Qualitative measures of prose recall in young and older women

Susan F. Achuff

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QUALITATIVE MEASURES OF PROSE RECALL
IN YOUNG AND OLDER WOMEN

A Thesis
Presented to the
Faculty of
California State University
San Bernardino

by
Susan F. Achuff

Approved by:

Chairperson

Date
QUALITATIVE MEASURES OF PROSE RECALL
IN YOUNG AND OLDER WOMEN

A Thesis
Presented to the
Faculty of
California State University
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In Partial Fulfillment of
the Requirements for the Degree
Master of Science
in
Psychology

Susan F. Achuff
October, 1985
ABSTRACT

Qualitative differences in memory between younger and older women were examined. Eighteen women 18-28 years old and 18 women 68-78 years old participated in this study which utilized both objective measures of memory and prose recall tasks. In half-hour individual interviews, participants were given the Digit Span and Vocabulary subtests of the Wechsler Adult Intelligence Scale, and were then asked to read three different stories. After each story, participants were asked to verbally recount what they had read. Audiotapes of these verbal accounts were made, transcribed and given to two undergraduate raters who analyzed them for number of facts, number and type of errors, and number and type of intrusions. Results showed that although the younger group recalled significantly more facts than the older group, the two groups did not differ in numbers of errors made. The older group made significantly more of one type of intrusion (intrusions reflecting personal history) than did the younger group. The raters were able
to guess the age group to which a significant number of the transcriptions belonged, further indicating the presence of qualitative differences between the groups. Informal personal observations made by the participants about memory changes with increasing age are included.
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INTRODUCTION

Overview

Many studies comparing memory in older and younger adults have concluded that cognitive processes decline with age. However, little attention has been given to the reasons for such decline or the possibility of compensating advantages which accompany old age. The present study examines memory differences from a new perspective in the hope of better understanding the aging process.

The number of persons over the age of 65 is ever increasing in the United States. In 1981, people over 65 comprised 11.4% of the total population. The projection for the year 2000 is that this age group will represent at least 13.1% of the population, growing steadily to an estimated 21.7% in the year 2050 (U.S. Census Current Population Report, 1982). This predicted demographic change differs from the current youth-crazed Western culture. The elderly are still viewed with an attitude of disdain by many people, and jokes regarding feeblemindedness as an inevitable consequence of age are the norm. The aging trend
in the United States has been noted for many years and has led to an increasing number of studies about aging.

Research on aging and memory. Unfortunately, many results of recent research support society's stereotypical concept of the elderly person. Research has consistently shown that elderly individuals suffer from a decline in such memory capacities as long-term memory, retrieval of information (especially when using free recall), the ability to utilize encoding strategies, and the ability to make inferences from newly presented information (Craik, 1977; Davis & Friedrich, 1982-83; Light, Zelinski, and Moore, 1982). Light et al. (1982) suggested that older adults have a poorer memory for facts and a reduced capacity of working memory than younger people, thus decreasing their ability to reason from new information. However, the degree to which various memory capacities deteriorate seems uncertain. Matlin (1983) reports that short-term memory shows little change as people grow older, while long-term memory becomes less accurate. Gordon and Clark (1974) illustrated this in a study which showed that younger people were only somewhat more accurate than older people in
immediate recall of prose, but were significantly more accurate than the older group in delayed recall. On closer examination, it appears that elderly people are better able to recall when there are cues, such as in recognition tasks, and that their free recall memory abilities decline much more in comparison to younger individuals (Schonfield, 1965). Matlin (1983) concludes that sensory memory, short-term memory, recognition memory, and semantic memory show little decline with age, but that long-term memory that is measured by free recall (rather than recognition) and is episodic in nature is substantially worse in older people. This conclusion is in accord with the selective deficit hypothesis which supposes that certain faculties decline at different rates than others.

Other research, however, casts doubt on some of these findings. Parkinson, Lindholm, and Inman (1982) found age differences in both primary and secondary memory for immediate recall tasks, as reflected by serial position analyses. This contradicts the selective deficit hypothesis and indicates a more involved decline in memory capacity.

In fact, the entire concept of separate memory systems is confusing and seems overly simplified.
Episodic memory refers to personal variables associated with the acquisition of individualized pieces of information and the temporal aspects of events; semantic memory involves organized knowledge about words and their meanings and relationships and rules for the manipulation of these words and concepts (Tulving, 1972). Despite the initial acceptance of Tulving's concept of two separate memory systems, it appears that it may be unfeasible to categorize memories into "episodic" or "semantic" at all. Memories may have both episodic and semantic qualities. Lockhart, Craik, and Jacoby (1976) suggested that all semantic memories are composed of a series of episodic memories. Reed (1979) pointed out that all newly acquired information is episodic in nature.

Recently, Tulving (1985) proposed a new classification scheme of the memory system which is composed of three subsystems. This system described by Tulving is monohierarchical with a "procedural" memory at the lowest level, "semantic" memory on the next level, and "episodic" memory at the highest level. The subsystems are interrelated so that "procedural" memory can operate completely independently of the other two, "semantic" memory can function independently of "episodic" but not of "pro-
cedral", and "episodic" memory depends on both "procedural" and "semantic" subsystems in its functioning. Each subsystem differs, however, in its methods of acquisition, representation, expression of knowledge, and the kind of conscious awareness that characterizes its operation. A further description of this latest theoretical model is not necessary to the present study, but an acknowledgement of the increased complexity of the model seems appropriate.

Another example of research on memory decline involves metamemory, or the knowledge and awareness of one's memory. Schonfield and Stones (1979) found that fulfillment of delayed command becomes less efficient with age. That is, mentally telling oneself to remember something is not as efficient a memory strategy in old age as it is in younger years.

Causes of memory decline. Attempts have been made to find causes for declining memory capacity. Schonfield and Stones (1979) suggested overloading of cues as a cause for age-associated retrieval problems, and cite evidence that newly stored associations are more likely to weaken or become de-differentiated with increasing age. Overloaded cues and sheer numbers of memories could obstruct pathways
to the desired target, thus encumbering retrieval but not encoding. However, Craik and Simon (1980) hypothesized that elderly people simply do not process information deeply and cannot discriminate the stimulus from other memories. Therefore, both encoding and retrieval are suggested to be at fault.

Williams, Denney, and Schadler (1983) found that the elderly themselves could think of many causes for their declining memories, such as: lower activity levels; reduced usage of memorization skills; lack of contact with information to be remembered; not remembering things which are not meaningful to them; use of forgetting as an excuse; and the actual expectation of a decline in memory. An interesting implication of these suggestions about memory decline is that these elderly people did not seem to view mental deterioration as an inevitability of growing old. The causes that were named were certainly not irreversible.

Some researchers have also decided that some apparent memory decline can be overcome through retraining, and see great merit in this area of work. Schonfield and Stones (1979) described properly functioning immediate recall as an inestimable
advantage to the individual since it "permits the aging organism to remain alerted to change in its immediate surroundings and also provides the basic building block for fresh learning" (p. 134). They went on to say that "better learning produces better recall and recognition," and suggested the following methods for improving acquisition (p. 134): over-learning, imagery, deeper processing, progressive part-learning, discovery method (Belbin, 1969), or slower pacing (Arenberg, 1967). Each of these methods, however, has had limited success. Others have tried more radical approaches to improve acquisition, including an experiment with hyperoxygenation which proved to have no practical use (Jacobs, Winter, Alvis, and Small, 1969).

Craik and his colleagues (Craik and Simon, 1980; and Craik and Byrd, 1982) have emphasized the inadequacy of re-training by merely teaching encoding strategies. They assert that age differences in memory function decrease only when both encoding and retrieval are corrected, producing "deeper" processing.

The quantitative measure. The vast body of research on aging and memory carries a negative implication about aging—the inevitability of a deteriorated mental capacity. It would seem that
part of the reason for this negative outlook is the emphasis on quantitative memory process. The unit of measurement typically used in memory studies is amount of recall (Craik, 1977). Baltes, Reese, and Lipsitt (1980) pointed out that most experiments on memory involve deliberate memorization, and that elderly people are seldom required to memorize material in their everyday lives. As stated earlier, elderly people themselves cited this as a possible cause for the apparent decline in their memory capacities (Williams, Denney, and Schadler, 1983). While qualitative aspects of memory are difficult to measure, this perspective may prove to be a more positive and useful avenue toward understanding memory as a function of age. For instance, the literature which reveals that information which is considered by the elderly individual to be meaningful will be more readily remembered, shows that there is more than simple processing at work (Williams, et al., 1983).

Hartley (1984) found an interaction of age and familiarity in processing information—regardless of the rate at which subjects read the material, older subjects (especially those over 75 years old) had much more difficulty processing unfamiliar information
than familiar. Perhaps the memory changes in older people which surface in testing reflect differences in cognitive processes rather than deficit (Baltes, Reese, and Lipsitt, 1980). Deficits may only be relative to youth-oriented measuring devices. For instance, Lorge (1936) showed that a test specifically designed for older people would make younger subjects appear to have inferior cognitive skills.

Views on adulthood development. The three main views on the nature of cognitive development throughout and after maturity are somewhat bleak: 1) stability as when one reaches formal operations; 2) decrement accompanying biological breakdown; and 3) decrement with compensation (Schaie, 1973; Schaie & Gribben, 1975). However, the criteria for measuring cognitive development provide only a simplistic evaluation of these processes. Labouvie-Vief (1977) advocated composing a more complex, interactive conceptualization of this process which considers the factors influencing variability in intellectual functioning. Craik and Simon (1980) also advocated a more interactive conceptualization which reflects how previous learning in the form of expectations interacts with current sensory input.

Role of the elderly in society. In an attempt
to escape the negative, fatalistic attitudes of much of society toward the elderly, Mergler and Godstein (1983) postulated that the physiological and cognitive changes which occur in aged persons can be understood as an adaptive stage of development. They view the elderly as "transmitters of information," a role consistent with the role of aged persons in primitive societies. Simmons (1946) stated that a "popular and very common function of the aged in primitive societies is storytelling, a past-time that serves a three-fold purpose of entertainment, instruction, and admonition." He goes on to point out that "among preliterate people memory is the only repository of knowledge, skills, and rituals," and that the old men and women who possess these memories are in great demand (p. 80).

**Societal and individual benefits of memories.**
Currently, such recounting of memories is labeled "reminiscence," "individual or shared," "episodic or semantic" memory. Although it is accepted that elderly people reminisce, not much attention has been accorded these thoughts and remembrances. Job (1983) sees many uses for such life review memories, not the least of which is obtaining "experiential information about the social structures of a bygone world and the
socialization processes intended to reinforce them, which nevertheless made possible the acceleration of social change" (p. 374). In this way, elderly people's retrospective accounts can be viewed as valuable pieces of information for society, rather than as meaningless stories.

Some research has shown that reminiscence of episodic memories can be beneficial in therapy with elderly individuals. McMahon and Rhudick (1964) found that reminiscing is not directly related to intelligence or to intellectual deterioration, but is positively related to personal emotional survival, such as freedom from depression, preserving self-esteem, and reflecting upon an ideal personal image from the past. In fact, these authors believe that reminiscence is a contributing factor to successful adaptation to senescence. "The strategy of using reminiscence in therapy presupposes that there is in the elderly individual's long-term memory, a store of associations and recollections which form a part of that individual's conscious experience" (Fry, 1983, p. 16). Thus, reminiscence has relevance to a person's current psychological functioning. The process of reminiscence in therapy involves the ability of the client to elicit memory
of past events and integrate them into present experience (Fry, 1983). This integration might involve changing parts of the remembered event so that the memory itself would be inaccurate.

**Accuracy of memory.** A concern with regard to the study of reminiscence and memory is the accuracy of the memory involved. Accuracy of an individual's short-term memory, or for some shared semantic or shared episodic events can be observed directly from an individual's episodic memory. However, memories of past events that were personal in nature are virtually impossible to verify.

It may be argued that, for the sake of therapy in particular, accuracy of a memory is of less importance than an individualistic perception of an event. Regardless of one's position on this issue, the question remains: If long-term memory capacity declines with age, is it inevitable that individual, personally significant memories will also become inaccurate? This may be an impossible question to answer with certainty, but it does have bearing upon an elderly individual's credibility as a source of knowledge, and may contribute either positively or negatively to society's treatment of the elderly.

**Metamemory.** If reminiscence is related to one's
self-esteem, then credibility and respect are important issues. How do elderly persons regard the accuracy of their own memories? One metamemory component, delayed command, has already been shown to deteriorate with age (Schonfield & Stones, 1979). Bengston (1973) found that most elderly people anticipate reduced competence. Society as a whole de-emphasizes competence-related behavior and fosters increasing dependency, helplessness, and senility in the elderly (Bennett & Eckman, 1973). How this affects or reflects older people's perceptions of their memory performances or the actual memory functioning itself is unknown.

Hart (1965) described the "feeling of knowing" experience, and discovered that this phenomenon is a relatively accurate indicator of memory storage. In objective tests of memory, subjects can, by referring to their "feeling of knowing" experiences, "make accurate judgments about which items they will be able to remember and which they will not" (p. 215). Johnson and Raye (1981) found that the human memory system, though fallible, preserves information about the origin of a remembered piece of information remarkably well. Assuming that this is true, it would be reasonable to expect that confidence
ratings regarding the accuracy of a memory should be fairly consistent with actual performance when individuals are given memory tasks. How this reflects the performance of an elderly person, however, is unclear.

Factors leading to intrusions of memory. If, however, the elderly's memories are inaccurate, what is the nature of that inaccuracy? Recalling information erroneously could involve improper reporting of that information, or it could involve adding other ideas, stories, or knowledge to the original information. This latter phenomenon is known as an "intrusion," and seems to be quite a different matter than the incorrect reporting of facts. It may enhance or distract from the original information, but it evidently is of importance to the person who is remembering.

Schachtel (1982) describes the "conventionalization of the adult memory," by which past memories (especially childhood memories) are transformed from the actual memory into a schema of an experience. Childhood experiences change into socially expected, accepted memories which are easily integrated into an adult's categorized storage system. One example of this was the evidence that European men recalled
fewer details about their lives prior to age six than did women in interviews with a colleague (Schachtel, 1982). Schachtel hypothesized that this was due to the socialization of males and females in our society—that women are traditionally associated with children and that those things relating to childhood are important to them, whereas men are expected to value maturity and respect. If this is true, age and gender differences could be expected in any group of subjects when asked to recall childhood events, if not other types of memories. It also supports the evidence for the relevance of reminiscence to present functioning, since that which will be recalled will have been filtered by an adult's conventionalized memory.

Another area in which socialization might be expected to influence reminiscence is in regard to the types of emotions expressed. Malatesta and Kalnak (1984) studied emotional experience in younger and older adults, and found that older people agreed more than young or middle-aged people that persons their age should conceal feelings of anger, happiness, disgust, and sadness. Other feelings, such as shame and interest or excitement, were deemed necessary to conceal by the young and older groups, but not by
the middle-aged group. However, there were no age differences with regard to the expression of fear or anxiety. These findings seem to reflect stereotypic rules of conduct which constrain the amounts of emotions such as anger and excitement in older people, allowing them only to express anxiety. This socialization could be expected to surface in reminiscence, in that older people might be more likely to remember events which do not evoke strong emotions such as anger or happiness. Accordingly, younger and middle-aged groups would be expected to be less constrained in their verbal recounting of emotional events.

It seemed that the likelihood of intrusions in this study was good, and that this could have an effect on accuracy of recall. Understanding this through studies on reminiscence could lead to a better understanding of qualitative differences in aging and memory.

Statement of Purpose

The purpose of the present study was to examine qualitative differences between the memories of older and younger adults. Objective measures of memory were compared with discourse memory tasks for accuracy and confidence of ability. The content of the recalled prose was analyzed for number of
facts, number and types of errors made (technical errors within the story; and errors reflecting bias, opinion, or world knowledge), and number and types of intrusions made (intrusions reflecting personal history; intrusions reflecting bias, opinion, or world knowledge; and intrusions reflecting metacognitive strategies). Qualitative differences in memory were analyzed in anticipation of intrusions from adults' conventionalized memories.

**Hypotheses**

First, it was expected that the young group would exceed the older group in performance on the objective memory task involving digit span, but that the groups' performances would not differ significantly on the objective memory task involving definition of words (Zimmerman & Woo-Sam, 1973). Second, both groups were expected to be able to predict their accuracy for recall unless an age-related flaw in metamemory surfaced. Therefore, it was expected that confidence ratings for all tasks would be fairly accurate on all measures of memory—regardless of age—and that the older group would rate its ability to perform on the digit span tasks lower than the younger group would rate its ability. Third, it was also expected that the older group
would perform best when the task was most personally relevant (i.e., as when they are asked to recall a story about an older person). Finally, more intrusions such as opinions and personal experiences were expected from the older group than the younger group when asked to recount a story which they have read.
METHOD

Subjects

Participants were 18 women between the ages of 68 and 78 years, and 18 women between 18 and 28 years old. The elderly participants were recruited from churches, senior citizen centers, and personal referrals, and were living in an independent, active manner. There was no known neurological damage in any of the participants. A very common ailment among the older group was hypertension, but no other serious health problems were reported. All participants were asked to list any medication that they were currently using (some reported using diuretics, analgesics, or steroids). The average level of education for the older group was completion of grade 11.667, and the occupations held prior to retirement included: secretary, homemaker, teacher, nurse, bookkeeper, and other traditionally female-dominated jobs. Each member of the older group was asked to estimate the amount of reading that she accomplished everyday. The average number of hours was 2.056. The younger subjects were obtained from undergraduate psychology classes and personal refer-
rals. Their average level of education was completion of grade 14.222, and the average number of hours that they reported as time spent reading were 2.806 hours daily. Cohort effects, such as amount of exposure to media and experimental conditions, were expected in some areas, but it was not feasible to control for these factors.

Materials

Two objective measures of memory were taken using the Vocabulary subscale and the Digit Span subscale from the Wechsler Adult Intelligence Scale, and were subsequently scored according to the instructions in the WAIS manual. These particular tasks were chosen with the idea that the use of verbal skills, as measured by a vocabulary test, would produce less failures for the elderly group than other traditional measures, such as word lists and number clusters. Zimmerman and Woo-Sam (1973) discussed the Deterioration Quotient of the Wechsler Adult Intelligence Scale which was originally designed to measure mental detriment due to aging, but which now includes the normal aging process. For females, the Vocabulary subtest (used in this study) remains consistent with age, and is designated "Hold." However, the Digit Span subtest (also used
in this study) tends to show deteriorated performance in females as they age, and is designated "Don't Hold."

Confidence ratings were taken before each objective test of memory, in which participants were asked to estimate their ability to accurately answer the questions posed. A five-point Likert scale was used for this purpose, ranging from 1 (indicating that the participant felt she could do none of the task at hand) to 5 (indicating that the participant felt that she could successfully complete all of the task).

Three articles with a mean length of 240 words each were used in this study. One article was oriented toward the interests of young college students; another article was oriented toward concerns of older people; and a third article was neutral in its value to older or younger individuals. The articles were made ecologically valid by the exclusion of any dated material, such as computers or ice boxes.

Participants were given these type-written articles to read one at a time. Prior to reading each article, a confidence rating was obtained from each participant which was to reflect her predicted ability to recall that article. After
the participant had finished reading, she was asked to verbally recount the article for the interviewer. The three articles ("Old", "Young", and "Neutral") were all presented in this manner to each participant. Articles were counterbalanced in their presentation. For example, the article written about college life, the article about victimization of the elderly, and the article about weather conditions in Southern California were presented so that each article was first for one-third of each group.

Information generated from the participants' memories for prose was transcribed from the audio-tapes and given to two undergraduate students for evaluation. The undergraduate raters had to reach an agreement about the facts, errors, and intrusions contained in each transcription. These raters were unaware of the hypothesis of this study, and were scoring the materials without knowing from which age group the material was obtained. The transcriptions were analyzed for number of correct facts included; number and types of errors including errors of information within the story, and errors reflecting bias, opinion, or world knowledge; and intrusions reflecting personal history, bias, opinion, or world knowledge, or metacognitive strategies. In addition
to the above, the raters were also asked to guess the age group to which each transcription belonged, to see if any qualitative differences between the groups were obvious.

Finally, participants were asked to state any changes that they had noted in their memories recently. Examples given to the participants included: problems recognizing words or faces. A simple tally was taken of the types of concerns expressed by the participants regarding their memories.

**Procedure**

All of the above instruments were administered in half-hour interviews conducted with each individual participant by the experimenter. At the outset, participants were told that the experiment involved memory. Each participant signed a release form consenting to an audiotape of the interview. Information regarding each subject's age, educational level, health status, occupation, and amount of time spent reading each day was recorded. Finally, the instruments were administered in the order described above.
RESULTS

Standardized Test Results

Statistical analyses of the Digit Span and Vocabulary data revealed several statistically significant effects. A 2 x 2 (Score on Digit Forward, Score on Digit Backward x Young and Old Age) mixed design analysis of variance found a significant main effect for Digit Span task across age groups for scores on Digit Forward versus Digit Backward. Figure 1 demonstrates that Digit Span Forward scores were significantly higher than Digit Span Backward scores, $F(1,34) = 175.043, p < .01$. A significant interaction for age and scores on Digit Span was found, such that the older group scored significantly lower on the Digit Backward task than the younger group, $F(1,34) = 10.938, p < .01$. This can also be seen in Figure 1.

The vocabulary test scores were analyzed with a between-groups t-test in which young and old subjects were compared. There were no significant differences.

All subjects rated their ability to perform Digit Span and Vocabulary tasks, using a five-point Likert scale, before the tests were administered.
MEAN DIGIT SPAN SCORES

Young Group
Older Group

Forward  Backward

Digit Span Task
Both groups felt more confident about their abilities to define words than about their abilities to perform the Digit Span tasks. A 2 x 2 (Young and Old Age x Confidence Ratings on Digit Span and Vocabulary) mixed design analysis of variance revealed statistical significance for Digit Span versus Vocabulary confidence ratings, $F(1,34) = 10.588$, $p < .01$.

There were no differences between the age groups in their confidence to perform these tasks (Digit Span means: Older group = 2.78, Younger group = 2.56; Vocabulary means: Older group = 3.33, Younger group = 3.5). This is interesting in light of the finding that differences in Digit Span performance varied by age. However, Age and Age x Test type effects failed to obtain significance, so that although there were age differences in the Digit Span scores, there were no significant differences in the groups' scores on the Vocabulary task.

Prose Recall Results

Multivariate analysis. A multivariate analysis of variance was conducted on the prose recall results. A one-between (Age--Young and Old) x one-within (Story Type--Young, Old, and Neutral) mixed design with three dependent measures (Facts--number of facts correctly recalled, Errors--number of errors, and
Intrusions (number of intrusions) showed that age and story type were significant main effects, \( F(1,3) = 8.02, p < .0004 \) (Hotelling's Generalized \( T^2 \)) and \( F(6,132) = 10.33, p < .0001 \) respectively. The age \( \times \) story type interaction failed to obtain significance.

Univariate analysis. Univariate analyses of variance were then conducted with each of the three dependent variables. Main effects for age and story type were found with respect to number of facts correctly recalled. The younger group consistently recalled more facts than did the older group, no matter which story was involved, \( F(1,34) = 22.71, p < .0001 \). As Figure 2 shows, the number of facts correctly recalled was also significantly different according to story type, \( F(2,68) = 21.65, p < .0001 \). The greatest number of facts recalled by both age groups were from the "Old" story. However, there were no significant differences between the number of facts recalled from the "Young" versus the "Neutral" stories, when a post-hoc Scheffe test was performed.

Analysis of the number of errors made revealed a main effect for story type, but no age effects. A mixed design analysis of variance showed that story type was a factor in the number of errors made.
Mean Number of Facts Recalled

Type of Story

Young Group
Older Group
overall, $F (2,68) = 4.14, p < .0200$. However, there were no significant differences in the number of errors made by each age group.

A significant main effect for story type was found in respect to the number of intrusions made, $F (2,68) = 7.77, p < .0009$.

Univariate analyses on types of errors and types of intrusions. Additional univariate analyses of the variables were conducted on types of errors ("errors within the story," and "errors reflecting bias, opinion, or world knowledge"), and types of intrusions ("intrusions reflecting bias, opinion, or world knowledge," "intrusions reflecting personal history," and "intrusions reflecting metacognitive strategies"). Overall, considering both age groups, the most frequent of the two types of errors assessed was "errors within the story," $F (1,34) = 83.87, p < .0001$. There were no "errors reflecting bias, opinion, or world knowledge"; therefore, this error-type was removed from the analysis.

All three types of intrusions showed statistical significance overall: "Intrusions reflecting bias, opinion, or world knowledge," $F (1,34) = 29.66, p < .0001$; "Intrusions reflecting personal history," $F (1,34) = 11.41, p < .0018$; "Intrusions reflecting
metacognitive strategies," $F(1,34) = p < .0136$.

An age effect was found for "intrusions reflecting personal history." A 2 x 3 x 5 (Young and Old Age x Story x Specific Recall Classification—facts; errors within story; intrusions reflecting bias, opinion, or world knowledge; intrusions reflecting personal history; and intrusions reflecting metacognitive strategies) mixed design analysis of variance revealed that the older group had significantly more intrusions of this type than did the younger group, $F(1,34) = 11.41, p < .0018$. "Intrusions reflecting metacognitive strategies" had a trend toward significance, in that the younger group had more intrusions revealing memory strategies than did the older group, $F(1,34) = 3.64, p < .0649$. The actual numbers, however, were small (mean of younger group = .2407; mean of older group = .0370).

A 2 x 3 x 5 (Young and Old Age x Story x Specific Recall Classification) mixed design analysis of variance found that there were no statistically significant age differences in the number of "errors within the story" and "intrusions reflecting bias, opinion, or world knowledge."

The same 2 x 3 x 5 mixed design analysis of variance described above found that "errors within
the story" was most significantly related to story type, $F(2, 68) = 4.22, p < .0187$. One type of intrusion, "intrusions reflecting bias, opinion, or world knowledge" was also significantly different according to story type, $F(2, 68) = 4.68, p < .0125$.

Correlations between the groups' confidence ratings and the actual number of facts recalled from each story type showed no significant relationships, with the exception of that of the older group's confidence ratings and scores on the "Old" story ($r = .544, p < .05$).

**Rater Results**

When the two undergraduate raters who were blind to the researcher's hypotheses were asked to guess the age group to which each transcript belonged, they guessed correctly on 30 out of 36 subjects' transcriptions. A normal approximation of a binomial test on this data revealed significance ($p < .0001$).

**Self-report Data**

In examining the comments which each older participant made concerning changes in her own memory, many types of changes, explanations, and methods of compensation were named. The most frequent changes noted were: forgetfulness (misplacing objects, forgetting appointments), trouble with names of people
or objects, the observation that remote memory is better than recent memory, and the observation that the things which are best recalled are those which are important to the individual. Four women in the older group reported that they had noted no changes at all. Some participants gave possible explanations for their changed memory abilities, including: deteriorated hearing, increased responsibilities (such as care of an ailing husband), and the fact that they may not choose to recall certain details.

Many of the women revealed methods of compensation including: writing information down, knowing one's limitations and purposely not taking in "unnecessary" details, keeping the mind active with a determination not to allow the memory to deteriorate, and relaxing instead of panicking when something will not come to mind.
DISCUSSION

Objective Measures

Quantitative objective measures of memory were in accordance with previous findings, with age differences evident in the Digit Span task but not in the Vocabulary task (Zimmerman & Woo-Sam, 1973). Although not statistically significant, the younger group scored higher than the older group on Digit Span tasks, and both groups performed better on the Digit Forward portion than on the Digit Backward portion of the task. However, as previous research has shown, vocabulary skills do not deteriorate much, hence the lack of a significant age effect on the Vocabulary test. These results indicate that the samples used in this study are representative of the age groups, and that the prose recall results are representative of the two age groups involved.

Prose Recall

While the younger group recalled more facts from the stories, there were no age effects for errors. That is, although the older participants remembered fewer facts, they did not make any more or any fewer errors than did the younger group. Relating this to
the previous discussion of credibility and accuracy of memory, these results suggest that the older participants did not fabricate when they could not remember the facts, nor did they become confused and falsely recall story events. Their perceptions and reconstructions of the stories did not cause them to state falsities, but merely to leave out certain points. Many of the participants stated to the interviewer that they were satisfied to give the "gist", the overall message of the story, and did not deem it necessary to recall specific facts.

Stories were apparently reconstructed in other ways though, since the older group had significantly more intrusions than did the younger group. "Intrusions reflecting personal history" was significantly higher for the older group. They added to the stories, rather than committing errors about the already-existing story.

The underlying reason for this phenomenon is not known. It may have been an attempt to relate impersonal information to their own points of reference as Williams, Denney, and Schadler (1983) suggest, or it may simply have been that the situation provided a spring-board for the older women to discuss matters of importance with a ready listener.
This certainly seemed to be the case with one older woman who waited until after the interviewer had turned off the tape recorder following the second story, then refused to take the third story until she had spoken of personal matters for approximately a half-hour. Others took the opportunity to comment upon societal matters of personal concern, such as the state of education or the need to lock their doors and windows at night. In those instances, the intrusions were clearly related to the stories at hand.

These possible explanations for the occurrence of intrusions tie into the earlier discussion of semantic and episodic memory systems (Tulving, 1972). It may be that for the older group, recalling the stories involved finding other episodic memories which were then combined with the new incoming information. Reed (1979) believed that all newly acquired information is episodic in nature, which might imply that relating new information to episodic memories is a necessary strategy for recall.

Another type of intrusion, "metacognitive strategies," was found more often in the younger group than the older group. Although this result tended toward significance, neither group spoke much about the memory strategies which they were using. Of
those who did, the comments included such strategies as trying to recall the article in the same order as it was written, and feeling the need to write down cues as she read the story.

The type of story made a difference in both numbers of errors made, number of facts recalled, and number of "intrusions reflecting bias, opinion, or world knowledge." The structure of the stories was not consistent—the "Young" story contained many more quotations than the others, and the "Old" story contained more lists of facts. This could account for the greater number of facts which were recalled from the "Old" story. The greatest number of errors occurred from the "Young" story, and may have been the result of a confusing story format. A replication of this study would require closer examination of the structure of the stories used in order to obtain a comparable measurement between story types.

The use of additional stories or an attempt to examine each subject's interests would also help confirm or disprove the present hypothesis that people would best recall the story which was most relevant to them. In this case, there was no interaction between age and story type. Perhaps the
inclusion of more than one story in each category—"Old", "Neutral", and "Young"—along with closer examination of each story's structure would clarify this. Anderson (1978) suggested that compatibility of the text, such as difficulty and topic, with the background knowledge and interests of the subject is an important determinant in comprehension.

Story type was also a factor in the number of intrusions made. Most of the intrusions in each category were for the "Young" or the "Old" stories, with relatively few intrusions for the "Neutral" story. This may have been due to the relative interest of each story, or it may have been influenced by the structures of the stories. It seems most likely that the participants were most inclined to respond to the stories which interested them.

It may be that the particular content of the stories triggered personal memories. For instance, some people spoke about their own education, about a recent crime in the area, or their observations about opportunities afforded younger generations and the regret of unfulfilled personal goals. However, few people felt compelled to speak about a weather report. The types of intrusions in that instance involved relating the report to current
weather conditions, as though it was a current report (which it was not).

Another concept which may pertain to this difference in numbers of intrusions for each story is that of "inferential reconstruction" (Spiro, 1977). In this concept, a person possesses schemas which provide a conceptual framework about a class of things, events, or situations. Spiro believed that it was possible to use this framework in order to fill in any gaps in one's memory. However, a distinction between inferences and intrusions needs to be made before this concept can be applied to this case.

**Confidence Ratings**

Confidence ratings did not appear to accurately differentiate the groups' performances except in the case of Digit Span versus the Vocabulary tasks. In that instance, each group accurately predicted that it would perform better on the Vocabulary than it had on the Digit Span task. On prose recall tasks, the groups' confidence ratings did not differ, despite the result that the younger group recalled more facts than the older group. In fact, confidence ratings did not differ greatly for individuals among all of the tasks. It often appeared that an individual chose a certain rating and stayed there.
throughout the experiment, deviating perhaps one digit.

It seemed as though the measure was tapping self-esteem, or self-confidence, rather than an actual evaluation of the individuals' memory capabilities. For instance, some people rated their abilities high, and felt satisfied giving a brief synopsis of the story. Others rated themselves average (predicting that they could recall half of the material contained in the story), and proceeded to recall a large number of facts.

For these reasons, the measure used in this experiment may not accurately reflect knowledge about the participants' own memory abilities. In future research, the "feeling of knowing" experience needs to be examined in a different manner. Hart's (1965) research on metamemory which showed that people could make accurate judgments regarding their own memory storage capabilities dealt primarily with recognition rather than recall as used here, and may not be applicable to recall situations. Further, it may not be feasible to separate self-esteem from confidence ratings as used in this study. However, examining how the two factors co-vary may produce information vital to the study of metamemory.
**Qualitative Differences in Prose Recall**

Although some significant differences in prose recall of a qualitative nature were discovered, it seems as though there were qualitative differences between the two groups which were not revealed by the type of data analysis utilized. The fact that the undergraduate raters were so accurate in their guesses about the transcripts seems to support this notion. The raters said that they found clues in words used by the participants and some references to time or age, but there were other clues involved which were less tangible but which enabled the raters to guess correctly.

One measurement which the raters suggested for future research was the amount of repeating that the participant employed. They believed that the older group repeated facts more often than did the younger group. Whether this was some type of metacognitive strategy, simply making the most of what they could recall, or some other explanation is unknown.

**Implications and Further Thoughts**

The findings reported here both confirm previous research and add to those earlier studies. Whereas Light, Zelinski, and Moore (1982) spoke about older people having "poorer memory for facts," the present
study adds that while memory for facts is poorer, the number of errors around those facts is not greater or less than those made by a younger person.

It seems that previous research has been too general in its approach to discuss this important facet of memory and aging. Other discussions of memory for prose or lists of numbers and words do not include the possibility of such a subtlety. Certainly we expected the older group to recall less facts from the stories than the younger group, since recall rather than recognition was the method utilized (Matlin, 1983). However, none of the previous designs appeared to search beyond the confirmation that deterioration in recall abilities was occurring with age.

Much discussion has been generated on the question of depth of processing and retrieval. Craik (1977) believed that the elderly do not process information deeply enough to recall it without cues. It is difficult to determine the depth of processing. Objectively, recalling fewer facts from a story could lead one to the assumption that encoding or retrieval was faulty. However, the additions to the stories, exemplified by intrusions, raise questions about processing. Does processing involve memorizing data by rote or does it involve integration of the data
with previous knowledge? To what degree is information processed in order for a person to expand upon that information?

The directions given by the interviewer to the participants were not to "memorize" the stories, but to "tell me about it." The result that the younger people chose to list facts, while the older group most often recounted the "gist" of the story and made intrusions reveals some seemingly basic differences in style. This stylistic disparity between the two groups may be a cohort effect or a developmental difference. The younger group was comprised of college students, who obviously were accustomed to reading and recalling details. They may also have had greater familiarity with psychological experiments than the older group, and could have attempted to second-guess the purpose of an experiment on memory. The older group, while well-educated, was farther away from book-learning and research. They may not have felt compelled to perform for the experimenter in the way that the younger group was. On the other hand, memory for facts may simply decline with age due to physiological deterioration, necessitating the use of different memory strategies such as recalling only basic points, and relating material to personal
experiences.

The intrusions added by the older group have qualities of both interference and integration. In a sense, the intrusions detracted from the story at hand; from another viewpoint, the intrusions acted as connectors to join the abstract to the concrete. A statement as simple as an expression of agreement or disagreement seems to reflect personalization and processing.

Fry (1983) wrote of reminiscence as a necessary tool which brings past events and present experience together to form an integrated whole. The "intrusions reflecting personal history" in the transcriptions of the older group were reminiscences. The content of the stories seemed to trigger these personal memories which were told by the participants. Perhaps these past memories were more important to the women than the story which they were reading, or perhaps they could see a continuity in life by telling how their past experiences related to present events. It would be interesting to find out at what point in their reading those personal experiences came to mind. By doing that, we could detect whether or not the intrusion was actually preventing the women from integrating all the material by calling their atten-
tion to personal events. If, however, we found that the intrusion occurred only as the participants were recounting the story which they had read, we would have evidence of interference with recall rather than input.

The presence of intrusions also brings to question the issue of constricted emotions described by Malatesta and Kalnok (1984). Clearly the older women in this study touched upon some emotional issues (i.e., disappointments and concerns, childhood experiences, memories of deceased loved ones, and personally revealing statements). Of course, the format of the interviews was ideal for intimate discussions if the participants were so inclined. This one-to-one atmosphere is the type of situation which Simmons (1946) and Mergler and Goldstein (1983) may have envisioned in their descriptions of the elderly as storytellers, repositories of knowledge, and "transmitters of information." The personal nature of this study may have tapped a feature which is undetectable in more clear-cut, "sterile" experiments. Indeed, that was the hope of the experimenter.

It is exactly this intangible area of qualitative difference which makes the experimental method so frustrating. Life is not so easily compartmentalized,
and qualities cannot be easily measured or described. In this particular experiment, the strongest indications of qualities which differ with age were the presence or absence of intrusions, and the finding that the undergraduate raters so accurately guessed whether they were reading the words of an older or younger person. However, there was much more to this experimental data than numbers. There was a richness in the transcriptions of the interviews which was not transmitted through means of statistics. The manner in which each subject approached the tasks, the degree of interaction with the experimenter, and the degree of humor, interest, or even skepticism expressed nonverbally was not conveyed in the data analysis.

There are countless areas into which future research could delve. Several have been mentioned previously (other approaches to the aspect of knowing one's abilities, measuring the occurrence of repeating in prose recall, and manipulation of story content). It would be interesting to discover the way in which an "intrusion reflecting personal history" was triggered for each person. From a more clinical point of view, examining the way that the presence or absence of an interviewer affects recall could reveal
more evidence of the story-teller role for older persons described by Simmons (1946).

The fact that so many questions can be raised concerning factors which affect memory is evidence of the complexity of aging. Fewer facts and more personal stories without adding errors—this sums up the impression of the older woman's prose recall ability as shown in this study. It does not sound as though deterioration is the only prominent factor. As Baltes, Reese, and Lipsitt (1980) stated, perhaps the memory changes that we find by testing older people reflect difference rather than deficit.

It was the intent of this author to complicate matters by reminding other researchers that there is more to science than easily-calculated reactions; that there is more to aging than getting old.
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