that complex information and large amounts of information increase the size of age-related learning deficits.

Another topic that has been explored recently is the impact of information relevance on the age-related learning deficit. When information is relevant to a person, that person is likely to allocate more of their cognitive abilities to learning and subsequently recalling that information. There is some evidence indicating that the elderly greatly benefit from a manipulation in information relevance. Simply put, because of their life's experiences, the elderly may be better than younger adults at ignoring or filtering out irrelevant information, (Hess and Tate 1991). This characteristic may explain the age-related learning gap shown in many academic studies on the subject. However, other studies have found that a manipulation in information relevance improves recall and recognition equally for both the young and old (Zelinski and Miura 1988), keeping the size of the age-related learning gap intact.

Retirement and Cognitive Processes

During the aging process, individuals undergo gradual changes which ultimately affect the type of information to which they are exposed as well as the intensity they will devote to processing the new information (Phillips and Sternthal 1977). Furthermore, with age comes a reduction in the number and variety of roles an individual assumes, and some of the remaining roles are performed with less intensity. For instance, retirement results in the loss of such formal roles as employee and colleague. This is often stressful for an individual because for the majority of people their work life is much more than a source of income. The work role provides an important, if not primary, source of identity and self-esteem within society (MacBride 1976). Therefore, retirement has the potential to compound the effects of age (or "speed up" the aging processes).

Studies by Burnett (1989) and (1996) have looked at the impact of retirement on purchase specific behaviors (i.e., the use of non-store retailing and shopping for pleasure) and non-purchase behaviors

(i.e., exercise and engaging in outdoor activities). He found that retirees differed significantly from the elderly employees in both the types and amounts of purchase and non-purchase behaviors. While the impact of retirement on behavior is evident the impact of this social contraction on the retirees' mental health has yet to be explored.

Activity and Cognitive Processes

The ***Activity Theory*** argument states that maintaining high activity levels is necessary to inhibit the negative effects caused by old age and thus improve life satisfaction (Havighurst 1963). Presumably, participation in activities, particularly those that are cognitively demanding, serves to maintain learning strategies and other mechanisms that promote stability and enhancement of cognitive performance in the older person.

Consistent with activity theory, Schooler (1984) argued that environmental complexity leads to effective cognitive functioning at all points in the life span including old age. In his view, complex environments are characterized by a diversity of stimuli, large numbers of decisions to be made, multiple influences encountered and ill-defined and apparently contradictory contingencies resulting from the decision. In essence, a person is challenged by his/her surroundings. Simple environments, on the other hand, may not provide sufficient support for the maintenance and enhancement of cognitive functioning.

Hultsch, Hammer, and Small (1993) added empirical support for the activity theory argument. They found that elderly people leading active life-styles performed significantly and consistently better on most cognitive measures than did older people leading more passive life-styles. Therefore, if a retiree does not find alternative activities to fill the void created by the loss of work, the negative effects associated with advancing age are likely to be pronounced. When examining the impact of physical activity on the cognitive processes of the elderly, Hill, Storandt, and Malley (1993) found that long-term exercise did not improve cognitive functioning in the elderly.

Although it is often criticized as extreme, ***Disengagement Theory*** offers an alternative explanation as to why retirement may act as a catalyst for an age-related learning decline. Disengagement Theory proposes that retirement is a necessary manifestation of the mutual withdrawal of society and older persons from one another. That is, society tries to disengage the older worker, and the worker is inclined to withdraw because he can't keep pace (Cumming and Henry 1961). If elderly people feel inclined to withdraw from society, the negative effects associated with old age will likely accelerate by restricting individual life pace and possibly reducing activity levels as well.

Kimmel, Price, and Walker (1978) found that pre-retirement attitudes about retiring are strongly predictive of life-satisfaction after retirement. Said another way, people who had positive pre-retirement feelings about retired life were significantly more satisfied with life after retirement than those who had negative pre-retirement attitudes. Similarly Beehr (1986) and Glamser (1981) found that all else being equal (i.e., money, number of friends, etc.), the majority of people would prefer not to work. For those people who prefer working over retirement, retirement is likely to be a stressful event that accelerates the negative effects associated with the aging process.

Occupation and Cognitive Processes

Minkler (1981) suggests that blue-collar workers have a tougher time adjusting to retirement than do white-collar workers for a number of reasons. First, white collar workers tend to be better off financially, a factor that is found to be highly correlated with retirement satisfaction (Palmore, George, and Fillenbaum 1982). Second, when retirement involves the relinquishing of a person's most meaningful social contact, as is more frequently the case among blue collar workers, the resultant diminished involvement and activity may contribute to the shortening of the life span (Minkler 1981).

Burnett (1989) and Minkler (1981) also found that self-reported health status, poor economic status,

and loss of a social network may all act as stressors which negatively impact a retiree's health. The evidence regarding retirements' effect on health, however, is inconsistent. Beehr (1986) suggests that poor health may be a cause rather than an effect of retirement. Nonetheless, when testing the effects of retirement and age, income and health need to be controlled.

RESEARCH HYPOTHESES

Based mostly on list-learning tasks and multi-store models of memory, research has consistently shown an age-related deficit in secondary memory processes (Stephens 1982; Hess and Tate 1991). The objective of this study is to empirically examine the effects of retirement, occupation, and cognitive activity on the age-related learning deficit. Additionally, the effects of perceived personal health and the propensity to work are also examined for possible effects on the age-related learning deficit.

There is some evidence to suggest that retirement acts as a catalyst for the age-related learning decline (Burnett 1989). Work is a major life role, often central to a person's identity. The termination of this role can cause a person's social world to contract, acting to accelerate the age-related learning decline. Thus, it is proposed that:

H_1: There is no difference in the level of aided recall or recognition between chronologically elderly retirees and chronologically elderly employees.

Minkler (1981) found that blue-collar workers had a tougher time adjusting to retirement than white-collar workers given their (often) lesser financial position and loss of more meaningful social contacts. The resultant diminished involvement may accelerate the age-related learning decline. Thus, it is proposed that:

H_2: There is no difference in the level of aided recall or recognition between blue collar retirees and white collar retirees.

The Activity Theory argument states that retirees who do not find alternative activities to fill the void created by retirement have lower life satisfaction than those who remain active (Hultsch, Hammer, and Small 1993). Therefore, retirees who lead a passive life-style are more likely to experience a more rapid cognitive decline than those who remain active. Thus, it is proposed that:

H_3: There is no difference in the level of aided recall or recognition between retirees who lead an active life-style and retirees that lead an inactive life-style.

METHODOLOGY

The methodology used to test the three research hypotheses is presented in the sections that follow. First, descriptions of all variables are provided. Second, the sample group composition and procedures are provided. Third, pretest procedures are outlined. Fourth, a description of relevant statistical techniques is provided to ensure clarity in their application and interpretation.

Dependent Variables

For this study, the dependent variable is respondent memory as measured by (1) aided recall, and (2) recognition. A description of each dependent variable is provided below.

Aided Recall. Aided recall is represented by the retrieval from memory stage of information processing. For this experiment, the product category (shampoo) of the test advertisement was offered as a cue or aid.

Recognition. Recognition is knowledge or a feeling that a stimulus has been encountered before (Singh, Rothschild, and Churchill 1988). Recognition is a retention measure that has been shown to minimize age differences among respondents (Roedder 1981). This occurs because recognition tests do not require subjects to generate information from long-term memory; rather, they need only recognize information as previously seen or heard (Roedder 1981).

In this experiment, recognition was measured for the key points of the fictitious shampoo advertisement (i.e., the shampoo ad was for 'brand X', 'brand Y', or 'brand Z') in a three-response-choice format as described by Cavanaugh (1983). Three choices were used to avoid memory load difficulties (Cavanaugh 1983).

Independent Variables

For this study, the independent variables are (1) retirement status, (2) job type, and (3) activity level. A description of each independent variable is provided below.

- **Chronological Age.** Chronological age was controlled at the age of 60 or higher.

- **Retirement Status.** Retirement status was measured with a three-choice format in a manner similar to Burnett (1989): (1) employed full-time, (2) employed part-time, or (3) currently retired.

- **Job Type.** Respondents indicated their occupation. A post hoc analysis classified the responses as either white-collar or blue-collar occupations.

- **Activity Level.** The activity level of respondents was measured by the respondents' reporting their average frequency of participation in each of forty-five activity domains in the last two years as described by Hultsch, Hammer, and Small (1993). Example cognitive activities included solving cross-word puzzles or using a personal computer. Example physical activities included exercising (i.e., walking, swimming), or outdoor activities (i.e., golf, fishing).

Covariates

Covariates for this study include (1) subjective health assessment, (2) income, (3) education, and (4) propensity to work. A description of each covariate is provided below.

- **Subjective Health Assessment.** Poor health has consistently been found to have a severe effect on both mental and physical activities of the elderly, regardless of retirement status. Therefore, any generalizations about age or retirement must be tempered by a consideration of health. The respondents perceived health was measured on a multi-item scale suggested by Sirgy, Mentzer, Rahtz, and Meadow (1991) and then covaried to determine its impact on the age-related learning deficit.

- **Income.** Income was measured on a five-category scale and was covaried.

- **Education.** Education was measured on a six-category scale and was covaried.

- **Propensity to Work**. Propensity to work was measured on a four-item scale in a manner described by Stagner (1979) and covaried.

Sample Composition

The sample of seniors was drawn from several groups located in the southeastern United States. Targeted groups include churches, PTA, civic clubs, and clubs for the elderly. In order to maintain a consistent cognitive set among participants (Sawyer 1975), an introduction was read from a prepared script at the regularly scheduled club meetings of the participating groups. A total of 168 questionnaires were administered yielding 146 usable questionnaires for an 87 percent usable response rate. The experiment took place at the regular club meeting locations. Two separate inducements were offered: (1) a choice of a bottle of shampoo or disposable razor, and (2) a chance to win a $100 that was drawn after data collection.

Sampling Procedure

The procedure employed in this experiment closely resembles that used by Petty, Cacioppo, and Schumann (1983). Two booklets were designed for the study. The first booklet contained the advertising stimuli while the second contained the

independent and dependent measures. On the first page of the portfolio of advertisements it was explained that the study concerned the retention of magazine advertisements (thus increasing the relevance of the material to the audience). Respondents were asked to read the introductory sheet before viewing the advertisements. This introductory sheet gave information about the advertisements that followed (e.g., "CSI Clarity is a new type of contact lens that employs a new technology that resists deposits up to eight times better than other lenses....")

The instructions told respondents to continue through the booklet at their own pace and to raise their hands when finished. These instructions acted to control the pace of the message. The advertisement booklet contained six advertising stimuli broken down as follows: Four real magazine ads for both relatively familiar (e.g., Ford Truck) and unfamiliar (e.g., CSI Clarity contact lens) products as well as two fictitious advertisements (one used to study treatment effects and a second used to lessen the probability that respondents could identify the treatment fictitious advertisement). To ensure consistency, the third advertisement in each booklet was the treatment fictitious shampoo advertisement. When the subjects completed perusing their advertising booklet, they were given a second booklet containing the self-reported dependent measures (i.e., aided recall and recognition).

Pretests

In an effort to make the fictitious shampoo seem realistic, two independent pretests were conducted to determine which shampoo attributes were salient. A list of potential attributes was generated from two independent focus groups of young and elderly subjects, respectively. During these focus groups, a brainstorming session was employed to generate a list of potential shampoo attributes. Then, the salience of these attributes was measured during a second pretest on a seven-point semantic differential scale from 'very important' to 'unimportant'. The identified salient attributes were featured in the treatment fictitious shampoo advertisement.

The packet of magazine advertisements and the questionnaire were pre-tested on thirty elderly adults. Adjustments were made and then the final advertising packet and questionnaire were administered to ten elderly adults. Data collected during the pre-test are not included in the final results. (Note: The final advertisement packet and questionnaire are available upon request.)

A Description of Statistical Methods Used

Multivariate analysis of variance (or MANOVA) is used to test the impact of retirement (vs. not retired) and job-type (white- vs. blue-collar) on aided recall/recognition.(See Hair et al. (1995) for a complete description of MANOVA).

Given the presence of presumed covariates, multivariate analysis of covariance (or MANCOVA) is used for more sensitive tests of treatment effects (i.e., independent variables) on the dependent variables. MANCOVA can be used in conjunction with MANOVA to remove (after the experiment) the effects of any uncontrollable variables (i.e., the covariates of subjective health assessment, income, education, and propensity to work) on two or more metric dependent variables (i.e., aided recall and recognition). (See Hair et al. 1995) for a complete description of MANCOVA).

The role of cognitive activity on the age-related learning deficit is analyzed with canonical correlation analysis and Pearson's correlation coefficient. Canonical correlation is a statistical technique that permits researchers to correlate simultaneously several metric dependent variables (i.e., aided recall and recognition) and several metric independent variables (i.e., retirement status, occupation, and activity level). Pearson's correlation coefficient indicates the strength of the association between dependent and independent variables. (See Hair et al. 1995) for a complete description of canonical correlation and Pearson's correlation coefficient).

RESEARCH RESULTS

The results of this research study are presented in the sections that follow. First, the issues of reliability (the consistency of measurements) and validity (the accuracy of measurements) are addressed. Second, the basic assumptions underlying the use of MANOVA are validated. Finally, the research results are presented and analyzed.

Reliability and Validity

While reliability and validity are difficult to establish for some of the constructs used in this experiment, several steps were taken to increase the internal consistency of this experiment. For example, a pilot study of the aided recall portion of the study was conducted in order to diagnose any potential inter-rater reliability problems prior to data collection. Next, two independent raters scored the responses on the aided recall section as either correct or incorrect. A relatively liberal criterion was used for cued recall in that 'gist' was emphasized rather than verbatim recall. In an attempt to ensure a high degree of inter-rater reliability, the independent raters were given specific, unambiguous instructions. If agreement still could not be reached, then a third independent rater scored the responses. The total number of items correctly recalled from 0 to 8 acted as the recall score. The inter-rater reliability for this scoring system was .92. An independent rater decided the cases in which there was a discrepancy.

Cronbach's alpha is a commonly used measure of reliability with values ranging from 0 to 1.00. Smaller values of Chronbach's alpha indicate that the sample of items does a poor job of capturing the construct of interest (Hair et al. 1995). According to Nunnally (1978), Chronbach's alpha values should be at least .70 or greater for levels of reliability to be acceptable. Chronbach's alpha was employed to test the internal consistency of the perceived health scale, the propensity to work scale, and the activity scale.

Table One reports the Chronbach's alpha coefficient for each scale. The three questions that made up the propensity to work scale were going to be used as a covariate when analyzing the impact of retirement on recall and recognition. However, these three items were not correlated with each other or the dependent variables, and thus, they were eliminated from further analysis.

TABLE 1
Reliability Analysis Using Chronbach's Alpha

Scale	Number of Items	Chronbach's Alpha Value
Perceived Health	6	0.8514
Activity	37	0.7333

As per Nunnally (1978), Chronbach's alpha values should exceed .70 for reliability to be acceptable. This is the case for these two measures.

Testing the Assumptions of MANCOVA

Before hypothesis testing, the researcher must test the following assumptions of MANCOVA for violations (see Hair et al. 1995):

1. The set of dependent variables must follow a multivariate normal distribution (i.e., any linear combination of the dependent variables must follow a normal distribution).
2. There should be equal variance-covariance matrices for all treatment groups.
3. The observations of the dependent variables should be independent.
4. The dependent variables should be correlated with the covariates.

Normality. Inspection of the stem-and-leaf displays for the data do not indicate any problems with the distributions of the dependent variables. Some of the demographic variables were modal rather than normally distributed, which is the tendency of such nominal data as marital status.

Homogeneity. Bartlett's test of sphericity was used to evaluate the assumption of equal variance-

covariance matrices. Bartlett's test of sphericity examines the correlations among dependent variables to determine whether significant inter-correlations exist (see Hair et al. 1995). The Bartlett's test of sphericity uses a Chi-square value for interpretation. For the vector relating recall and retirement status, the Chi-square value was 2.2740 (p = .5175) while the vector relating recognition and retirement status yielded an 8.8196 Chi-square value (p = .0318). Clearly, the p-value for recognition and retirement appears to violate the assumption of equal variance-covariance matrices. However, visual inspection of the variances for recognition and retirement status indicated that the assumption was not seriously violatled. Therefore, the assumption of equal variance-covariance matrices was satisfied (albeit cautiously) and further MANOVA analysis was appropriate. **Table Two** presents the results of this test for each MANOVA analysis.

TABLE 2
Test for Homogeneity of Dispersion Matrices

Dependent Var(s)	Independent Var(s)	Chi-Square	P-Value
Recall	Retirement Status	2.2740	.5175
Recognition	Retirement Status	8.8196	.0318
Recall	Job Type	3.5961	.0579
Recognition	Job Type	0.6246	.4293

Covariates. As mentioned above, perceived personal health and propensity to work were used as covariates in the MANCOVA analysis involving the dependent variables (aided recall and recognition) and the independent variable (retirement status). Additionally, the covariates of education and income were anticipated for use in the MANCOVA analysis involving the dependent variables (aided recall and recognition) and the independent variable (job type). Before these variables could be included in the analysis as covariates, they must be shown to be correlated with the dependent variables. Analysis of the correlation matrix indicated that neither of the proposed covariates were highly correlated with the dependent variables. As such, they were eliminated from analysis and MANOVA was shown to be the appropriate statistical procedure to be used.

Hypothesis Testing

The first research hypothesis examines the effects of retirement on respondent memory. Specifically,

H_1: There is no difference in the level of aided recall or recognition between chronologically elderly retirees and chronologically elderly employees.

MANOVA analysis was used to test research hypothesis one. **Table Three** shows the results of this analysis.

TABLE 3
Manova Analysis: The Effect of Retirement on Recall and Recognition

Dependent Var.	Independent Var.	F-Value	P-Value
Overall	Retirement Status	1.49	.1796
Recall	Retirement Status	0.61	.6085
Recognition	Retirement Status	2.43	.0678

The overall F-value of 1.49 with a p-value of .1796 indicates that there is no difference in the mean vector of aided recall and recognition based on retirement. The F-value for the main effect of retirement status on recall is .61 with a p-value of .6085. Additionally, the F-value for the main effect of retirement status on recognition was 2.43 with a p-value of .0678. These individual F-values indicate that retirement had no impact on aided recall. Based on this series of results, the null hypothesis that there is no difference in aided recall or recognition between retirees and elderly employees cannot be rejected.

The second research hypothesis examined the effects of occupation on respondent memory. Specifically,

H_2: There is no difference in the level of aided recall or recognition between blue collar retirees and white collar retirees.

MANOVA analysis was used to test research hypothesis two. **Table Four** shows the results of this analysis.

TABLE 4
Manova Analysis: The Effect of Job Type on Recall and Recognition

Dependent Var.	Independent Var.	F-Value	P-Value
Recall	Job Type	.4500	.5030
Recognition	Job Type	4.3300	.0405

The p-value for the main effect of job type on recall is .5030 indicating that there is no difference in the amount of recall between blue-collar and white-collar retirees. Thus, the null hypothesis that there is no difference in recall between blue-collar and white-collar retirees cannot be rejected. The p-value for the main effect of job type on recognition is .0405 indicating statistical significance. The post hoc pair-wise comparisons (see **Table Five)** show that white-collar retirees recognized significantly more than blue-collar retirees. This result was found regardless of how stringent the test. Thus, the null hypothesis that there is no difference in the level of recognition between blue-collar and white-collar retirees is rejected. This result is consistent with the findings of Minkler (1981) who found that white-collar employees were significantly more satisfied with retirement than blue-collar employees. Presumedly, the difficult adjustment to retirement may accelerate the cognitive decline in blue-collar retirees.

TABLE 5
Pairwise Comparisons Using Least Significant Differences: The Effect of Job Type on Recognition

T Grouping	Mean	N	Job Type
A	4.776	67	White Collar
B	4.048	21	Blue Collar

The third research hypothesis examined the effects of activity on respondent memory. Specifically,

H_3: There is no difference in the level of aided recall or recognition between retirees who lead an active life-style and retirees that lead an inactive life-style.

A combination of Factor Analysis and Canonical Correlation Analysis was employed to test research hypothesis three. Factor analysis can be used to analyze interrelationships among large groups of variables to explain these variables in terms of underlying dimensions (known as factors) (Hair et al. 1995). As noted earlier, canonical correlation is used to correlate simultaneously several metric dependent and several metric independent variables.

A post hoc content analysis of 43 activity items (similar to those employed by Hultsch, Hammer, and Small 1993) suggested a six category classification of items: (1) physical activities, such as exercise or gardening, (2) social activities, such as attending a party or dining out, (3) self-maintenance activities, such as preparing a meal or shopping, (4) passive information processing, such as listening to the radio or watching television, (5) integrative information processing such as driving a car or reading a novel, and (6) novel information processing such as traveling or playing bridge.
A principal components factor analysis with varimax rotation was computed on the self-reported activity measures and is provided in **Table Six**. The first factor, labeled 'cognitive activity', consisted of self-maintenance, passive information processing, integrative information processing, and novel information processing. This factor

accounted for 30 percent of the variance. The second factor, labeled 'physical activity', consisted of physical and social activities which explained approximately 27 percent of the variance.

TABLE 6
Factor Analysis:
Cognitive and Physical Activity

Rotation Method: Varimax

	Factor 1	Factor 2
PHYSICAL	-0.09511	0.89493
SOCIAL	0.34858	0.61204
SELF	0.61794	0.14279
PASSIVE	0.63903	0.42665
INTEGRAT	0.48860	0.48100
NOVEL	0.80941	-0.06184
Variance explained by each factor:	**Factor 1**	**Factor 2**
	1.814630	1.613094

Further, canonical correlation analysis was used to test the effects of cognitive and physical activity on a linear composite of recall and recognition, respectively. **Table Seven** presents the effects of cognitive activity on aided recall and recognition.

Regarding cognitive activity, the Wilks F-value is 6.7883 with a p-value of .0017 indicating there is a significant relationship between amount of cognitive activity and a linear composite of aided recall and recognition. The canonical correlation for cognitive activity and the linear composite of aided recall and recognition is .3442. The redundancy index is .0408 indicating that approximately 4 percent of the variance in the linear composite of aided recall and recognition can be explained by cognitive activity for retirees. The Pearson Correlation Coefficient for cognitive activity and recall is .3434 with a p-value of .0004 indicating statistical significance. The Pearson Correlation Coefficient for cognitive activity and recognition is .1631 with a p-value of .0981.

TABLE 7
Canonical Correlation Analysis:
the Effect of Cognitive Activity on
Recall and Recognition for Retirees

Statistic	Statistical Value	P-Value
Wilkes (F)	6.7883	.0017
Canonical Correlation	.3442	
Redundancy Index	.0408	
Pearson Correlation: Cognitive Activity w/Recall	.3434	.0004
Pearson Correlation: Cognitive Activity w/Recognition	.1631	.0981

Table Eight presents the effect of physical activity on aided recall and recognition.

TABLE 8
Canonical Correlation Analysis:
the Effect of Physical Activity on
Recall and Recognition for Retirees

Statistic	Statistical Value	P-Value
Wilkes (F)	1.2479	.2915
Canonical Correlation	.1553	
Redundancy Index	.0037	
Pearson Correlation: Physical Activity w/Recall	.1136	.2507
Pearson Correlation: Physical Activity w/Recognition	.1502	.1281

Regarding physical activity, the Wilks F value is 1.2479 with a p-value of .2915. This indicates that there is no relationship between physical activity and a linear composite of aided recall and recognition for retirees. Thus, further interpretation is unnecessary. This finding is consistent with Hill, Storandt, and Malley (1993) who found that long-term exercise training did not improve cognitive functioning in the elderly.

Based on the above series of analyses, the null hypothesis that there is no difference in aided recall between retirees who are active and retirees who are inactive is rejected. This result is consistent with Hultsch, Hammer, and Small (1993). They found that cognitive activity was predictive of semantic processing time, comprehension time, verbal fluency, vocabulary, and world knowledge, generally accounting for 1 to 2 percent of the variance. While the relationship between cognitive activity and recognition was not statistically significant (p-value = .0931), cognitive activity is believed to influence the elderly's recognition as well.

DISCUSSION

As noted earlier, empirical evidence suggests that indeed **an age-related information processing deficit does exist**. Repeated studies have shown that the elderly do not recall (aided or unaided) or recognize stimuli to the same extent as younger adults. What is less clear, however is "*Why* do young adults recall and recognize stimuli better than elderly adults?" This study attempts to improve our collective understanding of the age-related learning decrement. Specifically, the purpose of this study was to empirically test the effects of retirement, occupation, and activity level on the age-related learning deficit.

The first hypotheses examined the influence of retirement on respondent memory. Retirement was not found to impact a person's unaided recall or recognition (though the recognition p-value was close to statistically significant). It seems a person's cognitive processes are not affected by whether they continue to work or have retired after the age of sixty. Thus, the adage "working keeps me sharp" may not hold true as no differences were found between the two groups (older workers and retirees).

The second research hypothesis examined the effects of occupation on respondent memory. It was determined that recall is not influenced by a person's occupation when analyzed as blue-collar or white-collar occupations. However, differences were identified in level of recognition between blue-collar and white-collar retirees. The adjustment to retirement may be more difficult for blue-collar employees, possibly due to a lesser degree of financial preparedness and the loss of the critical social network of the work environment. This difficult adjustment to retirement may accelerate the cognitive decline in blue-collar retirees. It has been previously established that white-collar retires tend to have a greater degree of satisfaction with retirement than blue-collar retirees (see Minter 1981).

The identified differences between recall and recognition may be explained by the argument that recall and recognition use two different cognitive processes. The fundamental difference between the two processes is that recall requires the individual to describe the stimulus, which is not present. Whereas for recognition of a stimulus, which is shown to the respondent, it must merely be identified as having been seen or heard previously (Singh, Rothchild, and Churchhill 1988). This process bypasses retrieval from long-term memory. This finding is consistent with prior studies on aging which have shown that lack of encoding is a major cause of observed memory impairment (Horn, Donaldson, and Engstrom 1981; White and Cunningham 1982; and Zelinski and Miura 1988).

The third research hypothesis examined the influence of activity on respondent memory. Regarding cognitive activity, analysis of the p-values of the Pearson correlations indicates a significant relationship between amount of cognitive activity and recall, but not with recognition. More cognitively active retirees tended to have better recall functions than their less active counterparts. Intuitively, the brain functions like other organs in the body...it must be used to maintain its strength, reflex activity, and motor functions. This result is consistent with Hultsch, Hammer, and Small (1993). Regarding physical activity, no relationship was found between physical activity and a linear composite of aided recall and recognition.

IMPLICATIONS, LIMITATIONS, AND DIRECTIONS FOR FUTURE RESEARCH

Implications

An important finding of this study is that cognitive activity is significantly related to aided recall for retirees. That is, retirees who stay cognitively active recall significantly more material than retirees who are not as cognitively active. As such, marketing programs (such as advertising) aimed at more active seniors should be more successful given the greater likelihood of consumer recall over time. Further, more complex information can be incorporated into advertising aimed at active seniors given their enhanced recall ability. From the perspective of marketing academicians, cognitive activity is further implicated as a piece of the age-related learning gap puzzle.

A second important finding of this study is that white-collar retirees recognized significantly more than blue-collar retirees. The increased amount of stress felt by blue-collar workers during retirement might have an impact on this recognition deficit. This may have implications for marketers attempting to cultivate brand recognition and brand equity with blue-collar retirees in that they exhibited lower recognition levels. Intuitively, white-collar retirees are more likely to recognize brand images projected into the marketplace than their blue-collar counterparts.

Previous research has shown that the pace of the message has a significant impact on the recall of the elderly (i.e., externally-paced material such as that contained in broadcast media tends to overwhelm the elderly when compared with self-paced media such as print (see Stephens 1982). Therefore, messages aimed at the cognitively inactive should appear in print so as not to overwhelm the target consumer. Conversely, broadcast media may be best directed at significant influencers such as adult children or care-takers.

Limitations

External validity is not a strength of this study. First, other than for face validity, it is impossible to determine the validity of the dependent constructs aided recall and recognition. Even though the study basically evolves around theory testing, it may be possible that the external validity of the study is limited. Another limitation of this study is that the propensity to work scale proved to be neither reliable nor valid. The scale apparently was capturing other potential constructs (e.g., job satisfaction). Finally, this study is based on data collected from a convenience sample. As such, any generalizations or conclusions that may be drawn from this study should be guarded.

Directions for Future Research

The age-related learning topic is ripe for future research. In this growing body of knowledge, there are currently more questions than answers. The biggest question yet to be answered is "Is age the cause of the observed memory decline or is some other related variable the root cause?" The use of longitudinal, rather than cross-sectional, studies is the first logical step towards improving our understanding of the age-related learning gap. By measuring a subject's recall at several intervals over time, extraneous confounding influences may be removed (i.e., generational differences). In particular, a measure of overall health might be something worthy of future attention. Mental abilitites for the elderly often begin to decline after the onset of an illness. As such, measuring health might allow future researchers to determine if health is a confounding variable.

Finally, while this study did not find that retirement status affected recall, this hypotheses should not be abandoned. The effect of retirement status on recognition had a p-value of .0678 which would pass a more liberal significance criterion (i.e., alpha=.10). As such, more research in this area is recommended. It is entirely possible that retirement status is not a factor that relates to the age-related learning deficit. Instead, those elderly who have not retired may just be among the group of elderly who are cognitively active. One thing is clear: an age-related learning deficit does exist. What is less clear, however, is the root causes as to why this phenomenon exists. This study has

attempted to shed light on this vitally important topic ... a topic that will surely garner increased research attention in the future as the "graying of America" continues to alter the demographic landscape.

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