ABSTRACT

GERMAIN, CASSANDRA MALLORY. Effect of Personal Relevance on Distractibility in Older Adults. (Under the direction of Thomas M. Hess.)

Within the social-cognitive framework, it has been suggested that typical patterns of age-differences in performance on laboratory tasks may in part be reflections of age-related variations in motivation or processing goals rather than age-related cognitive decline (Hess, 2000). In fact, several studies arising from this framework have shown that when motivational factors are sufficiently increased, older participants are more likely to engage cognitive resources and age-differences in performance are reduced (e.g., Hess, Waters & Rosenberg, 2001). Of particular interest to this study was whether motivational influences could also impact aging-related patterns of performance often attributed to a decrement in inhibitory processes and attention.

The present study examined the impact of personal relevance on the ability to ignore distracting information within the context of a reading task. Thirty-six older adults (*Mean Age* = 71) and 36 younger (*Mean Age* = 18) were asked to read a series of passages that contained irrelevant, distracting information interspersed throughout the text. In an attempt to manipulate personal relevance, the subject matter of the passages was varied so that half of the passages reflected information considered highly relevant to older adults but not to younger adults, and half of the passages reflected information considered highly relevant to younger adults but not to older adults. It was hypothesized that the participants would perform better (i.e., faster reading speeds, and higher reading comprehension) on passages that were highly

relevant to their age-group than on those of low relevance. It was also hypothesized that there would be greater memory for distracting information contained in passages of low relevance than those of high relevance, which would suggest that both older and younger participants are more likely to engage their cognitive resources thereby reducing the impact of distracting material when the passage material is personally meaningful in some way.

Support for this hypothesis was obtained when reading times and comprehension scores were examined. Participants from both age-groups took longer to read passages of low relevance to their age group than passages of high relevance to their age group. This indicates that all participants were more affected by the distracting material while reading passages that were low in personal relevance than they were when reading high relevant passages, suggesting less task engagement in both older and younger adults in the former condition. Both younger and older adults also answered significantly more questions correctly on the passages that were highly relevant to their age group than on those that were of low relevance. In addition, participants recalled more of the distracting information when it was contained within the low relevant passages, although this effect only approached significance.

The results of this study suggest that whereas observed age-differences in performance may be in part due to a decline in cognitive ability among older adults, motivational factors also play an important role. It appears that when motivation is high, participants engage in more control of attentional processes and age-related differences in distractibility are reduced; in contrast, when motivation is low, age-differences are greater. The results provide further support for the notion that with age,

older adults tend to be increasingly selective in determining when to use cognitive resources (Baltes, 1990; Hess, 2001).

Effect of Personal Relevance on Distractibility in Older Adults

by

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Biography

I am a third year student in the Developmental program in the Department of Psychology. I graduated from Hunter College of the City University of New York. I moved from New York City with my children in July of 2000 in order to pursue a graduate education. Now that I have completed the Master s degree, I will continue towards a Ph. D. in the Developmental program. I hope to continue to conduct research in the areas of aging, attention and memory. Upon graduation, I intend to pursue a career in research and teaching at the university level.

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Introduction

With the almost constant presence of multiple pieces of information competing for our attention, the ability to direct and maintain focus is both an essential and complex skill. Yet, most of us are able to function effectively in our environment with relative ease. For example, we are capable of maintaining a conversation with a single person in a crowded room where other conversations are occurring concurrently without being unduly distracted. We can select and read one advertisement out of many on a crowded bulletin board, and we have the ability to navigate ourselves on confusing highways. Without the ability to consciously focus on one aspect of an object or task without being distracted by irrelevant or extraneous information, it would be very difficult if not impossible to perform many everyday tasks involving selective attention (Plude, Schwartz & Murphy, 1996).

Although maintaining the ability to attend selectively remains important throughout life, research suggests that older adults are deficient in their ability to engage in controlled processing relative to younger adults. Older adults have been shown to be more susceptible to distraction, experience problems in their ability to maintain attentional control and to have difficulty in discarding no longer relevant information (Rabbitt, 1965; Carlson, Hasher & Zacks, 1995; Hartman & Hasher, 1991). For example, Connelly, Hasher and Zacks (1991) had old and young adults read and answer questions about short stories that either contained or did not contain distracting material. When present, the distracting material appeared in a different font from the target story. Participants were asked to attend to the target text only and to ignore the

distractions that appeared in a different font. Results of this study indicated that older adults had more difficulty ignoring the distracting information than did younger adults. In the visual search area, greater interference effects have been reported for older adults on search tasks --which require participants to search for target information-- versus non-search tasks --where targets always appear in the same location (Plude & Hoyer, 1986; Carlson, Hasher, Connelly & Zacks, 1995). This suggests that aging is associated with relatively greater difficulty in attending to objects in unpredictable locations.

Older adults memory performance has also been shown to be affected by declines in attentional abilities. Using a multiple-item learning task, Kausler and Kleim (1978) investigated age-differences in the processing of relevant stimuli. In this study, participants were asked to study a list of words. Each word on the list was paired with either one incorrect word or three incorrect words. The correct words were identified by an underline at the time they were presented. Participants were then asked to identify the correct words (words that had been underlined) in a subsequent recognition test. The study found that the older adults in their sample were disproportionately affected by increases in the number of irrelevant items presented during each trial. If the correct answer was paired with only one wrong word, older adults performed as well as younger adults. However, if the number of choices was increased to four, then older adults recognition memory was inferior to that of younger adults. Other memory studies have reported similar results (Hedden & Park, 2001; West, 1999).

Inhibition

Several hypotheses have been posited to account for these age-related deficits in attention and controlled processing mechanisms. Of these, the inhibition-based hypothesis (Hasher & Zacks, 1988; Hasher, Zacks & May, 1999) has been most salient in recent investigations of the attention construct. In brief, inhibition is conceptualized as serving three purposes in regulating information to be processed in working memory: access, deletion and restraint. The access function regulates what gains access into working memory. Deletion (or suppression) controls what is active in working memory by deleting or suppressing irrelevant content or information that becomes irrelevant during the course of a task. The restraint function prevents dominant but incorrect responses from overriding correct responses that may be irregular or less likely. It is posited that failures in inhibitory functions lead to a cluttering of working memory which results in a functional reduction of processing resources. Specifically, already limited resources must then be shared between task relevant and task irrelevant information, thereby preventing efficient processing.

Despite its popularity, findings from research investigating the inhibition hypothesis have not been unequivocal. For example, using a memory task, Pavur, Comeaux and Zeringue (1984) investigated the hypothesis that older adults have more difficulty ignoring irrelevant information than younger adults. In this experiment, young and old adults were given two shopping lists. Items on the shopping lists were preceded by the word(s) purchase or not to purchase. Participants were instructed to remember the purchase items but not the not to purchase items. Both lists used

some of the same categories (e.g., clothing) but not the same instances (e.g.,socks). Afterwards, a free recall test was administered. According to the inhibition hypothesis, the older adults should be less able than the younger adults to ignore the irrelevant items from the first list if the item shared a category with items on the second list. For example, if an item appearing on the second list (i.e., socks) belonged to the same category as items from the first list (i.e., shoes), it was hypothesized that older adults should be more susceptible to interference (e.g., erroneously mention items not to be purchased from list one). The results indicated however, that there were no significant differences between younger and older adults when asked to recall the to-be-purchased items. Similar results were obtained by Wright and Elias (1979) using a visual filtering task. In this study, two sets of target letters were presented alone or flanked by distracting letters. The target letter was a) presented alone, b) flanked by letters from the other set, c) flanked by other letters (neutral) letters, or d) flanked by letters from the same set. Prior to each trial, participants were given a ready signal. A target indicator was then presented, followed by the target and distractor letters. The target and distractors were always presented in the same position. Participants were required to respond by pushing a switch to the right if they saw a letter from one set of target letters, and to the left if they saw a letter from the other set. The results indicated that older adults were less affected by the distractors (irrelevant information) than the younger adults.

In interpreting their results, Wright and Elias (1979) suggested that observed age differences in performance on tasks used to measure attentional processes may

not necessarily reflect a general deficit on the part of older adults. Instead, these age-related dissimilarities may simply reflect inherent differences across tasks themselves. It may be that the unique characteristics of stimuli used elicit differential degrees of processing which in turn influences the nature and magnitude of age-related differences observed. For example, some tasks are designed in such a way that irrelevant information can simply be glossed over or ignored (e.g., Pavur et al, 1984). Because instructions were given in advance, participants were able to use the instructional cues to direct their attentions to relevant items and focus their processing efforts accordingly. In this manner, competition between relevant and irrelevant information is limited, and more efficient processing can occur.

Other tasks designed to measure inhibitory processes require that extraneous information be processed along with relevant information and then later discarded as irrelevant, such as in directed forgetting studies. This can be illustrated by contrasting the Pavur et al. (1984) study with one by Zacks, Radvansky and Hasher (1996). In this later study, younger and older adults studied categorized word lists in which each word was paired with a forget or remember cue after the word had been studied. The authors found that when compared to younger adults, the older adults were less capable of suppressing the retrieval of the to-be-forgotten words. While these results seem to provide further support for the notion that older adults are deficient in attentional processes, further examination reveals that there are two different processing requirements placed on the participants within each task.

Participants in the Zacks et al. (1996) study were required to memorize the items

on the list *prior* to receiving the forgetting instructions. That is, the irrelevant items had to be processed first, along with the relevant information. Afterward, the irrelevant information had to be discarded from working memory. Under these conditions, success on this task appears to be heavily dependent upon the delete function of inhibitory processes. In contrast, participants in the Pavur et al. (1984) study were able to use the directions as cues to assist them in distinguishing between relevant and irrelevant information prior to processing similar to the way that predictable location guides attention in non-search tasks. In that context, participants were more dependent on the access function of inhibitory processes which may not be impaired in older adults.

To elaborate, when a task requires equal processing of both relevant and irrelevant information, there is a greater likelihood that inhibition in general will be poor because irrelevant information is actively processed along with relevant information and therefore, more difficult to remove from memory. Given hypothesized negative effects of aging on inhibition, performance may be especially poor in older participants. In contrast, when irrelevant information does not have to be processed it is easier to inhibit. For example, in Pavur et al. (1984), the purchase or not to purchase instructions helped participants differentiate between relevant and irrelevant information. Using this method, participants were able to direct most of their cognitive efforts towards remembering the relevant information. As long as they were able to prevent the irrelevant information from gaining access into working memory, the task could be performed well because deeper level processing of irrelevant information

could be regulated.

Further support for this interpretation is presented by Brink and McDowd (1999). In this study, the authors were interested in differentiating the effects of task complexity from qualitative differences in cognitive demands on age-differences in selective attention. Participants completed color-block (identifying the color of a box and ignoring the adjacent color name printed in black) and color word (identifying the color of a word while ignoring the semantic meaning of the word itself) versions of the Stroop task, where complexity was manipulated by the number of response choices given. The results showed that older adults were disproportionately slowed on the color word, but not the color block version of the Stroop task. This difference was consistent regardless of the level of task complexity. Similar to the directed forgetting task used in Zacks et al. (1996), success on the color-word task is heavily dependent upon the delete function of inhibition. Both relevant (word) and irrelevant information (color of word) must be processed initially, then the irrelevant information must be deleted in order to respond correctly. In contrast, the color-block task enables the use of color as a peripheral cue which helps to direct attention primarily to relevant aspects of the stimuli. Thus, the possibility that the success of older participants in inhibiting irrelevant information may also be dependent upon the amount of processing performed on both the stimuli and irrelevant information should also be considered.

These findings present several interesting hypotheses concerning the nature of attentional functioning in older adults which merit further investigation. First, it is suggested that older adults may not be deficient in all aspects of selective attention,

and perhaps further investigation of this construct may benefit from considering each aspect (access, deletion and restraint) separately. Second, it appears that the presence or absence of environmental support within the context of tasks assessing both attention and memory helps older adults in directing and engaging their resources in a manner that helps to enhance performance._____

_____These results also suggest that age deficits are not necessarily an all-or-none phenomenon. In particular, it appears that factors that influence control over processing mechanisms may moderate age effects. Whereas constructs such as environmental support have often been invoked to repair older adults performance, it is possible that other factors not linked to biological deficits but also associated with control might moderate aging related inhibitory functions. One such factor rarely considered in traditional cognitive aging research is motivation.

Motivation and Task Engagement

Within the social-cognitive framework, motivation is often conceptualized in terms of "processing goals , and it is presumed that these processing goals are able to influence the degree to which individuals engage and utilize their cognitive resources (Bargh, 1994; Hess, 1994; Isaacowitz, Charles & Carstensen, 2001). Conceptualized in this way, it can be said that motivation in the form of processing goals operates in a similar fashion to external cues by directing and focusing attention on important information. In visual search and memory tasks, external cues in the form of instruction, color, or predictable location help guide attentional resources to relevant information. In investigations of motivational influences, processing goals may serve a

similar purpose by focusing attention on important information.

While motivation is somewhat of an elusive construct, it has been successfully manipulated using a variety of methods. According to Fiske and Neuberg (1990), effective motivational manipulations simply require a certain degree of personal impact. Operating within this framework, motivational influences have been shown to affect performance in a wide range of studies involving young adults. Tetlock (1983) found that participants were more likely to engage in complex thought processes when social accountability was used as a motivational manipulation. Thompson, Roman, Moskowitz, Chaiken and Bargh (1994) have shown a resistance to priming effects in forming impressions when motivation or personal relevance is sufficiently increased. In other impression formation studies, perceivers were found to engage in differential levels of processing of target information as a result of the target characteristics being made more personally relevant or interesting to the perceiver (see Fiske & Neuberg, 1990). The more personally relevant or interesting the target, the more likely the perceiver was to form more individuating impressions rather than relying on easily processed categorical information. This suggests that motivational factors may influence engagement in controlled processing.

Despite these intriguing findings among young adults, very few studies have investigated motivational influences in cognitive-aging research. Considering these influences among older adults may be particularly useful in gaining a clearer understanding of the capabilities of older adults, since age differences in performance have been shown to be influenced by a variety of factors unrelated to cognition,

including knowledge (Hess, 1990) and emotion (LaRue, Swan & Carmelli,1995). It is possible that at least some observed age-differences in performance, often interpreted as inability on the part of older adults, reflect adaptive functions that influence the degree to which older adults participate in controlled processing or engage in a task. In the same vein, the selectivity viewpoint (Baltes & Baltes, 1990) argues that there is an aging-related change in the manner in which older adults allocate their resources from one of consumption and expenditure to maintenance and preservation. In cognitive terms, this would mean that due to reductions in available resources, older adults become increasingly selective in deciding when and how to engage their cognitive resources, limiting their use for tasks and information that they consider important. Again, it is reasonable to assume that age-related differences in performance are not always an indication of inability on the part of older adults, but perhaps a reflection of compensatory mechanisms employed by older persons in order to preserve limited resources.

This was illustrated in one of the few direct investigations of motivational influences involving older adults. Hess, Rosenberg and Waters (2001) found that age of the target individual presented in a vignette (i.e., personal relevance), older adults made more accurate trait inferences -and age differences were eliminated- when the target person was similar in age. This suggests that participants were less likely to consider irrelevant information in making their trait inferences when motivation (personal relevance) was high than when it was low.

In a more recent study, Hess, Germain, Rosenberg, Lederc & Hodges (2002)

found similar results. Participants were asked to provide attitude ratings about political programs that varied in personal relevance. In addition, participants were also given irrelevant information about the personality of the individual proposing the program (proposers were either likable or unlikable). The study showed that older adults were more likely than younger adults to consider the irrelevant likability information into account in making their ratings about the proposed program when personal relevance was low. When relevance was high, however, irrelevant information had little impact on older adults abilities.

Together, these findings support the notion that although older adults may experience some decline in attentional abilities, they are capable of engaging their cognitive resources and maintaining attentional control in certain circumstances and motivation may be an additional factor in moderating inhibitory functioning in older adults.

The Present Study

This goal of this study was to investigate how motivation might operate in relation to attentional processes by examining susceptibility to distracting or irrelevant information among older and young adults. Specifically, the present study investigated the influence of motivation on selective attention abilities. Using a procedure adopted from Carlson et al. (1991), participants were asked to read a series of short articles that contained distracting words imbedded within the target text. In their study, Carlson et al. (1991) found that older adults were unable to ignore the irrelevant text whereas younger adults were virtually unaffected. In order to examine the influence of motivation

on the control of attention, I manipulated motivation by having the participants read articles on issues that varied in personal relevance and personal impact to young and old adults. As previously discussed, there is evidence to support the idea that motivation (processing goals) may influence the degree to which individuals engage and utilize their cognitive resources (Tetlock, 1983; Thompson et al., 1994). In keeping with this theorizing, I hypothesized that both older and younger adults would engage in more controlled processing when reading articles they considered highly relevant than when the articles were of low relevance. It was also hypothesized that increased personal relevance would result in higher levels of task engagement thereby attenuating age-differences in the impact of irrelevant information (distractors) on performance. Specifically, it was expected that older adults would have shorter reading times and higher reading comprehension scores on passages considered highly relevant to their age group than on those considered low relevance. Conversely, it was hypothesized that they would recall and recognize more distracting words appearing in passages than old relevant passages. The opposite effect was expected for younger adults.

Method

Participants

Thirty - six older adults (17 men and 19 women) were recruited from the local community via newspaper advertisements and compensated $10.00 for participation in this study. The older adults were between 58 and 85 years of age (*M* =71.1,*SD* =6.4).

Thirty-six younger adults (14 men, 22 women) were recruited from introductory psychology classes at North Carolina State University. Students received two class credits toward fulfillment of an optional course assignment. The younger adults were between 17 and 20 years of age (*M* =18.1, *SD* =.8).

Materials

Target Passages. There were a total of 12 experimental passages. Each passage was between 147-154 words in length (*M*=151.3) and printed in italicized, New Times Roman 13- point font. Six of the passages reflected topics considered of high relevance to younger adults (YR), and six reflected issues of high relevance to older adults (OR). In order to determine what topics might be of high relevance to each age group, a list of 24 topics was compiled and rated by an independent group of participants (15 young and 15 old). For each topic listed, participants were asked to indicate a) how important they considered the topic/subject matter in general, b) how personally relevant they considered the topic/subject matter, and c) how much personal impact the topic/subject matter had on them. All responses were made on a nine-point Likert scale ranging from -4 to +4. Mean ratings for the six YR topics used were 2.03 and -1.63 for young and old adults respectively. Mean ratings for the six OR topics used were .33 (young) and 2.58 (old) (Table 1). The younger adults in our norming sample tended to make higher overall ratings than the older adults in general. Thus, their overall ratings were not in the negative range for the OR passages as was expected. Nonetheless, the overall ratings were generally consistent across age groups and the rating differences were significant at the .05 level.

Table 1

Topic Ratings for Older and Younger Adults (Norming Data)

	Young		Old	
	M	*SD*	*M*	*SD*
Young Relevance Passages				
Employment Projections	3.06	1.20	-1.78	1.92
Drunk Driving	2.21	2.19	.18	3.02
Depression Among College Students	.14	2.75	-1.71	1.89
Tuition Increases	3.07	2.12	-1.75	2.11
Campus Parking Changes	.78	2.86	-2.53	2.30
State Budget Cuts	3.07	2.12	-1.75	2.11
Old Relevance Passages				
Future of Social Security	1.5	2.50	3.82	.37
Older Drivers	-.14	2.90	2.50	1.54
Cost of Health Care	1.21	2.15	3.21	1.43
Long-Term Care Insurance	1.46	1.50	2.87	1.56
Anti-Aging Research	-1.14	2.29	2.17	2.19
Retirement Communities	-.92	2.43	.89	2.80

Note. Ratings ranged from -4 to 4

Twelve articles (relating to the topic ratings) were then obtained from various sources such as the American Association of Retired Persons (AARP), NCSU Campus Bulletin and the Department of Labor web-sites. Articles were then edited for length and used as stimulus passages. Passages were controlled for reading difficulty and subject matter. Reading difficulty was calculated using the Flesch-Kincade tool on the Microsoft Word processing program. All passages received a 12.0 on the grade -level index. Efforts were also made to control for the effects of using varying topics/subject matter across age-groups. For example, if one OR passage reflected a health-related concern, an attempt was made to include a health-related issue relevant to younger adults. However, the ratings indicated that older and younger adults varied greatly in what they considered important and of high personal relevance. Thus, only some of the passage topics could be matched.

Distractors. Two lists of 16 words were used as distracting material List A words were used as distractors within the young relevant passages, and list B words were used as distractors for the old relevant passages. Distracting words were randomly interspersed throughout each passage approximately every two to four words, and positioned so that no word immediately followed itself (see Appendix A). All distracting words were improper nouns, four to seven letters in length, unrelated to the text, and were low in positive or negative content as determined by pleasantness ratings compiled by Bellezza, Greenwald and Banaji (1986). The distractor words within each set were also within the moderate range of frequency of occurrence in the English language as indicated by the Frances and Kucera (1982) norms. There were 45-48 (*M*

= 47.5) words per passage. Distractor words were printed in an upright font (Bookman Old Style 14 point) to distinguish it from the target text. More detailed characteristics of the distractor words can be found in Table 2.

In the original Connelly et al (1991) study, only four words /phrases were used as distractors across experimental passages. The authors failed to find any significant age differences in the comprehension foil scores used to assess distractibility, and it is assumed that there were no age-differences in recall scores either since these values were collected but not reported. One possible reason that differences failed to emerge is that the small number of distractor words used may have resulted in ceiling effects. In an attempt to prevent a similar effect, the distractors were increased to 16 per experimental condition in the current study.

Table 2

Frequency and Valence Means for Distractor Words

	List A	List B
Word Length (letters)	5.38	5.25
Frequency Ratings	239	239
Pleasantness Ratings	3.75	3.77

Note. Pleasantness ratings ranged from 1 to 5; Frequency ratings ranged from to 4000+.

Reading Comprehension. Four comprehension questions were constructed to assess how much the participants understood about what they had read. Each item asked a specific question about what was read in the target text and had four possible answer choices: one correct and three plausible but incorrect answer choices (see appendix B). There were no questions requiring participants to infer correct answers. The questions and possible answers were presented on separate sheets of paper.

Recognition. Two 32-item recognition tests were administered to participants in order to assess how distracted they were by the irrelevant text. One recognition test contained distractor terms from list A, the second contained distractor terms from list B. Each recognition test also included 16 new words that did not appear anywhere in the passages. The 16 new words were four to seven letters long, and also selected from the moderate range of frequency of occurrence in the English language. The items on each test were randomly arranged (see Appendix C).

Other Measures. The Vocabulary Test II (parts 1 and 2) from the Kit of Factor-Referenced Tests (Ekstrom, French, Harman & Derman, 1976) was used to assess general verbal ability. The SF-36 self-report health questionnaire (Ware, 1993) was used to assess self-reported physical and mental health. For descriptive purposes, a background questionnaire requesting other demographic characteristics (e.g., race, gender, formal education, occupation) was also used.

Procedure

All participants were tested individually. Upon entering the lab, participants provided informed consent and background information. They also completed the SF-

36 health questionnaire prior to beginning the experiment. Participants were informed that the purpose of the study was to investigate people s ability to focus attention in the presence of distracting information. To begin the experiment, each participant was instructed as follows:

> You will be reading a series of passages out - loud. We are interested in knowing how well people can ignore distracting information while reading. There will be words printed in both standard as well as italic font. Read the words in italic font only, and ignore the other font. That is, do not read the upright font. After each passage, you will be asked to indicate how important each topic is to you. You will also be asked to answer four reading comprehension questions about each passage. Therefore it is important that you read at a speed that will allow you to understand and remember what you have read. We ask that you do not use your fingers or pencil as a marker during reading. Please leave the passage on the table, or hold the passage at the bottom of the page. Please begin reading the title at the top of the page.

Participants completed two practice and 12 experimental sequences. For each sequence, the participants a) read a relevance passage, b) rated the general importance and personal relevance of the passage, and c) completed the reading comprehension questions. This procedure was repeated until all 14 passages were read. For all trials, practice and experimental, participants reading times were discreetly recorded by the experimenter. A manual stop watch was used to record reading time in seconds. The experimenter began timing with the first word of the passage and ended with the last word of the passage read out loud. Immediately following the completion of the final reading comprehension task, a surprise recall test was administered. Participants were asked to write down as many of the distractor words (words in upright font) as they could remember. Participants were given a minimum of three minutes for this task in order to ensure that they were making an

attempt to remember. Afterwards, the recognition tests were administered. Participants were instructed to indicate whether the words on the list appeared in the target text by circling Y for yes and N for no.

In order to minimize order effects, block randomization was used. The stimuli were presented in three different orders, A, B and C, with each order consisting of three blocks and each block consisting of two young relevant and two old relevant passages. Stimuli were presented to participants receiving order A in the following pattern: YOOY/OOYY/OYYO, where Y refers to a young relevant passage, and O refers to an old relevant passage. Orders B and C consisted of the following patterns: OOYY/OYYO/YOOY and OYYO/YOOY/OOYY respectively. One third of the participants in each age group received each order, thus ensuring that each passage appeared an equal number of times across participants within each tertile of the list. Each participant read every passage.

Results

Sample Characteristics

Detailed information about the sample s characteristics can be found in Table 3. The age-differences observed in education, verbal ability and health are consistent with those observed in similar studies of aging. Older adults had significantly higher levels of education, verbal ability and mental health than the young adults in our sample whereas the younger adults had higher indices of physical health.

Table 3

Sample Characteristics

Measure	Young		Old		*t*	*p*
	M	*SD*	*M*	*SD*		
Age(years)	18.1	.76	71.1	6.4	-10.3	.001
Education (years)	12.2	.51	16.1	2.5	3.9	.001
SF-36 Physical Health	30.3	5.2	26.2	3.7	3.5	.001
SF-36 Mental Health	24.6	2.7	25.9	3.1	-1.8	.06
Vocabulary	27.4	2.3	30.4	2.5	-5.3	.001

Note. Vocabulary Scores could Range from 0-36; SF-36 measures are *T*-scores.

Manipulation Check

In order to ensure that the participants were perceiving the relevance of the passages as expected, a manipulation check was introduced. After reading each passage, participants were asked to rate a) how important they considered the topic in general and b) how personally relevant they considered the topic on a seven-point Likert scale ranging from 0 to 7. Since the overall ratings in the norming sample were skewed towards the positive end of the scale, it was decided that negative values

would be eliminated from the rating scale. Mean ratings for the six YR passages were 4.27 and 2.83 for young and old adults respectively. Mean ratings for the six OR passages were 1.90 and 5.65 young and old respectively. Thus, the actual relevance ratings for the passages used in this study were generally consistent with our ideas. T-tests confirmed that all of the YR and OR passage ratings differed across age groups at .001 level with the exception of one YR passage. Both younger and older adults tended to view the *Drunk Driving* passage similarly (*M* = 3.22 young; *M*= 3.49 old). In order to assess the effects of this discrepancy, analyses were conducted including and excluding this passage. We found that excluding the *Drunk Driving* passage did not change the results of this study. Therefore the results reported here include all experimental passages.

Reading Time

A 2 X 2 X 4 ANOVA (Age Group X Relevance X Order) was conducted on all dependent measures so that the presence of order effects could be determined. No effects for order emerged, therefore this factor was excluded from further examination. Mean reading times for passages were examined using a 2 x 2 (Age Group x Age Relevance) mixed analysis of variance (ANOVA), with age as a between-participants variable and passage relevance as a within-participants variable. A main effect for age was revealed, with older adults generally reading more slowly than younger adults (Table 4), F (1,70) =14.87, p. <.001. The anticipated Age Group x Relevance interaction was also obtained F (1,70) = 13.04, p <.001; *Eta* = .157, with reading times of participants in both age groups being more disrupted by the

distracting words when the passages were of low relevance then when they were of high relevance. Although both groups showed differences in reading time across passage relevance, more detailed analyses revealed that the interaction was primarily driven by older adults F (1,35) = 9.68, $p < .01$. When passages were of high relevance, it appears that older participants were more likely to exercise attentional control than when the passages were of low relevance thereby reducing the negative effects of the distracting information. Among younger adults, there was a definite trend in the same direction, but the difference only approached statistical significance, F (1,35) = 3.48, $p < .07$. This suggests that, relative to the younger adults, the older adults were disproportionately influenced by the relevance of the passages.

Reading Comprehension Performance

The proportion of correct answers was calculated for all comprehension tests at each level of relevance. A 2 x 2 (Age Group x Age Relevance) ANOVA was then conducted on these scores. It was expected that older adults would have higher comprehension scores on the OR passages than on the YR passages, whereas the opposite would be true for the younger adults. Consistent with these predictions, a significant Age Group X Relevance interaction did emerge (Table 3), F (1,70) = 19.57, $p < .001$; *Eta* = .218, with both younger and older adults performing better on the comprehension questions that were associated with the passages of high relevance to their age group. This difference was maintained upon further analyses for both young and old adults, F (1,35) =7.01, $p < .01$, and F (1,35) =12.93, $p < .001$, respectively. These results provide further support for the hypothesis that personal relevance may

influence task engagement.

Distractibility

Recall and recognition of the distractor words from the passages were used as measures of distractibility. The number of distractor words recalled was used as the dependent measure for the recall task, and corrected recognition scores (proportion of hits - proportion of false alarms) were used as the dependent measure for the recognition test. On the recall task, consistent with our expectations, both young and old participants recalled more distracting information when it was contained within the low relevance passages than when similar information was contained within the high relevance passages. However, the interaction failed to reach statistical significance (Table 3), $F(1,70) = 2.82$, $p < .09$. When planned contrasts were examined within age-groups, we found that younger participants recalled significantly more distracting information from OR passages than from YR passages (Table 4), $F(1,35) = 11.66$, $p < .01$. Older participants raw scores showed similar patterns in recall performance, but the differences were not meaningful $F(1,35) = .32$, $p < .57$. We speculate that failure to find more consistent differences may partially be due to floor effects in the recall performance of older adults *(*$M = .847$ for list A and $M = 1.069$ for list B). On the recognition tests, we found a main effect for age-group with older adults remembering fewer distractor words than did the younger adults (seeTable 4), $F(1,35) = 11.72$, $p < .001$. Again, the anticipated Age Group x Relevance interaction only approached significance $F(1,35) = .07$.

Table 4

Means for Dependent Measures

	Young		Old	
	M	*SD*	*M*	*SD*
Reading Time (*seconds)*				
YR	75.66	10.30	86.68	1.69
OR	76.54	11.10	83.59	1.70
Reading Comprehension				
YR	3.01	.34	2.78	.49
OR	2.80	.49	3.06	.39
Distractor Recall				
YR	.64	.93	.31	.62
OR	1.47	1.10	.67	1.15
Distractor Recognition				
YR	7.64	3.57	4.58	4.40
OR	7.58	3.73	4.39	4.53

Discussion

The goal of this study was to investigate age-differences in the degree to which motivation can influence attentional control. Much cognitive research posits that aging is characterized by significant declines in controlled processing mechanisms. This would suggest that in the context of daily activities, older adults are more susceptible to distractions and irrelevant information than are younger adults. In contrast, the age-related selectivity viewpoint (Baltes & Baltes, 1990) argues that during adulthood, there is an aging-related change in the manner in which older adults allocate their resources, with the focus changing from consumption and expenditure to maintenance and preservation. In cognitive terms, this would mean that due to reductions in available resources, older adults become increasingly selective in deciding when and how to engage their cognitive resources, limiting their use for tasks and information that they consider important. Although such selection may also take place at younger points in adulthood, this perspective argues that such selection processes become more exaggerated in later life. From this framework, it is reasonable to assume that age-related differences in performance are not always an indication of inability on the part of older adults, but perhaps a reflection of compensatory mechanisms employed by older persons in order to preserve limited resources.

Consistent with this theorizing, I hypothesized that, although older adults experience some decline in controlled processing mechanisms, they would still be capable of engaging cognitive resources in order to minimize lapses in attentional

control in certain situations. In contrast to younger adults, older adults were expected to be more selective in deciding when to engage cognitive resources, and to limit their efforts primarily to situations that they considered personally relevant. Specifically, it was expected that by increasing personal relevance, both older and younger adults would be more likely to direct attentional resources toward relevant information and away from irrelevant information thereby facilitating comprehension performance and decreasing distractibility. Based on the selectivity hypothesis, I also hypothesized that this effect would be greater in the old than in the young group.

The results of this study were generally consistent with this framework. It was hypothesized, that participants would perform better (i.e., faster reading time and higher reading comprehension) on passages that were highly relevant to their age group than on those of low relevance. Support for these predictions was obtained when reading time and comprehension were examined. Participants from both age groups took longer to read passages of low relevance than passages of high relevance. This suggests that participants were less affected by the distracting material while reading passages that were high in personal relevance than they were when reading low relevance passages. This greater degree of control in the high relevance condition is suggestive of greater task engagement. In addition, both younger and older adults answered more questions correctly on high relevance passages than on low relevance passages. This greater degree of control in the high relevance condition is suggestive of greater task engagement. In addition, both younger and older adults answered more questions correctly on high relevance

passages than on low relevance passages. This suggests that the greater control over processing exhibited by participants in reading highly relevant passages facilitated performance on reading comprehension. Importantly, this relevance effect was not tied to specific stimuli in that the pattern of performance was reversed for the same stimuli across age groups.

It was also hypothesized that there would be greater memory for distracting information contained in passages of low relevance than those of high relevance. When recall and recognition were examined, we found that participants recalled more of the distracting information when it was contained within the low relevant passages. Although this effect only approached significance, a clear pattern in the expected direction suggests that both older and younger participants were less likely to engage their resources in order to control processing of distracting information when the passage material was not personally meaningful in some way. The results of the recognition test did not reveal any notable differences.

Consistent with the age-related selectivity notion (Baltes & Baltes, 1990), it was also anticipated that the influence of motivation on controlled processes would be greater in the older adult group than in the younger adult group, with older adults showing greater differences in performance across relevant conditions than younger adults. Indeed, differences in both reading time and comprehension scores between YR and OR passages were significantly greater for older participants than for younger participants. In the younger adult group, the differences were much smaller than those observed in the older group. While the performance of younger adults was also

influenced by passage relevance, it is clear that the older adults were disproportionately influenced by the passage relevance. It seems that older adults were more likely to use personal relevance as a guide in determining when to engage in higher levels of attentional control. These results argue in favor of an age-related increase in selectivity in older adults. If previously obtained age effects associated with distraction simply reflected biologically related decrements in the ability to maintain attentional control on the part of older adults, no age differences in relevance effects should have been found.

Contrary to the dominant view of inevitable decline in selective attention processes in older adulthood, the results of this study demonstrate that older adults are capable of engaging in controlled processing mechanisms and maintaining attentional control (perhaps as well as younger adults) in certain situations. This view is contrary to that posited by Connelly et al. (1991) and others operating from the traditional deficit-orient approach to the study of aging, which argues, for example, that older adults are more susceptible to distraction than younger adults because of inefficiencies in monitoring and inhibiting irrelevant information (Hasher & Zacks, 1999). As these results also suggest, older adults become increasingly selective in deciding when and how to engage their cognitive resources, limiting their use for tasks and information that they consider important. Considering these influences in older adult performance, it is reasonable to assume that age-related differences in performance are not always an indication of inability on the part of older adults, but perhaps a reflection of compensatory mechanisms employed by older persons in order

to preserve limited resources. One may also interpret the results of this study as evidence that older adults may be more efficient in certain aspects of inhibitory control than younger adults *because* of their need to preserve limited resources. In this sample, we found that the younger adults did recall significantly more distracting information from the OR passages than the YR passages whereas there were no differences in recall across passages among the older adults. This suggests that older adults may be more efficient in the access and delete functions of inhibition than younger adults.

In our attempts to gain a better understanding of inhibitory processes, it may be useful to take a similar approach to the study of inhibition as that taken in memory research. The complexity of findings in age-related differences in selective attention and inhibitory control parallel those in early memory studies when older adults were depicted as being generally deficient in memory functions. It is now known however, that age-related differences in memory performance and the consistency with which they are observed varies depending on the type of memory being investigated (see Bäckman, Small & Wahlin, 2001). It is possible that inhibitory processes may operate in a similar fashion and that further progress can be made toward the understanding of attentional processes if we consider each aspect separately.

While the results of this study are promising, there are a few concerns that merit consideration. One relates to the inability to find more consistent differences in recall scores across relevance and age groups. The null findings may be partially due to poor memory on the part of older adults in general and the fact that the overall recall scores

were particularly low. However, the fact that robust differences in recall across relevant passages in the younger adult group were found is encouraging and merits further investigation.

An additional concern that might be raised in interpreting the results of this study involves counterbalancing of the distractor lists. In the present study, the set of distractor words embedded in the passages covaried with the relevance of the passages. In order to assure that differences in performance associated with the distracting material was not an artifact of some unique characteristic of the words used in list A as opposed to list B, it would have been beneficial to systematically alternate the distractor lists across relevant passages. However, other controls used in constructing these lists (i.e., equating items in each list for word length, valence, part of speech) make this issue less salient. Furthermore, no systematic effects in favor of either list were observed. If one set of distractor terms was having an undue impact on performance, this should have been apparent as a systematic bias in performance across lists (e.g., relative to the YR passages, all groups would have read the OR passages faster, and performed better on the comprehension questions and remembered fewer distractors from these same passages). Thus it is argued that the lack of counterbalancing did not influence the results in any way.

In general, the results of this study suggest that the nature of inhibitory functioning in older adults is quite complex and that older adults are not necessarily deficient in all aspects of controlled processing. Furthermore, the results suggest that motivational factors may also play an important role in influencing controlled

processing mechanisms among older adults and these factors should be investigated in future research. Findings such as these argue for a more complex characterization of adult age differences in cognitive performance which takes into account a variety of factors beyond those associated with biologically based decremental processes.

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Appendix A: Experimental Passages

Cost Cutting Measures Underway at NC State University

Cost-cutting measures square *are underway* table *at NC* city *State as a result of a projected* vehicle *state budget deficit of* horse *at least $1.5 billion.* person *The hiring and spending* family *freeze for all state* moment *agencies, put* plant *into effect May 2 by Gov.*city *Mike Easley for the* street *remainder of the* theory *fiscal year, restricted all* earth *state-funded,* square *non-instructional* window *hiring, pay raises, travel,* person *and* music *spending except for* ship *mandatory obligations.* table *The impact has* city *been felt all across* home *campus. Cost cutting* moment *measures directly affecting* vehicle *students include* plant *a halt in all admissions* horse *for out-of-state* street *and international graduate* window *students. In* home *addition, the* family *NCSU libraries have* theory *reduced hours of* earth *operation, and stopped the purchase* person *of all new books* ship *for the rest of the* music *fiscal year.* horse *Work-study* square *students whose* vehicle *financial aide ended* window *with the spring semester* home *were also not allowed* plant *to continue working* table *through the summer* theory *as temporary employees* vehicle *since they would* ship *be considered* street *new hires for the* earth *state and have* moment *to be paid* family *with state money.*

Continuing Care Retirement Communities

Continuing power *Care Retirement* opinion *Communities (CCRC),* village *sometimes called* chair *life care communities,* month *offer several housing* tree *options and* poetry *services, depending* dream *upon the needs of the* girl *resident. Having* friend *several facilities on* doctor *the same grounds,* opinion *they accommodate* chair *older people who* paper *are relatively active,* tree *as well as those who* money *have serious* village *physical and mental* dream *disabilities. While CCRC's* girl *are usually very* money *expensive,* opinion *many guarantee* book *their residents lifetime* poetry *shelter and care. To some,* history *the appeal of a Continuing* month *Care Retirement Community* friend *is that entering one* chair *is usually a once* door *in a life time choice.* history *CCRCs may* girl *require residents* month *to sign a long term contract* paper *which details the* tree *housing and care obligations* poetry *of the CCRC as well* doctor *as its* dream *costs. Most CCRC's offer a* door *full continuum of* power *care so residents* book *can move from one* power *housing choice* friend *to another as* money *need determines. The* village *costs of living in these* paper *communities can be quite* history *high and unaffordable to those* door *with low or moderate* book *incomes and assets* doctor.

Depression Among College Students Rising

College students square *are the* table *focus of negative headlines* city *about everything* horse *from binge drinking to* moment *campus crime. Now a new* person *concern may* plant *dwarf the earlier* ship *crises: an alarming* street *increase in cases of* theory *mental illness on* vehicle *college campuses. North* window *America's college counseling centers* earth *reported an increase in* home *troubled students, according* music *to psychologist Robert* family *Gallagher of the* square *University of* table *Pittsburgh. His* city *2001 survey of* horse *counseling centers* moment *shows* person *that 85% of* plant *colleges reported an increase* ship *during the past five* street *years in students with severe* theory *psychological problems. A* vehicle *study from the* window *American College Health* earth *Association in* home *2000 said 10% of* music *college students* family *have been diagnosed with* square *depression. The* horse *National Institute of* earth *Mental Health (NIMH) lists several common stressors that* table *are part of a normal* city *college life,* moment *including* person *greater academic* ship *demands, new* plant *financial responsibilities,* street *changes in social life,* theory *exposure to new* vehicle *people, ideas* window *and temptations, greater* family *awareness of sexual identity* home *issues, and anxiety* music *about life after graduation.*

BLS Releases 2000-2010 Employment Projections

Projections for the home *American workforce covering* vehicle *2000-2010 were* vehicle *issued by the Bureau* plant *of Labor Statistics (BLS), U.S.* music *Department* table *of Labor,* street *providing information on* square *where* person *future job growth is expected by* horse *industry and occupation* family *and the likely composition* earth *of the* moment *work force pursuing* theory *these jobs. Over the 2000-2010 periods,* street *total employment is* city *projected to increase* square *by 15 percent, slightly less* moment *than the 17 percent growth* window *during the previous decade.* plant *The service-producing* city *sector will* ship *continue to be the dominant* home *employment generator in* table *the economy, adding* person *20.5 million* family *jobs by 2010. Within the* music *goods-producing sector,* theory *construction and* earth *durable manufacturing* vehicle *will contribute* horse *relatively modest employment* street *gains. While there* ship *have been* square *numerous immediate economic* window *impacts of this tragedy,* person *the nature and severity of* music *longer-term impacts* home *remain unclear. BLS* ship *will continue to review* table *its projections and,* city *as the long-term consequences* plant *of September 11* horse *become clearer, will* family *incorporate* moment *these effects in* earth *subsequent analysis of* window *industrial and occupational* theory *outlook.*

Get Ready for New Wrinkles in Long-Term Care Insurance

Americans opinion *worried about how* chair *to pay for the medical* door *and personal care they'll* paper *need later in life* village *can expect to hear* book *some new ideas* dream *next year on how long-term* tree *care insurance* money *might be made* money *more available and* girl *affordable. New ideas, experts say,* history *are needed in an* power *industry whose products* doctor *over the years* poetry *have tended to* opinion *be extremely expensive* book *and sometimes so* chair *complicated that* door *an average person* history *can't understand* month *them. Another obstacle hindering* paper *its appeal to consumers:* tree *the mistaken belief among* village *large numbers of Americans* poetry *that Medicare covers* dream *nursing home and in-home* girl *medical expenses.* money *Medicare doesn't cover* friend *these expenses on a* doctor *long-term basis.* opinion *Because of these and* power *other woes,* chair *only 6 million policies* book *were sold during the 1990's,* tree *reports LIMRA International,* friend *an industry research organization.* poetry *Congress next year* door *may consider* village *a bipartisan* history *measure that would establish a* month *$3000 credit toward* paper *caregiving expenses,* dream *plus a deduction* doctor *for long-term insurance* power *premiums.*

States Find Ways to Aid Older Drivers

Drivers over friend *age 70 number* doctor *about 18 million today.* power *As the number of older* opinion *Americans soars, some* chair *states are moving aggressively* history *to improve driving conditions* month *on the nation's* book *roads and help older* paper *motorists maintain* tree *their driving skills. "While* dream *older adults are involved in fewer* door *accidents than younger* poetry *drivers because* girl *they drive* village *less frequently, individuals* money *over 65 years of* friend *age are the most likely to* doctor *die in car* book *wrecks", says National* chair *Highway Traffic Safety* history *Administration official John* month *Eberhard. He also adds* tree*, "Traffic fatalities* poetry *involving older* power *drivers could triple* girl *by 2030". Such statistics* friend *have prompted several studies* door *of how aging might* chair *affect driving ability.* doctor *In response to* tree *this growing concern,* book *many states including* paper *Arizona, California, Florida,* month *Maryland,Michigan,* girl *Oregon and* dream *Pennsylvania,* poetry *are taking a hard look* money *at various approaches* dream *to reducing fatality* village *risks for older drivers,* paper *including better* history *medical screening* door *of older drivers and* opinion *installing more* money *left turn signals* power.

Parking Changes Take Effect In August

The Board of square *Trustees has* table *approved changes to the* moment *parking system for the 2001-02* family *academic year. These* earth *changes are currently* street *in effect, and* music *include a fee increase* window *of 5% which* person *was approved by* theory *the trustees* square *last year.* plant *In addition, other construction* home *projects are going to have* city *a significant impact upon* horse *student parking* ship *on this* plant *campus including* theory *the temporary loss of* moment *155 parking spaces* music *on north campus. The lost* horse *spaces are to* earth *be re-allocated* vehicle *to the Dan Allen and Coliseum* city *decks where* window *parking is already* person *difficult for students. The* home *design and use of* moment *the parking system greatly* family *impacts traffic* square *volume and* street *patterns on campus. NC State* theory *Transportation officials* ship *said the approved changes* table *in the parking system* city *will* horse *enable* vehicle *better management* table *of the* street *system, more effective* person *allocation of permits* vehicle *and a system* plant *that is more user-friendly.* home *The university's master plan,* earth *envisions a campus with* window *reduced vehicular* music *traffic and* family *being friendlier to* ship *pedestrians.*

Increasing the Age of Eligibility for Social Security and Medicare

The normal age door *of retirement (NAR) is* month *scheduled to increase* village *under current* dream *law to age 67,* poetry *and there are multiple proposals* paper *being considered to* history *increase it to age* tree *70. The Medicare Eligibility Age* dream *(MEA) is not* chair *scheduled to increase,* book *but proposals to raise* opinion *it in step with the NAR were* doctor *recently considered by the* dream *National Bipartisan Commission* money *on the Future of Medicare* friend . *An* power *increase in the NAR* doctor *and MEA would have* girl *significant impacts* book *on social Security* village *beneficiaries, Medicare-eligible,* tree *and employment. These* poetry *increases would reduce* girl *the number* money *of people who* paper *receive full Social Security* month *benefits and who are* opinion *covered by Medicare. Some* chair *beneficiaries* village *however, will* door *retain both their Social* history *Security benefits and Medicare* friend *eligibility by meeting* girl *the qualifications for* money *Social Security Disability* dream *Insurance.* village *Others could turn* poetry *to early retirement benefits* paper *or private pension* tree *benefits, but be* history *ineligible for Medicare* month *until they reach* chair *the MEA. Still,* door *others may have to* book *stay in the labor* doctor *market longer than* opinion *they would have* power *under the current policy.*

Tuition Up: Academia Downsized

When the 170,000 square *registered students* family *arrived at UNC* table *campuses this month,* city *they found* horse *unwelcome changes along with* moment *their higher* music *tuition bills: more* person *crowded classrooms, cancelled* plant *courses and* ship *fewer* street *instructors. Student's* theory *say they dreaded larger classes and fewer* home *academic choices. The impact* street *of cuts varies* vehicle *by academic* ship *department. For example, science* vehicle *departments* horse *operate with more* window *grant money* earth *and can delay* home *purchases to save* music *money. In contrast, the* family *humanities are* moment *generally hit hardest, and adjunct* person *faculty are the most vulnerable because* family *tenured* theory *professors cannot be fired.* moment *NCSU's College of Humanities* vehicle *has eliminated 60* ship *course sections for this academic year. The* city *crowded classes and* plant *shortage of faculty come as* earth *baby boomlet students are* window *enrolling in record* horse *numbers. Ironically,* square *the universities in the* table *UNC system are in the* city *biggest construction* horse *boom in* music *history, spending $2.5* table *billion approved in the 2000* square *higher-education* plant *bond referendum. Now* person *students* earth *wonder whether* street *universities can provide services* window *to match the modern* home *facilities.*

Drunk Driving

College ship *students are supposed* square *to be the cream* table *of the crop, America's brightest,* city *the future's doctors,* horse *lawyers and Web* earth *designers* moment. *According* person *to a study conducted by* plant *H. Wechsler in the Journal of the* ship *American Medical Association* street *in 1994, college* home *students* theory *are also the nation's* vehicle *heaviest drinkers. Over 50%* window *of college* horse *students who reported* earth *that they were* home *frequent binge drinkers* music *also reported that* square *they had driven* city *drunk at least* street *once in the last month.* window *College students* square *driving drunk are* table *twice as likely to* moment *be involved in* person *a fatal accident* plant *as adults 21 and older. For* family *all drivers, each 0.02 increase in* ship *BAC [Blood Alcohol Content]* street *nearly doubles* theory *the risk of being in* vehicle *a fatal crash. For* horse *drivers ages 16-20, the* earth *risk of a fatal crash* city *increases* home *even* table *more with* window *each 0.02 percent* music *rise in BAC." In order* moment *to encourage responsible* person *drinking, NCSU* family *provides extended* square *hours on the* vehicle *free Wolfline shuttle* theory *which runs until 2 a.m.* music *during the* plant *weekends.*

The Rising Cost of Health Care

The cost of music *health care which* chair *had stabilized in the* village *mid 1990 s* music *with the advent of* door *managed care, is climbing* dream *rapidly again, putting new* opinion *strains on employers, workers* poetry *and government* tree *health programs. The* girl *soaring costs are driven,* village *in part,* paper *by the biomedical* chair *revolution of the* music *past decade which has produced* tree *an array of* paper *expensive new* door *treatments for an aging* girl *population, from drugs to* chair *fight osteoporosis to* poetry *high-tech heart pumps. What results is* opinion *a health care system filled with* music *great promise and* girl *inequity,* opinion *symbolized by wonder drugs* dream *that many* paper *of the elderly can barely* dream *afford. If the cost of* tree *coverage keeps rising,* girl *even more* music *Americans will join the* door *ranks of the uninsured* village *because they will be* chair *priced out of the* paper *market. Politicians in* door *both parties are* opinion *beginning to* tree *respond, but they are* poetry *profoundly divided on* chair *the issue, a reality* dream *underscored recently by the* door *Senate s inability* poetry *to pass a* paper *prescription drug* village *benefit for* tree *Medicare.*

51 Top Scientists Blast Anti-Aging Idea

In one of history *the strongest attacks yet* chair *leveled against* poetry *anti-aging medicines, 51 top* doctor *scientists are warning* power *consumers that such* book *remedies don t work* tree *and may be dangerous. Anyone who claims* door *that they can* money *stop or reverse* girl *the aging process is lying to* history *you-even if* month *they are a doctor. It is not* poetry *currently possible, says S. Jay* friend *Olshansky, a demographer at the University* opinion *of Illinois at Chicago. No one knows* money *how many Americans* village *buy remedies like* tree *youth hormone* girl *treatments, megavitamin* opinion *cocktails, herbal elixirs and the* power *like. But* money *experts say it s a* dream *multibillion dollar* village *industry that s* history *exploding. Longevity* dream *clinics, some charging $2,000 a* month *visit, are* paper *popping up around* chair *the country. Anti-aging* door *entrepreneurs also* doctor *hawk their wares on television* book *infomercials, in direct mail* opinion *solicitations* door *and on more* girl *than a thousand* money *websites. Olshansky and* book *other internationally* month *recognized scientists* poetry *on aging refute* power *practitioners claims of miracle* doctor *treatments and* door *caution the public* friend *that some* chair *untested substances* dream *may be harmful.*

Appendix B: Comprehension Questions

Drunk Driving

A study reported by the _____ revealed that college students are the nation s heaviest drinkers.

a) American Psychological Association
b) American Medical Association
c) National Institute of Health
d) American Drug Administration

College students driving drunk are _____ to be involved in an accident as adults over 21.

a) just as likely
b) twice as likely
c) three times more likely
d) less likely

For all drivers, each _____ increase in Blood Alcohol Content nearly doubles the risk of being in a fatal crash.

a) .02
b) .03
c) .04
d) .05

What percentage of college student reported that they were frequent binge drinkers?

a) 40%
b) 50%
c) 55%
d) 60%

Employment Projections

The employment projections reported cover the years between _____.

a) 2000-2020
b) 2000-2010
c) 2000-2005
d) 2000-2015

Total employment is expected to increase by _____.

a) 15%
b) 17%
c) 19%
d) 21%

Employment projections are presented by _____.

a) Industry
b) Occupation
c) Industry and Occupation
d) Sector and Occupation

The impact of Sept 11th on employment projections is _____.

a) already included in the current projections
b) expected to be severe
c) unclear at this point
d) not considered in this passage

Budget Cuts

The state budget deficit is projected to be _____.

a) At least 1.0 billion
b) At least 1.5 billion
c) At least 2.5 billion
d) At least 3.0 billion

Work study students whose financial aid ended in the spring _____.

a) Were compensated by the state for the summer, but not re-hired
b) Continued to work as temporary employees during the summer
c) Were terminated at the end of the semester
d) Resumed their positions this fall semester

Cutbacks have affected the library in many ways EXCEPT _____.

a) Reduction in library personnel
b) Reduced hours of operation
c) Freeze on book purchases
d) Elimination of security staff

The hiring and spending freeze was put into effect _____.

a) March 1st
b) May 2nd
c) May 15th
d) June 1st

Tuition Up: Academia Downsized

Which academic departments are hit hardest by budget cuts?

a) Social Sciences
b) Humanities
c) Physical Sciences
d) Agricultural Sciences

Academic departments least impacted by budget cuts are shielded by _____.

a) Flexibility
b) Ability to attract private donations
c) Enrolling fewer students
d) Having larger class sizes

The reductions in course sections and faculty are in direct contrast to _____.

a) Increased spending on construction
b) Increases in student enrollment
c) Increases in library purchases
d) Increases in financial aid spending

How much money was approved for spending in the higher-education bond referendum?

a) 2.0 billion
b) 2.5 billion
c) 3.0 billion
d) 3.5 billion

Parking Changes

According to the passage, there was a ____ increase in fees for parking permits.

a) 3%
b) 5%
c) 7%
d) 10%

The current construction project is temporarily taking away 155 parking spaces from which NCSU campus?

a) Centennial
b) West
c) Central
d) North

Transportation officials want these changes to result in all of the following EXCEPT _____.

a) Better management of the system
b) More effective allocation of permits
c) More parking spaces
d) More user-friendly system

The university s master plan envisions a(n) _____.

a) Increase in vehicular traffic
b) More pedestrian friendly campus
c) More biker friendly campus
d) Increase in the Wolfline s capacity

Depression Among College Students Rising

A survey shows that _____ of colleges reported an increase in students with severe psychological problems.

a) 70%
b) 75%
c) 80%
d) 85%

The National Institute of Mental Health web-site pays special attention to college students and _____.

a) their unique adjustment problems
b) alternative healing
c) mental illness
d) physical wellbeing

The National Institute of Mental Health site also highlights a few of the common _____ that are part of a normal college life.

a) attitudes
b) changes
c) temptations
d) stressors

What percentage of college students was diagnosed with depression in the American College Health Association study?

a) 5%
b) 10%
c) 15%
d) 20%

States Find Ways to Aid Older Drivers

John Eberhard from the National Highway Traffic Safety Administration predicts the number of traffic fatalities involving older drivers will _____ by 2030.

a) Be reduced to half of the current rate
b) Remain unchanged
c) Double
d) Triple

About how many drivers over age 70 are there today?

a) 1.8 million
b) 2.8 million
c) 16 million
d) 18 million

Older adults are involved in _____.

a) Fewer accidents than other drivers
b) Approximately the same number of accidents as other drivers
c) More accidents than other drivers
d) Fewer accidents than middle aged adults

Which of these states is taking a closer look at the new approaches?

a) Arizona
b) Colorado
c) Connecticut
d) Illinois

Increasing Age of Eligibility

The retirement age for social security is scheduled to increase _____.

a) From 65 to 70
b) From 65 to 67
c) From 65 to 75
d) From 65 to 72

Proposals currently exist that would _____Medicare eligibility age.

a) Increase the current
b) Maintain the current
c) Decrease the current
d) Eliminate the minimum

Implementing age increases for Social Security and Medicare would have all of the following effects EXCEPT_____.

a) Force people to stay in the work force longer.
b) Reduce the number of people who can receive full benefits
c) Reduce the number of people eligible for Medicare coverage.
d) Reduce the amount of people receiving pensions.

NAR stands for _____.

a) National Age of Retirement
b) Normal Age of Retirement
c) New Age of Retirement
d) North American Age of Retirement

Rising Cost of Health Care

What is contributing to the increasing costs of health care?

a) Biomedical advances
b) Advent of HMO s
c) Lack of FDA regulations
d) Unemployment rate

What helped to stabilize health care costs in the mid 1990 s?

a) Advent of managed care
b) Secure economy
c) Opening of free clinics
d) Bipartisan agreement

The increasing cost of health care is putting a strain on all of the above EXCEPT_____.

a) Employers
b) Employees
c) Government health programs
d) HMO s

Presently, politicians in both parties are unable to come to agreement about _____.

a) Adding prescription drug benefits to Medicare
b) Placing restrictions on HMO s
c) How to keep health care affordable
d) Developing a national health plan

Anti-Aging

Which of the following products is NOT considered an anti-aging product?

a) Hormone treatments
b) Vitamin cocktails
c) Herbal elixirs
d) Massage therapy

Top scientists are warning consumers that_____.

a) Anti-aging remedies are not effective.
b) Anti-aging research doesn t exist.
c) Anti-aging remedies can cause heart attacks.
d) Untested remedies can be harmful.

The report states that anyone who claims that they can stop the aging process is lying _____.

a) Unless they are a Doctor
b) Even if they are a Doctor
c) Especially if they are a Doctor
d) Is not a licensed Doctor

Anti-aging drugs are solicited using all of the following methods EXCEPT_____.

a) direct mail
b) on web sites
c) on television
d) through telemarketing

Continuing Care

Continuing Care Communities are designed to accommodate _____.

a) Active adults only
b) Adults with mental disabilities
c) Adults with physical disabilities.
d) Both active adults and those with disabilities.

One advantage to continuing care communities is that _____.

a) They guarantee lifetime care
b) Are relatively affordable
c) Require minimal commitment on the residents part
d) Are available in most states

Most Continuing Care contracts include all of the following EXCEPT_____.

a) Housing and care obligations
b) Long-term commitment
c) Cost summary
d) Transfer restrictions

The major drawback listed regarding Continuing Care communities is _____.

a) They are not widely available
b) They are not flexible
c) They are very restrictive
d) They are very expensive

Long-Term Care Insurance

According to experts, why are new ideas needed in the insurance industry?

a) Current products are too complicated
b) Current products are too expensive
c) Current products are both too complicated and expensive
d) Current products are unavailable

Next year, Congress is considering which measure to assist with care-giving expenses _____?

a) A $2000 credit towards care-giving expenses
b) A $3000 credit towards care-giving expenses
c) A 2% tax break for caregivers
d) A 3% tax break for caregivers

What is Medicare s current policy on long-term care coverage?

a) They currently cover long-term nursing home expenses
b) They currently cover long-term in-home medical expenses
c) Medicare does not cover any expenses on a long-term basis.
d) Medicare currently covers long-term care both in-home and in nursing homes.

How many policies were sold in the 1990 s?

a) 3 million
b) 4 million
c) 5 million
d) 6 million

Appendix C: Recognition Test

Recognition Test A

1. Table	YES	NO
2. Room	YES	NO
3. Horse	YES	NO
4. Square	YES	NO
5. Wall	YES	NO
6. Image	YES	NO
7. Person	YES	NO
8. Music	YES	NO
9. Office	YES	NO
10. Plant	YES	NO
11. Food	YES	NO
12. Truck	YES	NO
13. Nation	YES	NO
14. Ship	YES	NO
15. Song	YES	NO
16. Home	YES	NO
17. Corner	YES	NO
18. Bank	YES	NO

19. Street	YES	NO
20. Theory	YES	NO
21. Light	YES	NO
22. Idea	YES	NO
23. Vehicle	YES	NO
24. Land	YES	NO
25. City	YES	NO
26. Group	YES	NO
27. Window	YES	NO
28. Earth	YES	NO
29. Tooth	YES	NO
30. Moment	YES	NO
31. Heart	YES	NO
32. Family	YES	NO

Recognition Test B

1.	Power	YES	NO
2.	Lady	YES	NO
3.	Ground	YES	NO
4.	Train	YES	NO
5.	Friend	YES	NO
6.	Money	YES	NO
7.	Foot	YES	NO
8.	Hour	YES	NO
9.	Girl	YES	NO
10.	Dream	YES	NO
11.	Judge	YES	NO
12.	Rain	YES	NO
13.	Poetry	YES	NO
14.	Village	YES	NO
15.	Tree	YES	NO
16.	Result	YES	NO
17.	Paper	YES	NO
18.	Chair	YES	NO
19.	Glass	YES	NO
20.	Mind	YES	NO
21.	History	YES	NO

22.	Valley	YES	NO
23.	Month	YES	NO
24.	Cost	YES	NO
25.	Body	YES	NO
26.	Door	YES	NO
27.	Book	YES	NO
28.	Opinion	YES	NO
29.	Island	YES	NO
30.	Court	YES	NO
31.	Doctor	YES	NO
32.	Party	YES	NO

Appendix D: Instructions and Informed Consent

Instructions
Relevance Study Fall 2002

You will be reading a series of passages out loud. We are interested in knowing how well people can ignore distracting information while reading. There will be words printed in both standard as well as italic font. Read the words in italic font only, and ignore the other font (that is do not read the upright font). After each story, you will be asked to answer a set of four questions about that story. Therefore, it is important that you read at a speed that will allow you to understand and remember what you have read. We ask that you do not use your fingers as a marker during reading. Begin by reading the title at the top of the page.

Give participant the practice passage first. (Correct them if necessary)
After the participant has read the practice passage, and understands the procedure, begin study protocol.

1)Place first passage face down in front of the participant, and cue the participant to turn the page over.

Discreetly time the reading of the passage, and record on data sheet.

Immediately after the participant has finished reading, ***take passage away from the participant** and have them complete:

2) Manipulation check scale

3) Reading comprehension measure.

Repeat STEPS 1-3 for all remaining passages

Once all passages have been read,

4) Administer the Vocabulary test

5) Have participants complete background questionnaire and SF-36

6) Debrief Participant (The purpose of this study is to see whether the degree of personal relevance can influence levels of task engagement or cognitive effort expended on a task. We wanted to see whether you would be better at ignoring the distractors in the passages that you rated as having high personal relevance than on the ones you rated as having low personal relevance.

7) Pay participant and thank them for coming in.

Materials

Stop Watch
Data Sheet (1)
Practice Passage (1)
Baseline Passages (2)
Relevant Passages (12)
Relevance Scales (12)
Reading Comprehension (12)
Recall Test (1)
Recognition Test A (1)
Recognition Test B (1)
Vocabulary
Background
SF-36

North Carolina State University
INFORMED CONSENT FORM

Selective Attention

Principle Investigator: Cassandra M. Germain Faculty Sponsor: Thomas M. Hess

You are invited to participate in a research study. The purpose of this study is to investigate people s ability to focus attention in the presence of distracting information.

You will be reading a series of passages aloud that contain distracting material. Then you will be asked to complete four reading comprehension questions after each passage to ensure that you understood what you have read. You will also be asked to complete additional questionnaires designed to measure general health and basic verbal ability. This study should take approximately 60 minutes to complete.

For participating in this study you will receive $10.00 for each hour of participation. If you withdraw from the study prior to its completion, you will still receive full compensation

There are no known risks involved with this study. The benefit we anticipate to achieve is to further our knowledge of those factors that may enhance or inhibit your ability to focus your attention.

CONFIDENTIALITY
The information in the study records will be kept strictly confidential. Data will be stored securely and will be made available only to persons conducting the study unless you specifically give permission in writing to do otherwise. No reference will be made in oral or written reports which could link you to the study.

CONTACT
If you have any questions at any time about the study or the procedures, you may contact the researcher, Thomas M. Hess, at Box 7801, NCSU Campus, or 515-1729. If you feel you have not been treated according to the descriptions in this form, or your rights as a participant in research have been violated during the course of this project, you may contact Dr. Gary A. Mirka, Chair of the NCSU IRB for the Use of Human Subjects in Research Committee, Box 7906, NCSU Campus.

PARTICIPATION
Your participation in this study is voluntary; you may decline to participate without penalty. If you decide to participate, you may withdraw from the study at any time without penalty and without loss of benefits to which you are otherwise entitled. If you withdraw from the study before data collection is completed your data will be returned to you or destroyed.

CONSENT
I have read and understand the above information. I have received a copy of this form. I agree to participate in this study.

Subject's signature_____ Date_____
Investigator's signature_____Date _____

North Carolina State University
INFORMED CONSENT FORM

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Principle Investigator: Cassandra M. Germain *Faculty Sponsor: Thomas M. Hess*

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There are no known risks involved with this study. The benefit we anticipate to achieve is to further our knowledge of those factors that may enhance or inhibit your ability to focus your attention.

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CONSENT
I have read and understand the above information. I have received a copy of this form. I agree to participate in this study.

*Subject's signature*_____ *Date*_____

*Investigator's signature*_____*Date* _____