Age and Depression Related Changes in Memory Performance and Self-Referential Processing

by

Brad P. Isaak

A Thesis
Submitted to the Faculty of Graduate Studies
in Partial Fulfillment of the Requirements
for the Degree of

MASTER OF ARTS

in Clinical Psychology

Department of Psychology
University of Manitoba
Winnipeg, Manitoba

ISBN 0-315-77926-8

Canada

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Abstract

Memory performance and self-referential processing biases were assessed among nondepressed and mildly depressed young and elderly adults. Participants were compared on a working memory task (Dobbs & Rule, 1989), an autobiographical memory task (Williams & Broadbent, 1986), and a self-referent encoding task (SRET; Derry & Kuiper, 1982). Consistent with predictions, the results indicated that the elderly participants performed more poorly on the working memory task than did young adults; however, contrary to expectations, significant differences were not evident between the depressed and nondepressed groups. On the autobiographical memory task, the latency to retrieve negative personal memories increased among elderly depressed participants. Moreover, elderly adults were more general than young adults in their recall of memories. The hypothesized speeded retrieval and greater specificity of mood congruent memories did not occur. On the SRET, self-referential endorsement of positive and negative content was influenced by depression level and age. Although both young and elderly participants exhibited higher self-referential

ratings for mood congruent material, these effects were attenuated among elderly participants. The reaction time data indicated that depressed participants had longer self-referential decision latencies for both positive and negative words than did nondepressed participants. Elderly participants had longer decision latencies than did young adults for negative but not for positive words. Recall results did not reveal the expected content-specific effects, but total recall was less among depressed elderly participants than among their nondepressed counterparts. These results indicate that self-referential processing and autobiographical memory measures are sensitive to depression while working memory is sensitive to age but not depression.

ACKNOWLEDGEMENT

I would like to thank all the members of my committee: Dennis Dyck, John McIntyre, Marianne Johnson, Neena Chappell, and Joe Rallo. Special thanks go to John who in many ways, and without complaint, became a second research advisor after Dennis moved to Washington. I am also grateful for Marianne's willingness to become my program advisor and for her thoroughness in helping me prepare for the thesis defense. I want to thank Don Godfred for lending me his much needed and appreciated computer programming skills. As well, I extend my gratitude to all my friends and family who helped to carry me through the discouraging times and celebrated with me the successful completion of my thesis. My heartfelt thanks go to my good friend and colleague Dieter Schonwetter whose support and statistical advice were a real blessing. All my love is, as always, given to my wife, Rose, who not only spent many hours on the computer preparing an aesthetically pleasing final draft, but whose support, encouragement, and presence always give me something to which to look forward at the end of a day. Above all, however, I want to thank my advisor, Dennis, who, despite his physical absence in the past half year, has provided me with incredibly prompt and invaluable feedback at all stages of my thesis work. I could not have wished for a better advisor or mentor. Although I am sorry that I can no longer run up to his office to chat with him, I am very happy for Dennis in his new place of work and residence.

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Introduction

Depression is the most prevalent psychiatric disorder among individuals over the age of 65 (Blazer and Williams, 1980; La Rue, Dessonville, and Jarvik, 1985; Murrell, Himmelfarb, and Wright, 1983; Phan and Reifler, 1988). However, a survey of the epidemiological literature reveals that estimates of the prevalence of depression vary between 2% and 44% among people over 60 years of age (Alexopoulos, Young, Meyers, Abrams & Shamoian, 1988; Blazer & Williams, 1980; Hasegawa, 1985; La Rue, Dessonville & Jarvik, 1985; Parmelee, Katz, & Lawton, 1989). It has been suggested by many researchers (e.g., Blazer, Hughes, & George, 1987; Cappeliez, 1988; Koenig, 1986; La Rue et al., 1985; Murrell et al., 1983; Ruegg et al., 1988) that this extreme range of percentages reflects differences in sampling, the criteria utilized for depression, and the methods (e.g., self-report, interview) and measures used for assessing depression. Estimates of the prevalence of depression become more consistent when these sources of variation are accounted for. Major depression occurs in less than 4% of healthy elderly in the general population (Blazer et

al., 1987; Blazer & Williams, 1980; Myers et al., 1984; O'Hara, Kohout & Wallace, 1985) and in approximately 10% to 15% of institutionalized elderly (e.g., Parmelee et al., 1989). Furthermore, estimates of the prevalence of dysphoria, a term applied to people whose depressive symptoms are not severe enough to receive the classification of major depression (Blazer et al., 1987; Moore, 1985), range from 4.5% to 30% in the healthy elderly population (Blazer & Williams, 1980; Blazer et al., 1987; Gurland & Cross, 1982) and even higher in the institutionalized elderly population (Parmelee et al., 1989; Phan & Reifler, 1988).

Major depressive episodes are defined in the Diagnostic and Statistical Manual of Mental Disorders-Third Edition-Revised (DSM-III-R; American Psychiatric Association, 1987) as involving the presence of at least five of the following symptoms, including at least one of the first two symptoms: depressed mood; a loss of interest in almost all usual activities; an increase or decrease in weight or appetite; sleep disturbances; psychomotor agitation or retardation; fatigue; feelings of worthlessness or excessive or inappropriate guilt; diminished

concentration or decisiveness; recurrent thoughts of death, suicidal ideation with or without a specific plan, or a suicidal attempt. Although these criteria are applicable to all age groups, the biological and cognitive changes frequently associated with aging can compromise the usefulness of a number of the above criteria when applied to the diagnosis of depression in geriatric populations.

Cognitive changes often associated with depression include disturbances in concentration, attention, retention, retrieval, and learning, as well as negative views of self and life experiences (Siegfried, 1985; Weingartner, 1986). The effects of depression on cognition, observed both through empirical and clinical observation, have been effectively utilized by clinicians for diagnostic purposes as evidenced by the inclusion of such criteria in the DSM-III-R. However, as mentioned previously, the application of such criteria to the elderly depressed is not always straightforward.

The diagnosis of depression in the elderly is complicated by two issues common to gerontology. First, it is often difficult to differentiate

depression from various forms of dementia (Kiloh, 1961). Feinberg and Goodman (1984) suggested that 5%-15% of the elderly population diagnosed with dementia will be found at follow-up to have experienced an affective illness. Part of this difficulty stems from the fact that both disorders often present similar cognitive impairments. One cognitive deficit that is often reported in both dementia and depression is memory loss. Consequently, it is possible that a depressed elderly person may be misdiagnosed as demented, hence, "pseudodementia". A second difficulty in making differential diagnoses is the existence of the popular belief, particularly among elderly people, that memory function diminishes with normal aging (Kahn, Zarit, Hilbert, & Niederehe, 1975; Niederehe, 1986). Because of this belief, a depressed elderly person who does not report any dysphoric affect but does report physical and cognitive ailments may simply be classified as experiencing the effects of normal aging (La Rue et al., 1985). Such a circumstance has been termed "masked" depression.

The existence of pseudodementia and masked depression make it important to determine if depression

alters memory functioning, particularly in the elderly, and, if so, to characterize the nature of such changes. Prior to reviewing the research literature concerning the effects of depression on memory, an overview of normal age-related changes in memory will be presented to provide a context from which to evaluate depression-related changes.

Memory Changes in Normal Aging

In the experimental psychology of aging literature, studies of learning and memory are much more common than any other topic of study (Poon, 1985). Consequently, the task of summarizing the vast amount of research focusing on memory and aging is unrealistic and impractical for the purposes of this paper. Therefore, the following brief overview of age-related memory changes will be based on relevant review articles.

Since research concerning memory and aging has accumulated over the years, the reported magnitude of age-related differences in memory has progressively decreased (Poon, 1989). Although such a global conclusion may be questioned, research has revealed that at least some aspects of memory are less affected

by age than are others (e.g., Howe & Brainerd, 1988; Poon 1989). Furthermore, it has been found that the performance of an elderly individual on a memory task may depend on a variety of factors, such as cognitive strategies, nature of the stimuli, criterial tasks, subject characteristics (e.g., physical health, verbal ability, level of motivation), and environmental influences (e.g., Craik, Byrd & Swanson, 1987; Poon, 1985; Poon, 1989; Robertson, 1987). Botwinick (1984) has reviewed studies that discuss various ways of facilitating performance in elderly people on memory tasks (see Botwinick, 1984). These methods include allowing more time for responding, rewarding subjects for responding, and providing supportive contexts within which to perform the memory task. Similarly, Craik (1977) describes techniques for structuring memory tasks so that they activate deeper levels of processing which can in turn significantly improve an elderly individual's memory performance.

Despite an increased awareness of those factors which contribute to an elderly individual's performance on memory tasks, and the realization that aging does not affect all aspects of memory equally, it is

nevertheless apparent that certain aspects of memory do deteriorate with age, and some quite substantially. Therefore, in a following section the focus will be on some of the aspects of memory that are affected by aging. This discussion will be prefaced by a brief conceptual overview of memory models.

Information Processing Models of Memory

Although several theories of memory have been developed (Craik, 1977; Kaszniak, Poon, Riege, 1986), the dominant theoretical models of the past two decades have been information processing models (Craik, 1977; Poon, 1985). There are two general types of information processing models. One type, which will be touched on later in this section, focusses almost exclusively on memory processes. Craik and Lockhart's (1972) "levels of processing" model is the best known of the process models. The other type of information processing model focusses on the underlying mechanisms of memory; the memory stores.

The most well-known and influential of the multi-store models, which is sometimes termed the "modal model", was that proposed by Atkinson and Shiffrin (1968). One of the assumptions of this type of model

is that information flow can be traced through several hypothetical memory stores. These memory stores consist of a brief sensory memory, a short-term primary memory, and a long-term secondary memory.

Sensory memory is referred to as iconic memory in the visual system and echoic memory in the auditory system (Craik, 1977; Crowder, 1980; Poon, 1985). The duration of sensory memory is very brief, about one-third of a second to one second for iconic memory and about two seconds for echoic memory (Botwinick, 1984; Craik, 1977). Information in this memory store can be processed to make it longer lasting, such that it becomes part of primary memory. Primary memory, also known as short-term store (STS), is conceptualized as a limited-capacity store in which information is still "in mind" as it is being used (Poon, 1985), that is, it is still the focus of conscious attention. Primary memory is often referred to as short-term memory; however, equating these two terms can be misleading as will be discussed later in the paper. Researchers hypothesize that primary memory processes control and assimilate information before being entered into secondary memory (e.g., Craik, 1977). Secondary

memory, or long-term store (LTS), is a repository of newly learned information (Kaszniak et al., 1986). In contrast to primary memory, secondary memory is long-lasting and has a limitless capacity.

Although it has had a significant impact on memory research, the modal model is not without its problems. Shortly after its development, various experimental findings surfaced for which the modal model was unable to account (see Baddeley, 1990 for a review). As problems with the modal model began to accumulate, Craik and Lockhart (1972) unveiled their levels of processing model, suggesting that it would be more profitable to focus on mode of processing than on hypothetical memory stores (e.g., STS and LTS). Their model was founded on the idea that the more deeply an item is processed, the better it will be remembered. Although they still assumed a separate primary memory system, its main role was simply to process the incoming information. What accounted for the durability of a memory was the depth to which an item was processed within the LTS, not its transfer from one store to another.

Directly related to this model was the distinction

between two modes of rehearsal, maintenance rehearsal, in which material was recycled without processing it more deeply, and elaborative rehearsal, which resulted in deeper levels of processing. The interested reader is referred to Baddeley (1990), almost any introductory psychology textbook, or Craik and Lockhart (1972) for a more complete review of the levels of processing model.

Neither the modal model nor the levels of processing model can account for all the findings in the memory literature. However, they provide a clearer picture of how memory operates and they have helped to guide researchers in other useful directions. For the purposes of this paper, the two models provide a framework in which to discuss the effects of aging on memory.

Aging and Memory: An Information Processing Viewpoint

In a review of the aging and memory deficit literature from an information-processing point of view, Kaszniak et al. (1986) concluded that there is a general age-related decline in speed of retrieval from all memory stores. However, this age-related slowing of retrieval is not paralleled by changes in the capacities of the sensory or primary memory stores

which are at most only minimally affected by aging. Although most researchers would agree with this conclusion, some would question the definitiveness of the empirical literature (e.g., Botwinick, 1984).

Unlike the minimal aging effects on sensory and primary memory, secondary memory is appreciably affected by aging (e.g., Botwinick, 1984; Kaszniak et al., 1986; La Rue, 1982). As a result, much research has been conducted to determine the nature of these age-related changes. Much of this research has concentrated on determining whether the deficit is a result of problematic encoding, storage, or retrieval or some combination of these processes.

Much of the research on age differences in encoding is directly related to the levels of processing model. For example, there is evidence that tasks requiring "elaborate" processing increase the age-related deficits seen in later recall (Kaszniak et al., 1986). Related to this is the finding that older adults appear to have difficulty with organization and visual elaboration (Botwinick, 1984; Kaszniak et al., 1986; Smith, 1980). La Rue (1982) echoes this conclusion, suggesting that the deficient performances

of elderly adults on tests of recent (secondary) memory are at least partially due to reduced spontaneity in their use of active encoding strategies. Interestingly, a review of the literature reveals that these encoding difficulties are quite sensitive to remediation (e.g., training in the use of mnemonics and reduction of performance anxiety), so much so that an elderly adult's performance can closely approach that of a younger adult (Botwinick, 1984; Kaszniak et al., 1986; La Rue, 1982; Smith, 1980; Yesavage, 1984; Yesavage & Rose, 1984).

Definitive conclusions concerning age-related deficits in storage and retrieval are difficult since the processes of encoding, storage and retrieval are so closely tied together. For example, storage is often studied by examining the amount of information originally acquired and then comparing it to the amount of information remembered after a period of time has elapsed. However, it is difficult to determine whether the deficit is due to storage loss, to poorer learning in the first place, or to retrieval difficulty.

Despite such difficulties, studies of recognition and recall suggest that retrieval rather than storage

is impaired in the elderly (Botwinick, 1984; Kaszniak et al., 1986; Smith, 1980). This is inferred from the fact that, in comparison to young adults, elderly adults are much better at performing recognition tasks than recall tasks. That is, because recognition tasks simplify the process of retrieval, they reflect mostly storage function. The observation that, in comparison to young adults, elderly adults do relatively better on tasks of recognition than on tests of recall leads many researchers to conclude that storage deficits are minimal or nonexistent (Botwinick, 1984; Craik, 1977; Kaszniak et al., 1986; Smith, 1980). Conversely, it is concluded that retrieval difficulties do exist. For a more thorough discussion of the evidence relevant to the above conclusions, the reader is referred to Botwinick (1984), Craik, 1977, Kaszniak et al. (1986), and Smith (1980). Moreover, some research has found age-differences even in storage (see Howe, 1988).

To account for age-related differences in memory, including those discussed above, researchers have posited several possible explanations, such as limited cognitive resources (e.g., Hasher & Zachs, 1979), a related difficulty with self-initiated mental activity

(Craik, Byrd & Swanson, 1987), failure to use optimal processing strategies (see Craik, 1977), and relative deficits in storage and retrieval processes that have yet to be specified (Howe, 1988). Although these represent some of the more popular theories, none of them can account for all of the findings in the memory and aging literature. In recent years, most researchers have agreed that it is unlikely that age deficits in memory are the result of a uniform decline in a single factor (e.g., Craik, Byrd, & Swanson, 1987; Howe, 1988).

Primary Memory vs. Short-Term Memory

A frequent source of confusion in the memory and aging literature is the failure to distinguish primary memory from short-term memory. These terms are not interchangeable. The concept of short-term memory, developed in the late 1950's, was characterized as a limited-capacity store in which acoustically coded items lasted for approximately 20-30 seconds (e.g., Peterson & Peterson, 1959). Although the STM concept did receive empirical support, findings indicated that short-term and long-term memory (LTM) overlapped in many ways (see Melton, 1963).

Therefore, the primary/secondary memory distinction was developed by Waugh and Norman (1965) to better explain the findings of memory research. They argued for the need to distinguish between STM and PM, suggesting that the former actually refers to the tasks and what they are assessing, whereas the latter refers to the underlying memory store. That is, STM refers to an experimental situation in which, typically, a small amount of information is retained over a short period of time. Although only a brief period of time may elapse between encoding and recall, this is often sufficient time for the information to be transferred to SM, while also being maintained in PM through the act of rehearsal. Consequently, when a study refers to a STM task, it will frequently be assessing both PM and SM, whereas LTM tasks assess only SM, as the information in PM will have decayed or been overwritten.

The above distinction explains why some tests of STM (i.e., those testing secondary memory) display age-related changes and others (i.e., those accessing only primary memory) do not. It may also explain why some researchers report that short-term memory (STM) is

affected by aging (e.g., Robertson, 1987; Siegfried, 1985). The reader interested in a more complete discussion of the relationship between STM/LTM and primary/secondary memory is referred to Baddeley (1990) and Craik (1977).

Baddeley (1986) discussed the equivocal findings concerning STM and aging, but from a slightly different perspective. He indicated that elderly people appear to be relatively unimpaired on many of the standard tests of STM, such as the digit span forward test. He suggests that these tests are insensitive to age-related changes because they reflect more passive forms of storage (i.e., STS). Hence, when STS is being assessed, age-related differences are not evident (see Baddeley, 1986 for a review). However, when tests of STM require active manipulation of information (i.e., digit span backwards) or division of attention, age-related deficits are usually apparent (e.g.. Craik, 1977; Dobbs & Rule, 1989; Gick, Craik, & Morris, 1988; Morris, Gick, & Craik, 1988; Wright, 1981). In contrast to STS, this latter aspect of memory has come to be known as "working memory" (e.g., Baddeley, 1986).

According to Baddeley (1986), working memory

differs from the notion of STS primarily in the emphasis placed on the active manipulation of information, rather than on simple storage capacity. Nevertheless, it must be recognized that working memory does have storage components and, therefore, could be considered to encompass STS. The following section briefly elaborates on Baddeley's model of working memory.

Working Memory

Baddeley (1990) developed the working memory model partly in response to the inability of the modal model to account for certain research findings, alluded to earlier in the paper, centering around its STS component. Baddeley, and others, believed that a mechanism of greater complexity than the STS, but still separate from the LTS, could account for these findings.

Baddeley and Hitch (1974), and more recently Baddeley (1986, 1990), have postulated that the constituent parts of their model are the "central executive", the "articulatory loop", and the "visuo-spatial sketchpad". The articulatory loop is considered to specialize in the processing of language

material whereas the visuo-spatial sketchpad (VSSP) is concerned with visuo-spatial memory. The storage aspect of working memory is contained within these component parts. However, the most important component of working memory is the central executive. The articulatory loop and the VSSP are considered slave systems of the central executive, being under the central executive's control.

According to Baddeley (1986), the central executive is considered to be the controller of all cognitive processing. It is the component of working memory that is responsible for the selection, organization, activation, and inhibition of cognitive processes. Moreover, it controls the active manipulation aspects of working memory (Baddeley & Hitch, 1974; Baddeley, 1986).

Working memory capacity is commonly measured using tasks requiring the simultaneous storage of recently presented material and processing of additional information (Hultsch & Dixon, 1990). For example, Baddeley and Hitch (1974) developed a task requiring subjects to hold a certain number of items in memory (e.g., digits, letters, phrases), verify several

sentences, and then recall the items. The dependent measures included verification latency and accuracy, and number of items recalled. One of the main conclusions from their study was that working memory has limits on both its storage and processing capabilities.

Morris, Gick and Craik (1988) employed a modified version of Baddeley and Hitch's (1974) task. They had subjects rehearse word lists of varying length aloud while they verified sentences. In this way they eliminated the possibility that subjects would be switching back and forth between memory and verification operations. Instead of measuring memory of words as the dependent measure, since memory of the words would almost always be perfect, they measured the latency of sentence verification. In this task the concurrent memory load was varied from zero to four words, as was the grammatical complexity of the sentences to be verified.

Both the Baddeley and Hitch (1974) task and Morris, Gick, and Craik's (1988) modified version of that task, attempted to assess both working memory storage capacity and central executive processing

ability. They considered the recall of the concurrent load and its effect on the verification task to be tapping working memory storage capacity, whereas manipulation of grammatical complexity and its effect on verification latency was assumed to assess the active processing aspects of working memory.

Daneman and Carpenter (1980) developed a slightly different task than either of those mentioned above. They developed a task in which subjects had to read aloud a series of sentences, memorizing the last word of each sentence as they read. After having read the sentences, subjects were required to free recall the words in the order in which they had occurred. The dependent measure for this task was the number of final words recalled. They then conducted a second study in which they required subjects to verify the sentences being read, followed by recall of the final words. This modified version of the task was employed by Gick, Craik, and Morris (1988) who varied the pace at which the sentences were read, the number of sentences per series, and grammatical complexity of the sentences. Similar to the study by Morris, Gick, and Craik (1988), the dependent variables consisted of sentence

verification latency and accuracy, and the number of words recalled. However, in this case greater emphasis was placed on the number of words recalled.

One final example is a task developed by Dobbs and Rule (1989). Their task differs from the others in that it does not depend on specific skills such as reading. Rather, subjects are required to memorize a series of numbers presented auditorally while simultaneously recalling the digit 0, 1, or 2 positions previous. For example, in the 0-lag delay, the subject is required to repeat each digit immediately after it is presented, whereas in the 1-lag delay, the subject is required to repeat the number that was one prior to the digit just presented. For each lag condition (i.e., 0, 1, 2), the dependent measure is the number of digits recalled to first error up to a possible score of 10. Two trials are given at each lag condition to increase the likelihood of obtaining an accurate assessment of working memory capacity. This task is assumed to maximize the burden placed on the central executive while minimizing the load on storage capacity.

As mentioned previously, the concept of working

memory was established to explain various findings for which the STS was unable to account. Since its conception, working memory has proven itself as a concept capable of accounting for most of the relevant research findings (see Baddeley, 1986; 1990). Included in these findings for which working memory provides a sound explanation is the finding that relatively slight age differences are exhibited on tasks such as forward digit span and free recall recency, but that substantial age-related deficits are displayed on tasks that require more active manipulation of information or division of attention (e.g., Craik, 1977). Included in the latter category are the working memory tasks discussed above (e.g., Dobbs & Rule, 1989; Gick, Craik, & Morris, 1988; Morris, Gick, & Craik, 1988). The following section will examine these differences.

Age Related Changes in Working Memory

Although Baddeley (1986) acknowledged that other aspects of memory are affected by aging, such as secondary memory, he hypothesized that any age-related decline in working memory efficiency may have far-reaching effects because of the central role of working memory as the controller of all cognitive

processing. It is the central executive that Baddeley suggests is the component of working memory that is sensitive to age-related changes.

Baddeley (1986) suggested that normal age-related changes in the central executive might be due to a decline in overall processing capacity. Although such an interpretation has received some support in the past (e.g., Wright, 1981), researchers have begun to question the usefulness of a unitary resource concept (e.g., Gick, Craik, & Morris, 1988; Morris, Gick, & Craik, 1988; Salthouse et al., 1988). The results of the previously discussed studies by Gick, Craik, and Morris (1988) and Morris, Gick, and Craik (1988) support Baddeley's suggestion that it is the central executive and not the storage component of working memory that is affected by age. However, while their results indicated that increased sentence complexity produced age-related declines in sentence verification latency, an increase in concurrent memory load (i.e., words to be recalled) did not. Therefore, they argued that age-related working memory deficits could not depend on a single set of processes, as Baddeley suggested. They speculated that many task-specific

resource pools may exist rather than one general pool (Morris, Gick, & Craik, 1988).

Dobbs and Rule (1989) have offered an alternative hypothesis that emphasizes a possible reduction in the speed or "agility" with which processing changes can occur rather than a reduction in overall resources. They further clarify their point by suggesting that the reduction is not in the speed of processing per se, but in the speed or agility of effecting changes in processing that is important. They suggest divided attention studies having one or both tasks that rely on the passive storage components of working memory may not show age-related deficits, but pairings of tasks that necessitate continuous and rapid shifts in processing are most likely to reveal age differences. This hypothesis is consistent with the findings of Morris, Gick, and Craik (1988) and Gick, Craik, and Morris (1988).

Regardless of how aging affects working memory, whether it involves reduced resources, reduced "agility", a combination of the two, or some other factor(s), it is clear that age-related deficits do exist.

Having noted some of the memory deficits associated with normal aging, the effects of depression on memory will now be discussed.

Depression-Related Memory Changes

Researchers have attempted to assess the effect of depression on both quantitative and qualitative aspects of memory. When assessing quantitative changes in memory, researchers are concerned with the amount of information encoded and retrieved; whereas an assessment of qualitative changes in memory focuses on the type of information processed. Much more research has been conducted on quantitative memory changes in elderly depressives than on qualitative shifts.

A discussion of the qualitative shifts in memory will be preceded by an examination of the quantitative changes. The literature reviewed will include studies of both young and elderly adults; the population employed will be specified as necessary.

Quantitative Changes

A review of the research literature concerning quantitative changes in memory reveals inconsistent results. Some studies report that there is a memory deficit associated with depression (e.g., Cohen,

Weingartner, Smallberg, Pickar, Murphy, 1982; Hart, Kwentus, Taylor, & Harkins, 1987; Hart, Kwentus, Wade, Hamer, 1987; Henry, Weingartner, & Murphy, 1973; Kennelly, Hayslip, & Richardson, 1985; Raskin, Friedman, Dimascio, 1982; Sternberg & Jarvik, 1976; Stromgren, 1977; Weingartner, 1986; Weingartner, Cohen, Murphy, Martello, Gerdt, 1981; Williams, Little, Scates, Blockman, 1987) whereas other studies do not (e.g., Kahn, Zarit, Hilbert, & Niederehe 1975; Miller & Lewis, 1977; Niederehe, 1986; O'Hara, Hinrichs, Kohout, Wallace, Lemke, 1986; Popkin, Gallagher, Thompson, & Moore, 1982; Roth & Rehm, 1980; West, Boatwright, & Schleser, 1984).

This inconsistent pattern of results may reflect methodological differences (e.g., Isaak, Rule, & Dobbs, 1990; Niederehe, 1986; Raskin, 1986), such as the following: a) differences in the control of drug consumption and electroconvulsive therapy (ECT), both of which may negatively influence memory performance; b) differences in level (mild vs. severe) and type (e.g., unipolar vs bipolar) of depression; c) measures of depression, some of which are more suitable than others for geriatric populations; and d) memory tasks

used, which can vary in their sensitivity to depression (e.g., automatic vs. effort-demanding memory tasks).

As a result of these equivocal findings, a consensus has not yet been reached concerning depression-related memory deficits. Regardless, researchers on both sides of the issue have developed several hypotheses to explain their findings.

Cognitive Interference. Several different theories have been advanced to explain the effect of depression on memory. One hypothesis is that the memory deficit is a result of cognitive interference, suggesting that the depressed patient experiences intrusive thoughts that disrupt normal cognitive processes (See Miller, 1975). Although the particular hypothesis of intrusive thoughts causing memory deficits has not evolved much, at a more general level several researchers have advanced the hypothesis that an attentional deficit results in the apparent memory deficits (e.g., Cohen et al., 1982; Friedman, 1964; Kelley, 1986; Niederehe 1986). Whether or not this attentional deficit is the result of intrusive thoughts is unspecified, although Kelley (1986) does mention it as a possibility.

Kelley (1986) hypothesized that the memory complaints of elderly depressives stem partially from their lack of attention to their environment. Based on this hypothesis, she concluded that short intentional memory tests may not always demonstrate memory deficits since depressed subjects may be able to focus their attention for brief periods of time. In contrast, she hypothesized that a test of incidental memory with no particular orienting instructions would be more sensitive to detect an attentional deficit. Kelley tested this by allowing subjects to look at a collection of photographs. The only instructions received by the subjects were that they were to imagine themselves browsing through photographs in a magazine or wandering through an art gallery. Kelley found that the elderly depressives showed a large decrement in incidental recall in comparison with normal subjects. Unfortunately, Kelley (1986) provided very few details of the study, such as sample demographics, depressive criteria, whether or not depressed and nondepressed subjects differed in performance on tests of intentional memory, and so on. Therefore, although this study is interesting, it needs to be interpreted

cautiously.

Whereas the above study addressed the hypothesis of an attentional deficit, many of the findings that ostensibly support such a hypothesis come from studies that indicate that depression has a differential effect on the stages of secondary memory, particularly encoding and retention (Cronholm & Ottosson, 1961; Hart, Kwentus, Taylor, & Harkins, 1987; Henry et al., 1973; Sternberg & Jarvik, 1976; Whitehead, 1973).

For example, Hart, Kwentus, Taylor, & Harkins (1987) hypothesized that motivational and attentional deficits in depressed elderly subjects would be expected to have maximum impact on learning efficiency rather than on the retention of well-learned material. In a very well-controlled study, Hart et al. compared 10 subjects with major affective disorder with normal controls on a battery of cognitive tasks including a Rate of Forgetting Test in which subjects where shown slides of line drawings. Subjects were criterion tested for recognition memory of 8 slides randomly selected from the original stimulus set and 8 distractor slides. If subjects did not correctly identify a certain proportion of slides, they were

given additional study time and retested, to insure that all subjects had reached an equivalent level of slide recognition. Recognition memory was then tested at intervals of 10 minutes, 2 hours, and 48 hours.

Hart et al. found that depressed subjects and normal controls did not differ significantly in their performance on the recognition memory task at any of the three intervals. Interestingly, however, they did find that depressed subjects took significantly longer than did normal controls to reach the criterion level, supporting their hypothesis that depressed individuals would have difficulty learning new material as opposed to retaining that which is well-learned. These findings are consistent with those from earlier studies (Cronholm & Ottosson, 1961; Sternberg & Jarvik, 1976; Whitehead, 1973) in which both young and elderly adult depressives were found to perform relatively more poorly on tasks assessing immediate recall rather than delayed recall. Similarly, Henry et al. (1973) reported that depressed subjects experienced a learning impairment. The consensus from these studies is that encoding is affected by depression, whereas retention is not, and that this is consistent with the hypothesis

of an attentional deficit.

Motivational Deficit. A second hypothesis mentioned by Miller (1975) is that the reduced motivation associated with depression produces the memory deficit. This position has been developed by other researchers who postulate that memory impairments reflect a general deficit in central motivational state (Cohen et al., 1982; Hart, Kwentus, Taylor, & Harkins, 1987; Hart, Kwentus, Wade, Hamer, 1987; Raskin, 1986; Raskin et al., 1982; Weingartner, 1984; Weingartner, 1986; Williams et al., 1987). According to this hypothesis, depressed subjects will perform better on memory tasks requiring less motivation in the form of sustained effort. Conversely, a more effort-demanding memory task is hypothesized to increase the magnitude of the memory deficit.

This hypothesis is very frequently discussed in conjunction with the attentional hypothesis (e.g., Cohen et al., 1982; Hart, Kwentus, Taylor, & Harkins, 1987; Hart, Kwentus, Wade, Hamer, 1987; Kelley, 1986; Raskin, 1986; Raskin et al., 1982; Sternberg & Jarvik, 1976; Weingartner, 1984; Weingartner, 1986; Williams et al., 1987) as attention can easily be subsumed under

the concept of motivation. That is, a task with high attentional demands would also require greater effort to perform and, therefore, would be affected by a deficit in central motivational state.

Cohen et al. (1982) conducted a study with the specific intent of determining whether a general deficit in the central motivational state could account for the memory deficits observed in depression. They administered memory and motor tasks to 16 adult subjects (3 males, 13 females) who ranged in severity of depression as determined by both clinician rating and self-report questionnaires. The motor task involved squeezing a dynamometer both at maximum strength and at half strength for a sustained duration. The memory task involved the presentation of 40 Peterson and Peterson (1959) trigrams (i.e., a nonsense syllable consisting of three different consonants). For each trigram, the subject was asked to recall the trigram following one of five (0, 3, 6, 9, or 18 s) different time intervals after presentation. During the waiting period a short distractor task was employed (counting backwards from 200 by 3's). They found that level of depression was negatively correlated with both

peak motor response and even more with sustained motor performance, as well as with memory performance. Thus, in support of their hypothesis, the results indicated that depression-related impairment was most noticeable on those subtasks that required greater sustained effort (i.e., sustained motor performance and memory of trigrams over the longer time durations).

Although the Cohen et al. (1982) study was generally well-designed, the small sample size necessitated replication of their findings. This replication has been provided by several studies, including Raskin et al. (1982) who tested 277 depressed subjects on a battery of 13 psychomotor and cognitive tests. Subjects ranged in age from 16 to 70 years and had at least moderate levels of depression. As in Cohen et al.'s study, Raskin et al. found that deficits appeared when tasks required sustained attention and concentration, energy, or motivation.

Using a series of paired-associate word tests, Weingartner (1986) also supported the motivation hypothesis. In two of the tests, depressed subjects listened to 20 different concrete stimulus words. In response to each word, subjects were required to

generate a second word to create an associated word pair. In the first test, the word pairs (i.e., semantically related) required more cognitive effort to produce than those in the second test (i.e., acoustically related). Twenty minutes after processing words, a free-recall memory test was given. In a second pair of tests, depressed subjects were required to listen to 20 concrete words and then to organize and relate them. The first test required more cognitive effort as the words were unrelated in contrast to the second test in which the words were related. Memory recall was tested one hour after processing words. As in the aforementioned studies, the results revealed that depressed subjects learn and remember less information than normal controls only under effort-demanding conditions.

In relation to the above finding, Weingartner et al. (1981) found that depressed subjects failed to use encoding operations that would be useful in reorganizing input and that would then facilitate later recall. These authors argue that depressed individuals find it difficult to structure input when the form of presentation requires an active restructuring of input

events. Interestingly, this account is reminiscent of descriptions of age-related deficits in working memory.

Further support for the motivational deficit hypothesis can be found in the Hart, Kwentus, Taylor, and Harkins (1987) study discussed previously. To reiterate, Hart et al. hypothesized that motivational and attentional deficits in depressed elderly subjects would be expected to have maximum impact on learning efficiency rather than on the retention of well-learned material. In support of this hypothesis they found that depressed subjects took significantly longer than normal controls to reach the criterion level on a recognition memory task, supporting their hypothesis that depressed individuals would have difficulty learning new material as opposed to retaining that which is well-learned. As mentioned before, these findings are consistent with those from earlier studies (Cronholm & Ottosson, 1961; Henry et al., 1973; Sternberg & Jarvik, 1976; Whitehead, 1973).

Learned Helplessness. A third hypothesis discussed by Miller (1975) is based on the behavioral model of learned helplessness. Proponents of this hypothesis have postulated that depressed patients

perform poorly on memory tasks because they perceive reinforcement to be response independent and, therefore, they do not bother trying as responding is useless (See Miller, 1975). The perception of response independence (i.e., helplessness) is assumed to result in both motivational and cognitive deficits. Since the mid 1970's, few researchers (e.g., Sternberg & Jarvik, 1976) have employed this hypothesis to explain depression's effect on memory. In fact, Cohen et al. (1982) question this hypothesis, suggesting that it is unnecessary to postulate the mediating cognitive concept that subjects learn that nothing they do matters. Nevertheless, some researchers (e.g., Kennelly et al., 1985) have inverted this hypothesis to explain how response dependent reinforcement can counteract the fatigue effects exacerbated by depression that produce memory deficits.

Related to the "learned helplessness" hypothesis are findings that depressed individuals seem to demonstrate a low willingness to guess, often referred to as cautiousness or a conservative response bias (Miller & Lewis, 1977; Niederehe, 1986). The research conducted by Miller & Lewis (1977) led them to propose

that the apparent memory deficit due to depression was a result of a low willingness to guess on the part of the depressed subjects rather than a true memory deficit. Similarly, researchers have found that depressed subjects tend to make errors of omission rather than commission (e.g., La Rue, 1982; Niederehe, 1986; Whitehead, 1973), again suggesting that depressed individuals are reluctant to guess. Interestingly, these same arguments have been made of the elderly.

It is apparent that all three of the above hypotheses suggest that memory deficits in depression are fundamentally deficits in attentional and motivational processes. This concurs with Cohen et al.'s (1982) conclusion that it may be unreasonable to hypothesize specific memory deficits in depression separable from the general deficits of motivation, drive, and attention.

Memory Complaints. As previously mentioned, many researchers have not found depression to significantly affect memory performance (e.g., Kahn, Zarit, Hilbert, & Niederehe 1975; Miller & Lewis, 1977; Niederehe, 1986; O'Hara, Hinrichs, Kohout, Wallace, Lemke, 1986; Popkin, Gallagher, Thompson, & Moore, 1982; Roth &

Rehm, 1980; West, Boatwright, & Schleser, 1984). Many of these researchers have found that depressed elderly subjects complained more about memory loss, but that complaints about memory had very little correlation with actual performance (Kahn et al., 1975; O'Hara et al., 1986; Popkin et al., 1982; West et al., 1984; Williams et al., 1987). In contrast, these researchers have found that memory complaint and depression are significantly correlated. One must be cautious with these latter studies since Popkin et al. (1982) used a fairly small sample, with only mild to moderate levels of depression, and West et al. (1984), who investigated the correlations between memory performance, self-assessment of memory, and affective status, utilized subjects with only a very limited range of depression. Caution is also indicated as more recent studies (e.g., Niederehe & Yoder, 1989) have reported that certain aspects of metamemory do correlate significantly with actual memory performance in depressed subjects.

Conclusion. The research literature reviewed above indicates that a parsimonious and consensual conclusion concerning the effect of depression on the quantitative aspects of memory is lacking at present.

It is apparent that attention and motivation are influential factors in determining a depressed individual's performance on memory tasks. Moreover, it seems that a depressed person's complaints about memory correlate more with level of depression than memory performance. Interestingly, some researchers have found that old age does not seem to magnify the effects of depression on memory (Niederehe, 1986; Stromgren, 1977).

Qualitative Changes

Compared to findings concerning quantitative changes in the memories of depressed individuals, studies assessing qualitative changes in memory have produced more consistent findings. Research with young adults suggests that both encoding (e.g., Derry & Kuiper, 1981; Hammen, Miklowitz, & Dyck, 1986) and retrieval processes (e.g., Teasdale & Fogarty, 1979) are modified by depression.

Encoding. Derry and Kuiper (1981) tested the memories of clinically depressed patients, nondepressed psychiatric control patients, and normal nondepressed individuals for both depressed and nondepressed personal adjectives. They varied the depth-of-

processing required for the adjectives by having individuals rate them for structural (i.e., lower- vs. uppercase letters), semantic (i.e., "Means same as a given word?"), and self-referent (i.e., "Describes you?") attributes. Their results indicated that self-referent encoding facilitates incidental recall of depressed, but not nondepressed personal adjectives among depressed individuals, while the opposite is true for nondepressed individuals.

Although the above findings have been supported by other research (Kuiper, Derry, & MacDonald, 1982; Kuiper, MacDonald, & Derry, 1983), Dobson and Shaw (1987) did not find depressed and nondepressed individuals to significantly differ with regard to the adjectives recalled. However, they also found that depressed subjects recalled significantly more words than the nondepressed subjects which is an atypical finding based on the research referred to previously under the quantitative memory section. This may suggest that their subjects were atypical and, therefore, that their findings lack generalizability.

Retrieval. Similar to the findings concerning encoding, it has been reported that depression also

modifies retrieval processes. Much of this research has focused either on the effects of induced moods or clinical depression on the retrieval of autobiographical memories.

The induction of depressed mood has been shown to increase the retrieval of unpleasant, but not pleasant episodic memories (e.g., Bower, 1981; Snyder & White, 1982; Teasdale & Fogarty, 1979). For example, Teasdale and Fogarty (1979) induced happiness or sadness in their subjects and then instructed them to retrieve either a happy or sad personal memory when prompted with a stimulus word. They found that memories congruent with the subject's mood state were retrieved faster than memories that were incongruent with mood state.

In a like manner, Snyder and White (1982) induced happiness and sadness in their subjects and found that participants in the happy condition reported significantly more happy memories than the participants in the sad condition. In contrast, participants in the sad condition reported significantly more sad memories than participants in the happy condition.

In contrast to the above findings, some

researchers suggest that mild depression or induced negative mood states do not result in the recall of congruently valenced events, or do so to a lesser extent than do positive mood states (e.g., Hasher, Rose, Zacks, Sanft, & Doren, 1985; Isen, 1985). The reader is referred to Isen (1985) for a discussion of the possible reasons for this assymetry in the effects of positive and negative mood states on the memory for mood-congruent events. Nevertheless, mood does seem to influence the retrieval of affectively valenced events to some degree. Furthermore, it may be a question of severity, as the studies that follow indicate that depression, as opposed to induced negative moods, modifies autobiographical memory.

In a longitudinal study, Fogarty and Hemsley (1983) had depressed subjects and nondepressed controls recall memories in response to stimulus words. They found that depressives showed an increased probability of recalling sad memories when compared with normal controls. Moreover, there was a significant relationship between severity of depressed mood and the percentage of sad memories. This finding is consistent with the suggestion that mild depression and induced

negative moods may not qualitatively affect memory. The second testing occasion revealed a significant relationship between reduction in depressed mood and an increase in the recall of happy memories and a decrease in the recall of sad memories.

Williams and Broadbent (1986) examined the autobiographical memories of people who had recently attempted suicide. They utilized a cue-word paradigm in which subjects retrieved autobiographical memories in response to the names of positive and negative emotions. This strategy has been found to be an effective way of prompting subjects to recall appropriately valenced memories (e.g., Robinson, 1976). They found that the overdose group differed from the control groups not in the speeded retrieval of negative memories but in the delayed retrieval of positive memories. Moreover, the recollections of the overdose group contained a greater proportion of general situational as opposed to detailed memories for both negative and, particularly, positive cue words.

The above findings were echoed by Williams and Scott (1988) who employed the same autobiographical memory test with subjects diagnosed with Major

Depressive Disorder. That is, depressives took longer to respond to positive than to negative cue words, and they were more general in their memories, especially in response to positive cue words.

Most recently, it has been reported that depression in university students is associated with shifts in the organization of autobiographical memory such that recalled positive events are more thematically similar than recalled negative events (McAdams, Lensky, Daple, & Allen, 1988). According to Tomkins' (1979) script theory, these effects reflect a more varied and hence 'rich' construction of negative autobiographical memories by depressed individuals.

Present Study

Although a large number of the studies of quantitative differences in the memory performance of depressed individuals have focused on elderly people, few if any of the studies of qualitative differences have utilized elderly people. Therefore, having found relatively consistent results with younger adults, research is now needed to determine whether or not elderly subjects experience the qualitative shifts in memory. If consistent results can be found with

elderly adults, these qualitative differences may be more useful for diagnostic purposes than the more inconsistent findings obtained from studies of quantitative changes.

This study was designed to assess both quantitative and qualitative changes in memory in both young and old adults reporting both high and low levels of depressive symptoms (DS). The participants with low symptom levels would be classified as nondepressed whereas those with high symptom levels would range from mild depression or dysphoria to more severe depression. Johnson, Weissman, and Klerman (1992), utilizing 18,571 participants from the Epidemiologic Catchment Area Study, found that subclinical levels of depressive symptoms resulted in as much or more service burden (e.g., medical and mental health care) and impairment than did clinical conditions of depression or dysthymia. Therefore, the need for improved diagnostic techniques with this population is indicated.

Quantitative changes in memory were partially assessed using a working memory task developed by Dobbs and Rule (1989). As mentioned previously, this task has been found to reveal significant age-related

changes in nondepressed individuals (Dobbs & Rule, 1989), but it did not distinguish depressed from nondepressed elderly participants (Isaak, Rule, & Dobbs, 1990). In the present study, age-related changes as well as the possible effects of subclinical levels of depression on working memory were reassessed.

Two tasks were used to investigate qualitative changes in memory. An adaptation of a self-referent encoding task (SRET) utilized by Dobson and Shaw (1987) was used to measure effects on content-specific encoding processes. Autobiographical memory was assessed with a cue-word task used by Williams and Broadbent (1986). This task has been found to differentiate between the memory retrieval of depressed and nondepressed middle-aged adults (Williams and Scott, 1988).

It was hypothesized that the results from the working memory task would replicate the findings by Dobbs and Rule (1989). Specifically, it was predicted that age-related differences would be found. Moreover, because of questions concerning the representativeness and size of the depressed sample in the study by Isaak, Rule, and Dobbs (1990), it was tentatively predicted,

despite their findings, that depression would produce modest performance deficits, with the high DS group experiencing more difficulty than the low DS group on the working memory task. This second hypothesis was based on evidence that depressed individuals perform poorly on tasks requiring effortful cognitive processing (Cohen, Weingartner, Smallberg, Pickar, & Murphy, 1982; Hart, Kwentus, Taylor, & Harkins, 1987; Hart, Kwentus, Wade, Hamer, 1987; Weingartner, 1984), a characteristic of the working memory task.

Studies of qualitative memory differences using elderly depressed subjects are rare, and theoretical considerations do not lead to a prediction of age-related differences. However, it was predicted that depressed participants would show qualitative memory deficits on mood incongruent but not congruent material. Thus an interaction between depression and type of material (congruent vs. incongruent) was predicted on the SRET as exhibited by younger adults in previous research (e.g., Derry & Kuiper, 1981). Similarly, it was predicted that depressed elderly subjects would take longer to recall positive events than to recall negative events on the autobiographical

memory task. Moreover, it was predicted that depressed elderly subjects would be less specific in their memories, especially in response to positive cues.

Method

Subjects

Sixty subjects were utilized in the study, being broken down into four groups of 15 subjects based on both age, young or elderly, and level of depressive symptoms, low or high. The four groups were equated as closely as possible for sex and education. Similarly, the low and high level depressive symptoms (DS) groups within both age groupings were equated for age.

The young adults who participated in this study consisted of University of Manitoba undergraduates enrolled in introductory psychology courses. Participation in research was a course requirement. The elderly adults were volunteers obtained through the six senior centres operated by Age and Opportunity in Winnipeg, Manitioba, as well as through two courses offered by Creative Retirement Manitoba.

Materials

Measures of Depressive Symptomatology

The Geriatric Depression Scale (Yesavage et al.,

1983) and the Center for Epidemiologic Studies -- Depression (Radloff, 1977), both self-report measures of depressive symptomatology, were used to assess the affective states of the subjects.

Geriatric Depression Scale. The Geriatric Depression Scale (GDS) consists of 30 yes/no questions (See Appendix A). The coefficient alpha for the GDS ranges between 0.82 and 0.93 indicating a reasonably high reliability coefficient for both young (17-55 years) and old (65+ years) adults (Lyons, Strain, Hammer, Ackerman, & Fulop, 1989; Rule, Harvey, & Dobbs, 1989; Yesavage et al., 1983). Yesavage et al. report a test-retest reliability coefficient of .85 with a one week interval between testing. As a test of convergent validity, Yesavage et al. (1983) and Rule et al. (1989) compared the GDS with the Zung Self-rating Depression Scale (SDS) and found correlations of .84 (elderly adults) and .67 (young adults), respectively. In studies of the diagnostic accuracy of the GDS compared with clinical diagnoses of major depression among elderly individuals, a cut-off score of 11 on the GDS has yielded a sensitivity (i.e., true positives for scores 11 and greater) ranging between 84%-92% and a

specificity (i.e., true negatives for scores below 11) between 89%-95% (Brink et al., 1982; Koenig, Meador, Cohen, & Blazer, 1988).

On the basis of the above studies, a score of 0 to 10 was viewed as within the normal, nondepressed range, 11 to 20 as mildly depressed, and 21 to 30 as severely depressed. For the present study, a cutoff score of 11 was used.

Center for Epidemiologic Studies -- Depression. The other depression scale that was employed was the Center for Epidemiologic Studies -- Depression (CES-D; Radloff, 1977) Scale (See Appendix B). The CES-D was designed for the general population as a measure of current level of depressive symptomatology, with emphasis on the affective component, depressed mood. The 20-item scale requires a frequency estimation for each depressive symptom over the past week. The instrument was normed on a sample of over 3000 respondents from the general population and 105 psychiatric patients. The CES-D has an internal consistency of .85 for the general sample and .90 for the psychiatric group. Test-retest correlations are reported to range from .51 to .67 when tested over two

to eight weeks and .32 to .54 when tested over three months to one year. The CES-D is reported to have excellent concurrent validity, correlating significantly with several other depression and mood scales. It also discriminated well between the psychiatric and general population.

Very little research has been conducted on this test regarding its reliability and validity with the elderly population. Himmelfarb and Murrell (1983) compared a community and a clinical sample of older persons (50+ years old) who were in psychiatric inpatient units. They found the CES-D to have an internal consistency of .85 for the community sample and .91 for the clinical sample. They also found the scale to discriminate well between the community and clinical samples. They found that 70% of the clinical sample and 14% of the community sample were above a cut-off score of 20. DeForge and Sobal (1988) reported a correlation of r=.69 between the CES-D and the ZUNG in the elderly. An attractive feature of the CES-D for the elderly population is the fact that it deemphasizes somatic complaints which are difficult to unambiguously interpret.

Although a cutoff score of 20 was indicated in the above study, other researchers have suggested that a score of 16 and above is reflective of depressive symptomatology (Weissman, Sholomskas, Pottenger, Prusoff, & Locke, 1977). Because interest in this study was primarily focussed on mildly depressed individuals, it was decided to employ the cutoff score of 16 for the CES-D.

Subject Selection Criteria

The definition of depression was initially determined to be a score of 11 or greater on the GDS and a score of 16 or greater on the CES-D. However, in the process of collecting data, it was discovered that few subjects scored above the cutoff criterion on both scales. This was particularly true among the elderly high DS group. Seven of the 15 elderly, and 4 of the 15 young, high DS adults did not score in the high DS range on the CES-D. Two others from the elderly group did not score in the high DS range on the GDS. The selection criteria were therefore relaxed to a score in the high DS range on at least one of the two self-report measures. The reader is referred to Appendix K for further details on the criterial changes.

Vocabulary Test

The vocabulary test employed in this study was the short version of the Mill-Hill vocabulary test (See Appendix C). It consists of 20 multiple-choice items, for each of which the participant must decide which of six words is synonymous with a given cue-word. Each item is worth one point.

Dependent Measures

Working Memory Task. The Dobbs-Rule task evaluated working memory by auditorily presenting a series of 10, 11, or 12 digits (depending on the lag condition) to the subject who was then asked to repeat them in one of three delays: 0-lag, 1-lag and 2-lag. In the 0-lag delay, the subject was required to repeat each digit immediately after it was presented. In the 1-lag delay, the subject was required to repeat the number that was one prior to the digit just presented. Finally, in the 2-lag delay condition, the subject was required to repeat the number that was presented two prior to the number just presented. Scores were based on the number of digits correctly recalled to the first error with a maximum score of 10 per lag condition. For each lag condition two trials were given and the

best score of the two trials was recorded. The numbers were presented auditorily using a tape recording that produced one number every two seconds. For a copy of the experimenter's instructions and the three series of digits used, refer to Appendix E.

Self-Referent Encoding Task. The Self-Referent Encoding Task (SRET) consisted of presenting subjects with a randomly ordered set of 18 depressed content and 18 nondepressed content adjectives (See Appendix F for the list of adjectives) and having them indicate (Yes/No) for each whether or not it was self-descriptive. The depressed and nondepressed content adjectives were matched for word frequencies (Kucera & Francis, 1967). The adjectives were presented on a computer monitor. For each adjective, the word "READY" appeared on the screen for three seconds, followed by a 500 millisecond blank screen, followed by the stimulus adjective. The subject was required to make a decision as quickly as possible, indicating his/her response by pressing one of two keys marked "YES" and "NO" on a computer keyboard. The adjective remained on the screen until a response was made. The response keys (i.e., YES and NO) were equidistant from a red dot on

the frame of the keyboard, a point to which the subject was required to return his/her index finger after each decision was made. Subjects were permitted to use only their right or left hands, not both. The reaction time for each decision was recorded by the computer. After each response, a blank screen appeared for three seconds followed by the next trial. Two filler words were included at the beginning and at the end of the task in order to reduce primacy and recency effects. The filler words were the same for each subject and were not included in the memory scoring. Following the completion of the list of adjectives, an incidental recall of the adjectives was required of all subjects. Subjects were given three minutes in which to recall as many words as possible. Hence, the recorded data includes which adjectives were considered self-descriptive, the reaction time for each adjective, and the number and kind (depressed vs. nondepressed content) of adjectives recalled.

Autobiographical Memory Task. The autobiographical memory task employed was the same as that used by Williams and Broadbent (1986) and Williams and Scott (1988). Five positive words (happy, safe,

interested, successful, and surprised) and five negative words (sorry, angry, clumsy, hurt, and lonely) were read to the subjects in an alternating order (i.e., happy, sorry, safe, angry, etc.; See Appendix G for the instructions and complete word list). Subjects were asked to retrieve a personal memory in response to each cue word. The latency to the first word of each response made by the subjects was recorded using a stopwatch. Subjects had 60 seconds per cue word in which to retrieve a specific autobiographical memory. If subjects did not respond in the available time, a time of 60 seconds was recorded. If a general response was given (e.g., to the cue word 'happy': 'I always feel happy at parties'), subjects were prompted to be more specific (e.g., 'Can you think of a specific time - one particular occasion?'). Williams and Broadbent (1986) found that this was a reliable method for distinguishing between general and specific memories (inter-rater reliabilities between .87 and .93). Practice items were given prior to beginning the task to ensure that subjects understood the requirements.

Procedure

An initial screening session was conducted with a

large group of individuals from which the smaller low and high DS groups were selected. Participants were told at the outset that some of them would be contacted for further testing. During the screening session, participants were asked to fill out a participation consent form (See Appendix L) the Geriatric Depression Scale (GDS), the Mill-Hill vocabulary test, and a demographics questionnaire (See Appendix D). The demographics questionnaire included questions concerning factors such as age, education, current medication, and health, as well as questions about self-assessed memory. At the end of the session the participants were thanked for their time and cooperation and were reminded that some would be contacted within a few days for further testing.

The depressed and nondepressed groups were selected based on their GDS scores. Moreover, the four groups were equated as closely as possible for sex and education. Similarly, the low and high level depressive symptoms (DS) groups within both age groupings were equated for age. Demographic data are presented in the results section.

Within a few weeks of the initial screening

session, selected subjects were contacted and sessions were scheduled. A one hour session was scheduled for each subject. The introductory psychology students were tested at the university whereas elderly adults were tested either at the Smith Street or St. Vital Senior Centres, or at the participants' homes.

Subjects first completed the GDS and the CES-D to assess current level of depressive symptomatology. Subjects were then tested on the memory tasks regardless of whether or not they were within the predetermined range of scores for their group. However, if this occured, a replacement subject was selected from the initial pool of subjects. Subjects were then assessed for performance on the Working Memory Task (WMT), the Autobiographical Memory Task (AMT), and the Self-Referent Encoding Task (SRET).

Following these tasks the subjects were debriefed and thanked for their time.

Results

Group Characteristics

Means and standard deviations for the four subject groups on the GDS, CES-D, and for age, education and vocabulary list score, are presented in Table 1.

Table 1:

Group Characteristics - Means and Standard Deviations

		Elderly		Young	
		Low DS	High DS	Low DS	High DS
N		15	15	13[a]	15
Male		4	4	5	5
Female		11	11	8	10
Age					
	M	68.07	71.47	18.62	18.27
	SD	5.39	6.80	1.33	1.22
GDS					
	M	1.47	12.93	0.85	16.33
	SD	0.92	3.08	0.99	2.13
CES-D					
	M	2.73	18.07	5.38	23.53
	SD	2.84	6.78	2.75	8.97
Composite					
	M	5.67	43.93	7.08	56.40
	SD	3.99	9.18	3.52	10.43
Education					
	M	12.33	12.93	12.00	12.13
	SD	2.06	2.05	0.00	0.52
Vocabulary					
	M	16.00	16.40	13.08	12.93
	SD	2.67	2.85	1.55	1.71

Note. GDS = Geriatric Depression Scale (Range = 0-30; 11 or greater considered mild to severe depression); CES-D = Center for Epidemiologic Studies -- Depression (Range = 0-60; 16 or greater considered mild to severe depression); DS - Level of Depressive Symptoms; [a] Two of the young low DS participants were eliminated from the analyses because their GDS scores were very low whereas their CES-D scores were very high.

Separate analyses of variance (ANOVAs) confirmed significant differences between the low DS and high DS groups for both the GDS and CES-D, with $F(1,54) = 638.62$, $p<.0001$ and $F(1,54) = 110.28$, $p<.0001$, respectively. Bonferroni t-tests conducted for the GDS and CES-D results revealed that the elderly high DS group reported significantly less depression than did the young high DS group. This is consistent with a literature which indicates that elderly adults underreport depression (e.g., Raschko, 1991).

A composite score based on both scales of depressive symptomatology was calculated to further delineate the group differences. This composite score was derived as follows:

$$\text{Composite score} = 2(\text{GDS score}) + \text{CES-D score}$$

The GDS score was multiplied by two to equate the total possible scores on both scales (i.e., 60). As with the GDS and CES-D, an ANOVA confirmed a significant difference between the low DS and high DS group composite scores, with $F(1,54) = 482.99$, $p<.0001$. See Table 1 for the results of the composite score group

means and standard deviations.

A correlational analysis was conducted on the data from the measures of depressive symptomatology. Of interest were the correlations between the scores of first and second administration of the GDS and between the scores of the CES-D and the second administration of the GDS. The test-retest correlation on the GDS was highly significant at .95, $p<.0001$. The correlation between the GDS and the CES-D was also highly significant at .81, $p<.0001$.

No significant differences were found between groups with regard to years of education; however, the elderly adults did score significantly higher than the young adults on the vocabulary test, $F(1,54) = 28.25$, $p<.0001$. The low and high DS groups within the separate age classes did not differ significantly with regard to age.

Although participants' use of psychoactive medication was not considered an exclusionary criterion for this study, participants were asked to report any medication currently being taken. Three elderly adults, two from the high DS group and one from the low DS group, reported use of mild tranquilizers. Reasons

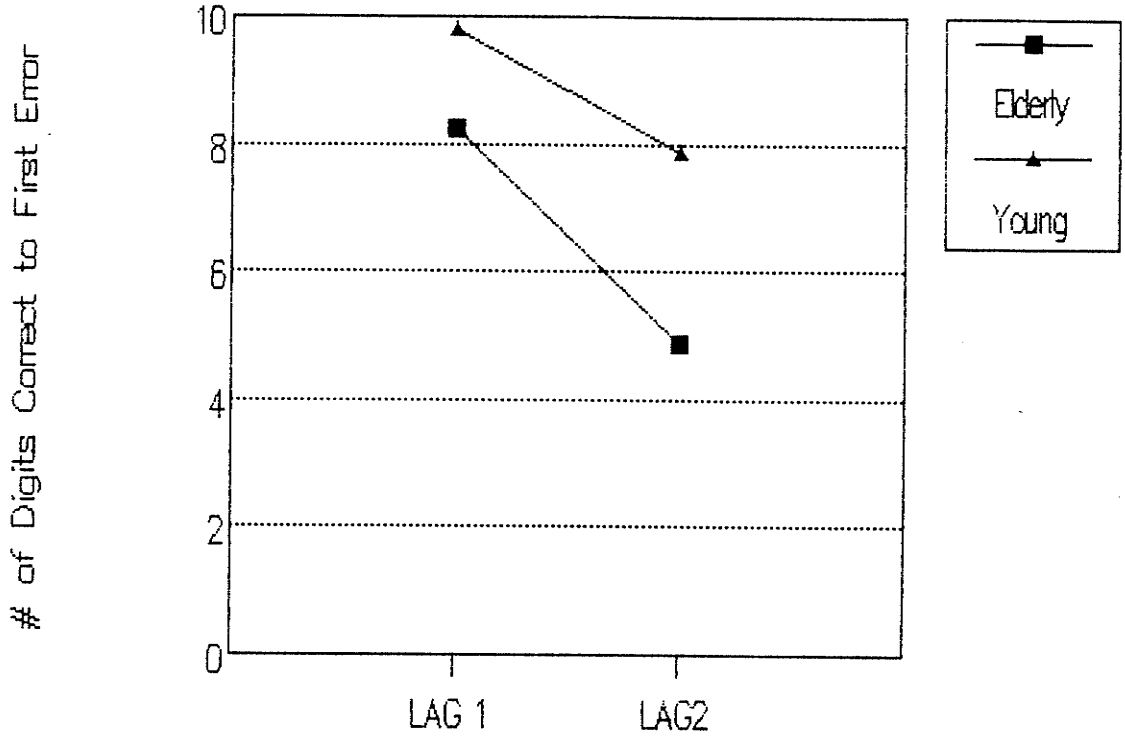
for medication included sleep and muscle relaxation.

Working Memory Task

An age (young, elderly) by level of depressive symptoms (low, high) by lag condition (1,2) 2 x 2 x 2 repeated measures analysis of variance (ANOVA), with lag condition as a within subjects variable, was conducted on the number of digits recalled to the first error (See Appendix H for a summary of the results). Only the lag 1 and 2 conditions were used in the analysis because all subjects obtained perfect scores on the lag 0 condition. A main effect of age was found with $F(1,54) = 16.67$, $p<.0001$. As expected, young adults scored significantly higher than the elderly adults on both lag conditions. Also as expected, a main effect of lag condition was found, $F(1,54) = 57.13$, $p<.0001$, with performance decreasing as lag increased. An age x lag condition interaction, $F(1,54) = 4.14$, $p<.05$, was found revealing that the performance of elderly subjects decreased more substantially than that of the young adults with the increase in lag (See Figure 1). No significant difference in mean performance was found between the low and high DS groups, nor were there any interactions involving level

FIGURE 1: Working Memory Task

Age x Lag Condition Interaction



of depressive symptoms. Group means and standard deviations are presented in Table 2.

Self-Referent Encoding Task

See Appendix I for a summary of the results to the statistical analyses described in this section on the self-referent encoding task (SRET). Group means and standard deviations are presented in Table 3.

Self-Referential Endorsement

An age (young, elderly) by level of depressive symptoms (low, high) by content (depressed, nondepressed) 2 x 2 x 2 repeated measures ANOVA, with content as a within subjects variable, was conducted on the number of adjectives rated as self-descriptive. As expected, a significant main effect of content was observed with $F(1,54) = 346.50$, $p<.0001$. Almost all participants, other than those most severely depressed, rated significantly more nondepressed content adjectives as self-descriptive than depressed content adjectives.

Also as expected, a significant content by depressive symptoms level interaction occurred, with $F(1,54) = 62.51$, $p<.0001$. The low DS group rated a greater number of nondepressed-content adjectives as

Table 2:

Working Memory Task - Group Means and Standard Deviations

		Elderly		Young	
		Low DS	High DS	Low DS	High DS
N		15	15	13	15
LAG 1					
	M	8.60	7.93	9.62	10.00
	SD	2.38	3.17	1.39	0.00
LAG 2					
	M	5.27	4.53	7.54	8.20
	SD	2.60	3.38	2.40	2.68

Note. DS = Level of Depressive Symptoms.

Table 3:

Self-Referent Encoding Task - Group Means and Standard Deviations

			Elderly		Young	
			Low DS	High DS	Low DS	High DS
N			15	15	13	15
Endorsement						
	NC	M	14.67	12.93	16.77	11.60
		SD	2.38	3.53	1.64	2.53
	DC	M	1.00	4.47	0.38	7.93
		SD	1.07	3.27	0.87	4.28
Reaction Time						
	NC	M	2.30	2.77	1.92	2.77
		SD	0.76	0.87	0.54	0.65
	DC	M	2.46	3.35	1.77	2.84
		SD	1.09	1.23	0.42	1.05
Words Recalled						
	NC	M	4.67	3.67	4.62	5.13
		SD	2.53	1.84	1.66	2.10
	DC	M	4.40	3.20	3.31	3.93
		SD	2.59	1.70	1.55	2.05
PWRS						
	NC	M	0.23	0.20	0.23	0.29
		SD	0.15	0.12	0.11	0.12
	DC	M	0.09	0.13	0.10	0.20
		SD	0.27	0.20	0.28	0.21
Total Recall						
		M	9.13	6.87	7.92	9.07
		SD	4.80	2.64	1.98	3.15

Note. DS = Level of Depressive Symptoms; Endorsement = Number of Words Rated as Self-descriptive; PWRS = Proportion of Words Recalled Rated as Self-descriptive; NC = Nondepressed Content; DC = Depressed Content.

self-descriptive, whereas the high DS group rated a greater number of depressed-content adjectives as self-descriptive.

A three-way interaction between age, depressive symptoms level, and content was revealed, with $F(1,54) = 11.01$, $p<.005$. The young participants endorsed adjective content that was congruent with their mood state to a greater extent than did the elderly participants. A Bonferroni t-test revealed that the participants in the young high DS group described themselves more negatively than did the participants in the elderly high DS group (See Figure 2), whereas the participants in the young low DS group described themselves more positively than did the participants in the elderly low DS group (See Figure 3).

Self-Referential Reaction Times

An age (young, elderly) by level of depressive symptoms (low, high) by content (depressed, nondepressed) 2 x 2 x 2 repeated measures ANOVA, with content as a within subjects variable, was conducted on the mean decision reaction time in judging the self-descriptiveness of the adjectives. A main effect of depressive symptoms level was found, with $F(1,54) =$

FIGURE 2: Self-Referent Endorsement of Depressed Content Adjectives

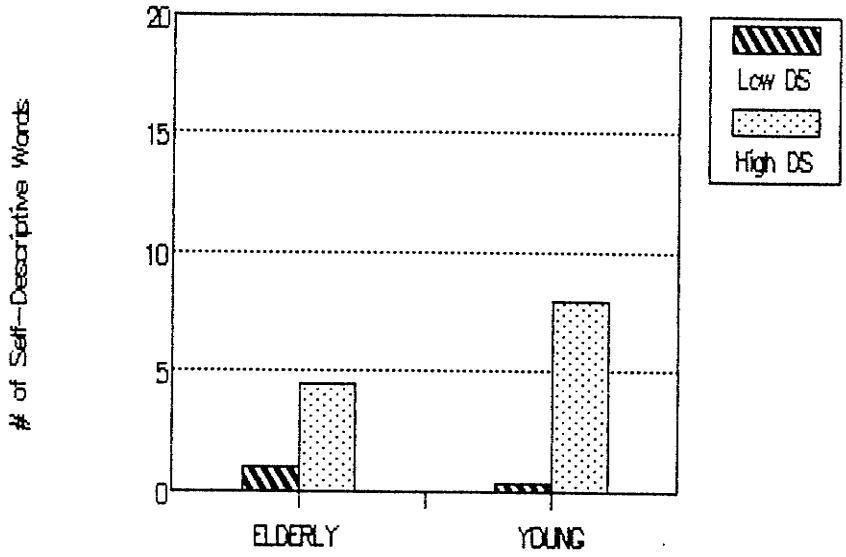
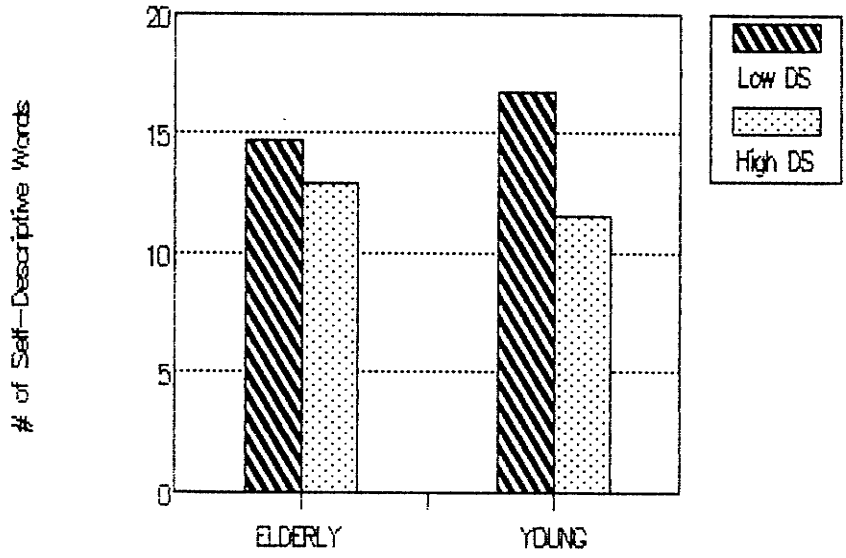


FIGURE 3: Self-Referent Endorsement of Nondepressed Content Adjectives



14.64, $p<.0005$. The low DS group was significantly faster, on average, than was the high DS group at making a decision on the self-descriptiveness of the adjectives.

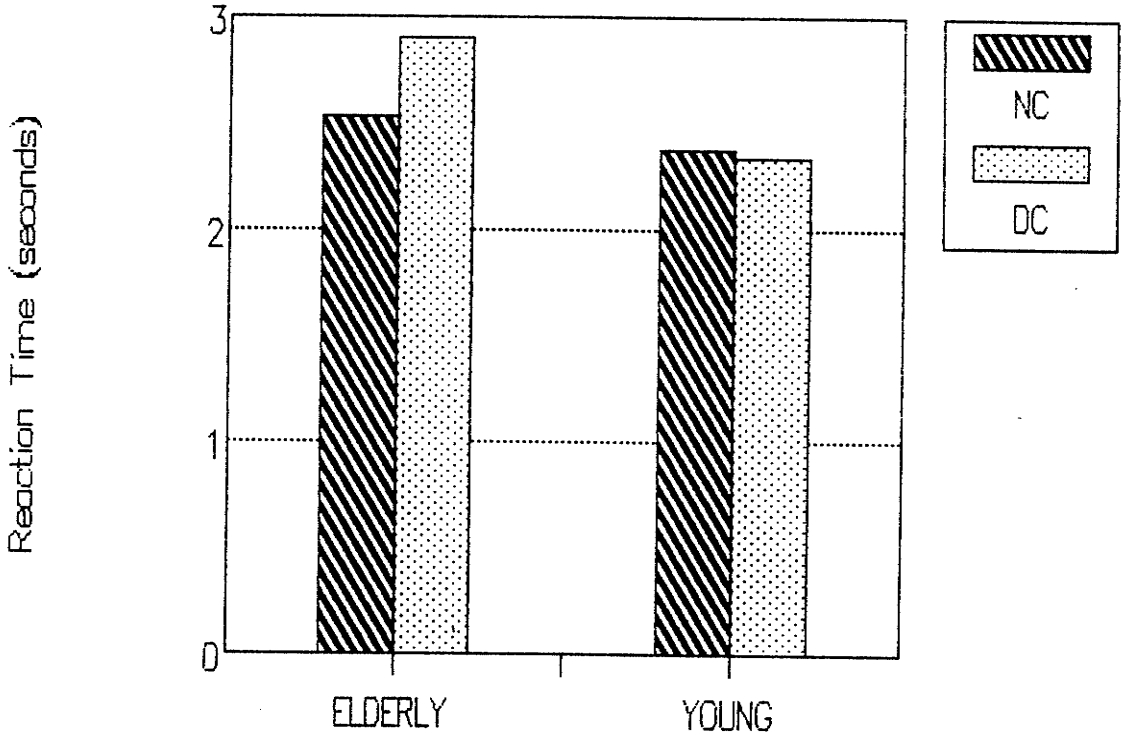
A marginal main effect of content, $F(1,54) = 3.65$, $p<.07$, revealed that, on average, the reaction times were faster for nondepressed than depressed content adjectives.

An interaction between content and age, $F(1,54) = 5.33$, $p<.05$ indicated that the two age groups differed significantly on their reaction time for the depressed content adjectives. The elderly adults took signicantly longer, on average, than did the young adults to make a decision concerning the self-descriptiveness of the depressed content adjectives. This age effect was, however, not observed with the nondepressed adjectives. See Figure 4 for a graphical representation of the reaction time data for both age groups.

Self-Referential Recall

An age (young, elderly) by level of depressive symptoms (low, high) by content (depressed, nondepressed 2 x 2 x 2 repeated measures ANOVA, with

FIGURE 4: Reaction Times for Depressed and Nondepressed Content Adjectives



content as a within subjects variable, was conducted on the number of adjectives recalled. A main effect of content, $F(1,54) = 6.70$, $p<.05$, revealed that, on average, all participants recalled more nondepressed than depressed content adjectives. However, a marginal age by level of depressive symptoms interaction was obtained, with $F(1,54) = 3.63$, $p<.07$. A Bonferroni t-test revealed that the high DS elderly group recalled significantly fewer words than did the elderly low DS and young high DS groups (See Figure 5).

A similar ANOVA on the proportion of adjectives recalled per set of adjectives rated as self-descriptive revealed only a main effect of content, with $F(1,54) = 8.77$, $p<.005$. That is, all participants recalled a greater proportion of nondepressed than depressed content adjectives.

Autobiographical Memory Task

See Appendix J for a summary of the results to the statistical analyses described in this section on the autobiographical memory task (AMT). Group means and standard deviations are presented in Table 4.

An age (young, elderly) by level of depressive symptoms (low, high) by content (positive, negative) 2

FIGURE 5:

SRET - Total Recall

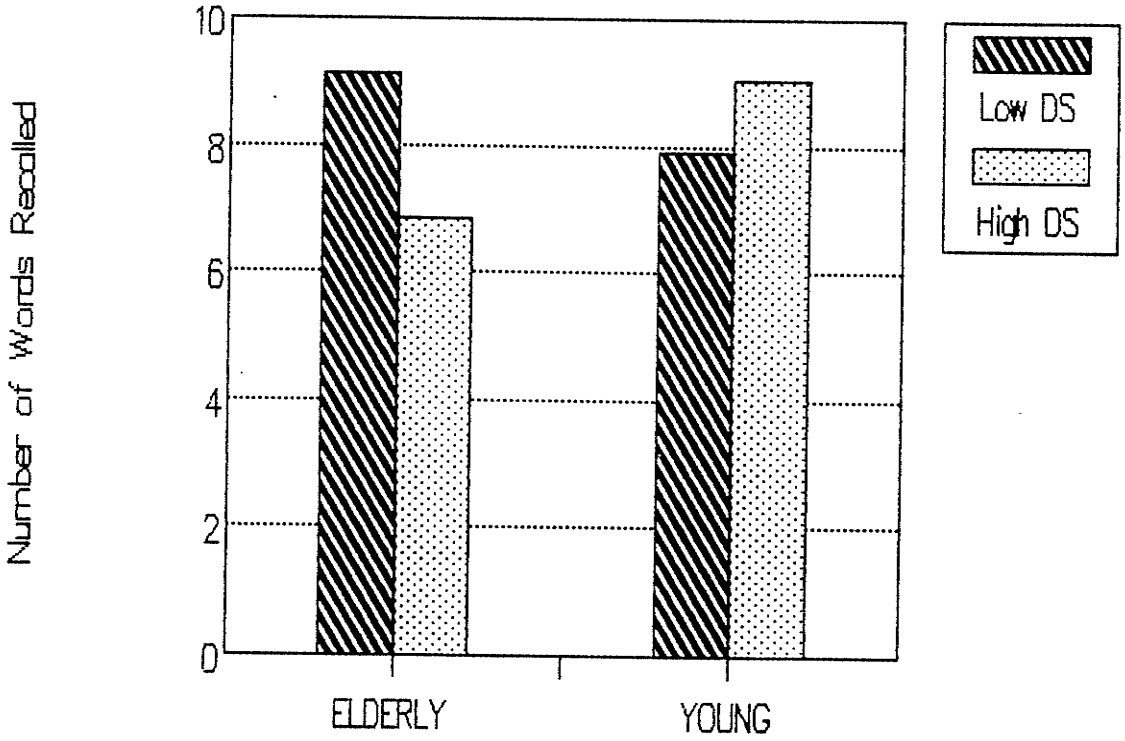


Table 4:

Autobiographical Memory Task - Group Means and Standard Deviations

		Elderly		Young	
		Low DS	High DS	Low DS	High DS
FRL					
NC	*M*	14.80	10.68	14.66	12.99
	SD	8.32	4.93	12.15	8.97
DC	*M*	18.81	12.87	11.23	10.96
	SD	7.85	7.70	3.67	6.60
FRS					
NC	*M*	3.20	3.00	4.08	4.27
	SD	1.74	1.56	0.76	0.96
DC	*M*	3.33	2.67	4.23	4.27
	SD	1.54	1.45	1.36	0.96

Note. DS = Level of Depressive Symptoms; FRL = First Response Latency; FRS = Number of First Responses that were Specific Autobiographical Memories; NC = Nondepressed Content; DC = Depressed Content.

x 2 x 2 repeated measures ANOVA, with content as a within subjects variable, was conducted on the mean latency to make a first response to the cue-word. An interaction between content and age, $F(1,54) = 5.87$, $p<.05$, revealed a significantly longer mean latency to first response for the elderly group on the set of negative cue-words but not for the set of positive cue-words. See Figure 6 for a graphical representation of the first response latency data for both age groups on the positive and negative cue-words.

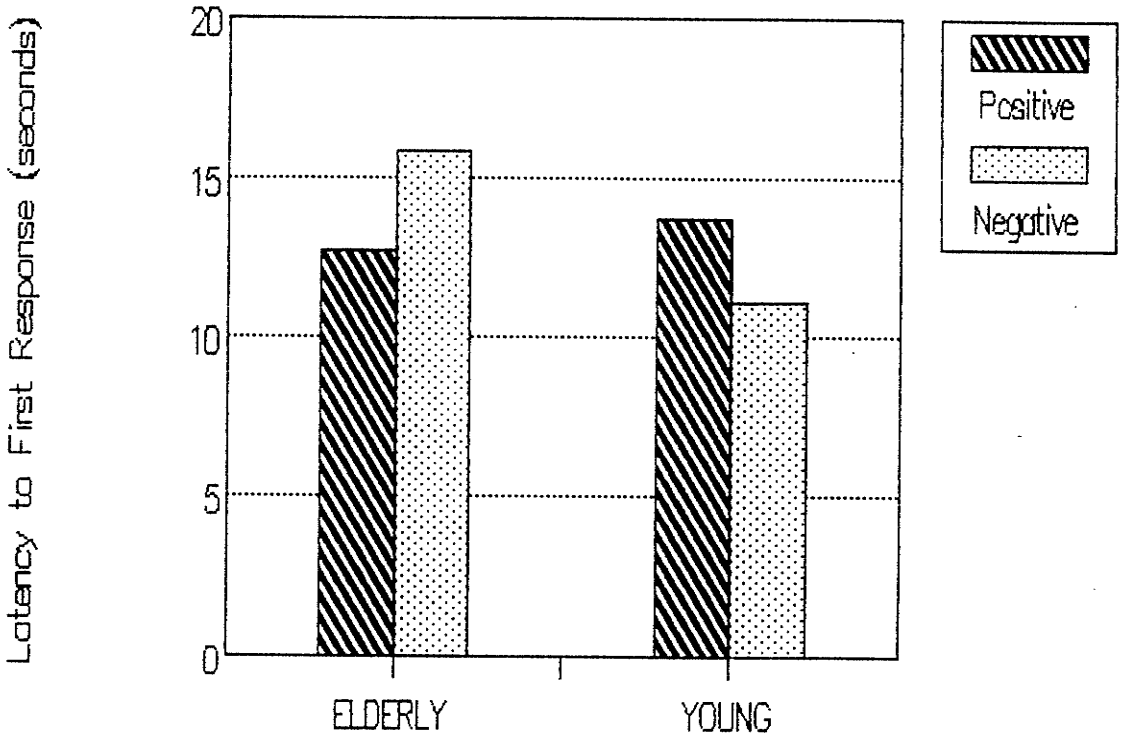
A similar 2 x 2 x 2 ANOVA conducted on the mean number of first responses which were specific autobiographical memories indicated a main effect for age, $F(1,54) = 13.93$, $p<.0005$. Young adults gave a greater number of specific first responses than did elderly adults.

Discussion

Group Characteristics

The difficulty experienced in obtaining elderly participants for the high DS group likely owes to the fact that the elderly adults were volunteers whereas the young adults were influenced by academic contingencies for participation. This reasoning is

FIGURE 6: AMT – First Response Latency for Positive and Negative Cue-Words



supported by the fact that several elderly adults scoring in the high DS range refused to participate in the completion of the memory tasks (i.e., the second phase of the study), whereas only one young adult would not participate. It was apparent that elderly adults with higher GDS and CES-D scores were much less likely to agree to complete the memory tasks than any of the other groups. These results support other researchers and clinicians who have described the elderly as unwilling consumers who minimize and underreport depressive symptoms and personal difficulties (e.g., Lasoski, 1986; Raschko, 1991).

The significantly higher vocabulary score achieved by the elderly adults is not unexpected. The superior vocabulary level of older adults is a commonly reported finding. Moreover, it is likely a reflection of the well-educated elderly population sampled, many of whom were obtained as participants through various university level courses being offered by Creative Retirement. Relatedly, a number of elderly participants indicated that they enjoyed vocabularly tests, stating that they would often self-administer the Reader's Digest vocabularly tests.

Working Memory Task

The difference in performance between the two age groups on the working memory task (WMT) is consistent with previous findings (Dobbs & Rule, 1989) and with our predictions. However, the prediction that modest performance differences would be seen between the low and high DS groups was not supported (see also, Isaak, Rule, & Dobbs, 1990). Research suggests that depressed individuals perform poorly on tasks requiring effortful cognitive processing (Cohen et al., 1982; Hart, Kwentus, Taylor, & Harkins, 1987; Hart, Kwentus, Wade, Hamer, 1987; Weingartner, 1984). If the WMT can be assumed to be an effort-demanding task, then the current negative findings are at variance with this body of research.

Alternatively, the depressive symptoms in the current sample may not have been sufficiently severe to produce the predicted memory performance deficits. To evaluate this possibility, it would be informative to administer the WMT to clinically depressed samples of both young and elderly adults. Negative results in the clinical sample would imply that it is insensitive to the changes that occur in depression. Such

insensitivity to depression may prove useful in differentiating between the disorders of depression and dementia, since Dobbs and Rule (1990) have reported that pronounced deficits are observed with the WMT, even in the early stages of dementia.

Self-Referent Encoding Task

Self-Referential Endorsement

The results of the ratings of self-descriptiveness of the adjectives were consistent with predictions based on a mood-congruency hypothesis. That is, the high DS subjects rated a significantly greater number of depressed content adjectives as self-descriptive whereas the low DS subjects rated a significantly greater number of nondepressed content adjectives as self-descriptive.

Of more interest, however, was the finding that the young high DS participants described themselves more negatively than their elderly counterparts, whereas the young low DS participants described themselves more positively than their elderly counterparts. This tendency for the elderly subjects to describe themselves more moderately than the young subjects may reflect a form of conservative response

bias. Conservative response biases have been reported both in depressed individuals (e.g., Niederehe, 1986) and in elderly individuals (e.g., Botwinick, 1984). Moreover, Niederehe (1986) found this bias to be stronger in elderly depressives than in young depressives, suggesting an additive relationship between these variables.

An alternate explanation for the finding that the young high DS group rated more depressed content adjectives as self-descriptive may reflect the fact that the young group had a higher level of depressive symptoms than the elderly group. However, the higher rating of nondepressed content adjectives in the low DS young group cannot be accounted for by a lower level of depressive symptoms.

Self-Referential Reaction Times

The reaction time measure revealed that, on average, the low DS group was faster than was the high DS group. This finding supports depressive psychomotor retardation in depressives' decision making (Miller, 1975), a finding not consistently reported (Derry & Kuiper, 1981; Dobson and Shaw, 1987).

A finding of greater interest was that elderly

adults reacted as quickly as did the young adults on the nondepressed content adjectives but were significantly slower on the depressed content adjectives. These results may indirectly support the previously mentioned findings of other researchers and clinicians who have suggested that elderly adults minimize, deny, and underreport their weaknesses and problems (Lasoski, 1986; Raschko, 1991). That is, elderly adults may experience an internal conflict in indicating the self-descriptiveness of depressed content adjectives. This conflict may result from factors outside their own awareness and/or simply from a reluctance to verbalize personal difficulties, thus slowing their reaction times.

Self-Referential Recall

The fact that no significant differences were found between the low and high DS groups with regard to either the number of depressed and nondepressed content words recalled or the proportion of self-descriptive depressed and nondepressed content words recalled is somewhat surprising. The findings of Derry and Kuiper (1981) and others (Kuiper, Derry, & MacDonald, 1982; Kuiper, MacDonald, & Derry, 1983) that self-referent

encoding facilitates incidental recall of depressed, but not nondepressed personal adjectives among depressed individuals, while the opposite is true for nondepressed individuals, were clearly not supported by our results for either the young or elderly adults. Rather, our results support the findings of Dobson and Shaw (1987) and Ek and Dyck (1992) who did not find depressed and nondepressed individuals to differ with regard to content-specific recall on the SRET.

It might be argued that this study's findings contrast with those of Derry and Kuiper (1981) because of differences in subject selection such as diagnostic criteria (i.e., clinical depression vs. subclinical levels of depressive symptoms) and subject pool (i.e., university students for the young adult sample vs. inpatients, outpatients, and staff at psychiatric hospital). However, these arguments would not apply to Dobson and Shaw's (1987) or Ek & Dyck's studies which found comparable results to our study.

The fact that no age-related differences surfaced on the recall of depressed and nondepressed content adjectives, a task that requires long-term memory stores, was also somewhat surprising. This finding may

be related to this study's use of a well-educated sample of elderly adults. Researchers have found that superior verbal abilities in elderly adults can nullify memory declines due to aging in tests of remembering and verbal coding (e.g., Craik, Byrd, & Swanson, 1987; Poon, 1985; Zelinski & Gilewski, 1988).

The finding that the elderly high DS group exhibited lower total recall on the SRET than did the elderly low DS group, an effect not evident in the young adult sample, requires explanation. This result may reflect an encoding deficit; however, since encoding instructions were not manipulated, it is not known whether encoding operations other than self-referent encoding (e.g., semantic encoding) would prove to be sensitive to depression in the elderly.

Alternatively, the above finding may also support Kelley's (1986) attentional deficit hypothesis. From this view, elderly depressives should exhibit performance deficits on tests of incidental memory due to diminished attentional resources. Further incidental recall tests with and without self-referent encoding instructions are needed to distinguish these possibilities.

Kelly's hypothesis is closely tied to the theory of reduced cognitive resources discussed by various researchers in the field of memory and aging (Baddeley, 1986; Craik, Byrd, & Swanson; Hasher & Zacks, 1979; 1988). From this view, it can be argued that the effect of depression on memory, through cognitive interference of some form (see Miller, 1975), reduces the already depleted cognitive resources of the aged individual, thus revealing memory deficits. Furthermore, the results of this study suggest that age and depression in isolation are insufficient to produce memory deficits but that the combined effect of these variables produces such deficits.

That this recall difference was not evident in the young adult sample may also suggest that young adults' attentional abilities are not as susceptible to the effect of depression as those of elderly adults. However, the results obtained in the young adult sample may not be generalizable beyond the university population.

Autobiographical Memory Task

First Response Latency

Similar to the reaction time data on the SRET, the

elderly group took significantly longer than the young group to generate a first response to the negative cue-words but not the positive cue-words. The same hypothesis offered for the reaction time on the SRET may be given here. That is, the elderly adults' longer latencies to the negative cue-words may reflect a tendency to minimize negative thoughts, feelings, and/or their verbalization of these. Regardless of the mechanisms involved, the result is interesting and deserves further study.

First Response Specificity

The results revealed that the elderly group was less specific in their first responses than the young group. This finding may suggest that elderly adults experience greater difficulties than young adults in retrieving autobiographical memories. Craik (1977) reviewed a number of studies examining the recall and recognition of past events and concluded that elderly adults are poorer than young adults at those tasks.

General conclusions

The absence of findings in support of the hypotheses concerning mood-congruent facilitation of autobiographical recall are inconsistent with the

findings of Williams and Broadbent (1986) and Williams and Scott (1988). These researchers found recent suicide attempters and patients diagnosed with Major Depressive Disorder took longer to recall positive memories than negative ones and they were less specific in their memories, especially in response to positive cue-words. However, although our null findings were unexpected, they may not be that surprising for two reasons.

One reason is that these findings are consistent with research that has found mild depression or induced negative mood states to be of insufficient severity to produce mood-congruent effects (e.g., Fogarty & Hemsley, 1983; Hasher, Rose, Zacks, Sanft, & Doren, 1985; Isen, 1985). Only a few of the high DS subjects in this study were in the severe depression range on the measures of depressive symptomatology, the rest would be classified as mildly depressed.

A second possible explanation of the negative findings concerns several problems that became apparent while administering the autobiographical memory task. Although anecdotal, a consideration of these problems should temper conclusions from the results. One

problem was that in testing some of the subjects, it was apparent that for some of the cue-words, most often the negatively valenced words, the subjects were able to recall a specific memory but were unwilling to vocalize it due to its personal nature. For example, in testing one of the high DS elderly adults, the participant specifically indicated that he had retrieved a particular memory but did not want to share it.

A second difficulty encountered was knowing whether or not to interupt a subject providing a general response and to prompt for a specific memory. In some cases a subject would proceed to describe a specific instance, but not in all cases. Consequently, some subjects were, in a sense, penalized for expanding on general memories.

A third problem stemmed from questions posed by participants. That is, occasionally a subject would ask a question (e.g., "can I say the same memory twice") while time elapsed on the stopwatch. Although this time could be partialled out with reasonable accuracy, this would not necessarily be appropriate as the subject may still have been searching his/her

memory during the question and/or answer period.

Additional problems include the common concerns of assessing autobiographical memories, such as questions about the authenticity of the memory and the open-ended nature of most autobiographical tests (Baddeley, 1990; Robinson, 1976). Baddeley (1990) discusses some of the more recently developed autobiographical tasks which are more structured and therefore avoid some of these pitfalls.

Conclusions and Future Directions

The related findings that elderly adults evinced an increased response latency to negative cue-words on the autobiographical memory task and depressed content adjectives on the self-referent encoding task are intriguing. It would be interesting to test elderly adults on other tasks incorporating positively and negatively valenced material to examine the extent of this finding. That these findings reflect an underlying tendency to minimize and/or deny personal problems resulting in inner conflict and indecision was offered as one possible explanation. This hypothesis may prove difficult to test, however, since the concepts of minimization and denial are hard to

interpret in an unambiguous manner. Nevertheless, the differences revealed in this study represent age-related differences in the processing of negatively valenced material and may reflect societal/cultural issues in need of consideration.

As expected, both young and elderly participants exhibited higher self-referential ratings for mood congruent material on the SRET. Once again, an age difference proved interesting in that the mood congruent effects were attenuated among elderly participants. This finding is consistent with the above discussion and research that indicates elderly individuals minimize problems (Lasoski, 1986; Raschko, 1991). Similarly, it could be conceptualized as a form of conservative response bias.

The absence of content-specific recall effects is inconsistent with much of the relevant research (e.g., Derry & Kuiper, 1982), but in support of more recent findings (e.g., Dobson & Shaw, 1987). The popular notion that depressed individuals recall more mood-congruent material may need to be reconsidered. That total recall was less among depressed elderly participants than among their nondepressed counterparts

or the young depressed group supports the idea of an additive effect of age and depression related deficits.

The results on the working memory task echoed those of Dobbs & Rule (1989), in terms of age-related deficits, and Isaak, Rule, and Dobbs (1990), revealing no effect of depression level. As mentioned previously, research is needed to ascertain the effect of clinical depression on the working memory task. If this task, which has been demonstrated to be sensitive to the early stages of Alzheimer's Dementia, proves to be insensitive to clinical depression, it might be beneficially employed in the often perplexing task of differential diagnosis.

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APPENDIX A

Geriatric Depression Scale:

DIRECTIONS: Circle the better response (YES or NO) to the following questions.

1. Are you basically satisfied with your life?...YES/NO
2. Have you dropped many of your activities and interests?.....YES/NO
3. Do you feel your life is empty?.....YES/NO
4. Do you often get bored?.....YES/NO
5. Are you hopeful about the future?.....YES/NO
6. Are you bothered by thoughts that you just cannot get out of your head?.....YES/NO
7. Are you in good spirits most of the time?.....YES/NO
8. Are you afraid that something bad is going to happen to you?.....YES/NO
9. Do you feel happy most of the time?.....YES/NO
10. Do you often feel helpless?.....YES/NO
11. Do you often get restless and fidgety?.....YES/NO
12. Do you prefer to stay home at night, rather than go out and do new things?.....YES/NO
13. Do you frequently worry about the future?....YES/NO
14. Do you feel that you have more problems with memory than most?.....YES/NO
15. Do you think it is wonderful to be alive now?.....YES/NO
16. Do you often feel downhearted and blue?.....YES/NO
17. Do you feel pretty worthless the way you are now?.....YES/NO
18. Do you worry a lot about the past?.....YES/NO
19. Do you find life very exciting?.....YES/NO
20. Is it hard for you to get started on new projects?.....YES/NO
21. Do you feel full of energy?.....YES/NO
22. Do you feel that your situation is hopeless?.....YES/NO
23. Do you think that most people are better off than you are?.....YES/NO
24. Do you frequently get upset over little things?.....YES/NO
25. Do you frequently feel like crying?.....YES/NO
26. Do you have trouble concentrating?.....YES/NO
27. Do you enjoy getting up in the morning?.....YES/NO
28. Do you prefer to avoid social gatherings?....YES/NO
29. Is it easy for you to make decisions?.....YES/NO
30. Is your mind as clear as it used to be?.....YES/NO

APPENDIX B

Center for Epidemiologic Studies Depression (CES-D) Scale:

Using the scale below, indicate the number which best describes how often you felt or behaved this way DURING THE PAST WEEK.

0 = Rarely or none of the time (less than 1 day)
1 = Some or a little of the time (1-2 days)
2 = Occasionally or a moderate amount of the time (3-4 days)
3 = Most or all of the time (5-7 days)

___ 1. I was bothered by things that don't usually bother me.
___ 2. I did not feel like eating; my appetite was poor.
___ 3. I felt that I could not shake off the blues, even with help from my family or friends.
___ 4. I felt that I was just as good as other people.
___ 5. I had trouble keeping my mind on what I was doing.
___ 6. I felt depressed.
___ 7. I felt that everything I did was an effort.
___ 8. I felt hopeful about the future.
___ 9. I thought my life had been a failure.
___ 10. I felt fearful.
___ 11. My sleep was restless.
___ 12. I was happy.
___ 13. I talked less than usual.
___ 14. I felt lonely.
___ 15. People were unfriendly.
___ 16. I enjoyed life.
___ 17. I had crying spells.
___ 18. I felt sad.
___ 19. I felt that people disliked me.
___ 20. I could not get 'going'.

___ TOTAL

Total scores can range between 0 and 60. Items 4, 8, 12, and 16 are reverse-scored.

Appendix C

MILL-HILL VOCABULARY TEST

In each group of six words below, underline the word which means the same as the word above the group, as has been done in the first example.

1. CONNECT

Accident	Join
Lace	Bean
Flirt	Field

2. PROVIDE

Harmonize	Commit
Hurt	Supply
Annoy	Divide

3. STUBBORN

Obstinate	Steady
Hopeful	Hollow
Orderly	Slack

4. SCHOONER

Building	Man
Ship	Singer
Plant	Scholar

5. LIBERTY

Worry	Freedom
Rich	Serviette
Forest	Cheerful

6. COURTEOUS

Dreadful	Proud
Truthful	Short
Curtsey	Polite

7. RESEMBLANCE

Attendance	Fondness
Assemble	Repose
Likeness	Memory

8. THRIVE

Flourish	Cry
Thrash	Leap
Think	Blame

9. PRECISE

Natural	Stupid
Faulty	Grand
Small	Exact

10. ELEVATE

Revolve	Move
Raise	Work
Waver	Disperse

11. LAVISH

Unaccountable	Selfish
Romantic	Lawful
Extravagant	Praise

12. SURMOUNT

Mountain	Descend
Overcome	Concede
Appease	Snub

13. BOMBASTIC

Democratic	Pompous
Bickering	Cautious
Destructive	Anxious

14. ENVISAGE

Contemplate	Activate
Surround	Estrange
Enfeeble	Regress

15. PERPETRATE

Appropriate	Commit
Propitiate	Deface
Control	Pierce

16. LIBERTINE

Missionary	Rescuer
Profligate	Canard
Regicide	Farrago

17. QUERULOUS

Astringent	Fearful
Petulant	Curious
Inquiring	Spurious

18. FECUND

Esculent	Optative
Profound	Prolific
Sublime	Salic

19. ABNEGATE

Contradict	Decry
Renounce	Execute
Belie	Assemble

20. TRADUCE

Challenge	Attenuate
Suspend	Establish
Misrepresent	Conclude

21. TEMERITY

Impermanence	Rashness
Nervousness	Stability
Punctuality	Submissiveness

Appendix D

DEMOGRAPHICS QUESTIONNAIRE

The following questionnaire will provide necessary information to complete the psychological research in which you have agreed to participate. All of the information you provide will be kept in strict confidence and will not be published or used for any purpose other than group comparisons. Most journals publishing research in this area require general descriptions of the overall sample involved so that researchers can compare group characteristics, such as, age, health status, education, and so on. However, the names and data of individual people are not published nor do researchers exchange research findings for individuals who have been in their studies.

Instructions:

Please PRINT all of your responses where required, or circle the best response.

PART I: PERSONAL HISTORY

1. Gender: M / F

2. Age: _____

3. Are you a Canadian citizen? ..... Yes / No

4. If you are NOT a Canadian citizen, of what country are you a citizen? _____

5. In what country were you born? _____

6. How long have you lived in Canada?
   a. All my life
   b. 10-19 years
   c. 1-19 years
   d. less than 1 year

7. Is English your ...
   a. first language
   b. second language
   c. third language

PART II: EDUCATION, WORK HISTORY, LIVING ACCOMMODATIONS

8. Are you presently working? ..... Yes / No

9. If you are working, what is your occupation?

   _____

10. Which of the following is the most appropriate answer for your highest level of education achieved? (You may circle more than one response)
    a. University Degree
    b. University Courses - No Degree Attained
    c. Community College Degree
    d. Community College Certificate
    e. Technical/Business School Certificate
    f. High School Graduate (Grade 12)
    g. Other (Please list) _____

11. Do you live in ...
    a. your own home
    b. a relative's home
    c. an apartment building
    d. a condominium
    e. other _____

12. Do you share your living accommodations (as indicated above) with anyone? ..... Yes / No

13. If yes to question 12, with whom do you share your living accommodations?
    a. spouse
    b. relative
    c. roommate

14. Have you recently experienced any of the following significant changes in your life? (You may circle more than one response)
    a. Death of a spouse
    b. Death of a close relative
    c. Death of a close friend
    d. Change in living accommodations
    e. Other _____

PART III: HEALTH

15. How would you rate your general health as compared with other people your own age?
    a. much better than others my own age
    b. better than others my own age
    c. the same as others my own age
    d. poorer than others my own age
    e. much poorer than others my own age

16. How would you rate your vision as compared with other people your own age?
    a. much better than others my own age
    b. better than others my own age
    c. the same as others my own age
    d. poorer than others my own age
    e. much poorer than others my own age

17. How would you rate your hearing as compared with other people your own age?
    a. much better than others my own age
    b. better than others my own age
    c. the same as others my own age
    d. poorer than others my own age
    e. much poorer than others my own age

18. Are you currently suffering from any major illness? ..... Yes / No

19. If yes to question 21, please list:

    a. _____

    b. _____

    c. _____

    d. _____

20. Have you been hospitalized recently? ..... Yes / No

21. If yes to question 20, please list the reason for your hospitalization: _____

_____

22. Are you currently taking any medication? ..... Yes / No

23. If you are taking medication, please list the medication AND the reason you are taking it: (e.g., digitalis for heart problem)

a. _____

b. _____

c. _____

d. _____

PART IV: ACTIVITIES

24. Do you belong to any social clubs? ..... Yes / No

25. If yes to question 23, please list:

a. _____

b. _____

c. _____

26. Do you do any volunteer work? ..... Yes / No

27. If yes to question 26, for what organization(s)?

a. _____

b. _____

c. _____

28. Do you drive? ..... Yes / No

29. How often do you exercise?
    a. Everyday
    b. Three Times A Week
    c. Twice A Week
    d. Once A Week
    e. Occasionally
    f. Never

30. Are you an active member of an organized fitness group or exercise club? ..... Yes / No

31. Do you participate in any of the following sports? (You may circle more than one response)
    a. golfing
    b. swimming
    c. bowling
    d. lawn bowling
    e. fishing
    f. tennis
    g. jogging
    h. aerobics
    i. walking
    j. dancing
    k. other: _____

    _____

    _____

32. Do you like to read? ..... Yes / No

33. How often do you read the following? (Please circle the best response)

	Every Day	3 times a week	Twice a week	Once a week	Occasion-ally	Never
a. City Newspaper (e.g., Free Press)	1	2	3	4	5	6
b. Magazines (e.g., Chatelaine, Sports Illustrated)	1	2	3	4	5	6
c. Novels (e.g., fiction, romance)	1	2	3	4	5	6
d. Technical Journals or Reports (e.g., Canadian Journal of Psychology)	1	2	3	4	5	6
e. Reader's Digest	1	2	3	4	5	6
f. Cultural Newspapers (e.g., Mennonite Reporter, The Times CZAS)	1	2	3	4	5	6

PART V: MEMORY

34. How is your memory compared to the way it was ...

	much worse			same			much better
a. one month ago.....	1	2	3	4	5	6	7
b. one year ago.....	1	2	3	4	5	6	7
c. five years ago.....	1	2	3	4	5	6	7
d. ten years ago.....	1	2	3	4	5	6	7

35. How often do the following present a memory problem to you?

	always			sometimes			never
a. names	1	2	3	4	5	6	7
b. faces	1	2	3	4	5	6	7
c. appointments	1	2	3	4	5	6	7
d. where you put things e.g., keys)	1	2	3	4	5	6	7
e. performing household chores	1	2	3	4	5	6	7
f. directions to places	1	2	3	4	5	6	7
g. phone numbers you've just checked	1	2	3	4	5	6	7
h. phone numbers used frequently	1	2	3	4	5	6	7
i. things people tell you	1	2	3	4	5	6	7
j. keeping up correspondence	1	2	3	4	5	6	7
k. personal dates (e.g., birthdays).....	1	2	3	4	5	6	7
l. words	1	2	3	4	5	6	7

m. going to the store and forgetting what you wanted to buy	1	2	3	4	5	6	7
k. taking a test	1	2	3	4	5	6	7
l. beginning to do something and forgetting what you were doing	1	2	3	4	5	6	7

36. As you are reading a novel, how often do you have trouble remembering what you have read ...

	always			sometimes			never
a. in the opening chapters, once you have finished the book	1	2	3	4	5	6	7
b. three or four chapters before the one you are currently reading.....	1	2	3	4	5	6	7
c. the chapter before the one you are currently reading.....	1	2	3	4	5	6	7
d. the paragraph before the one you are currently reading.....	1	2	3	4	5	6	7
e. the sentence before the one you are currently reading.....	1	2	3	4	5	6	7

37. When you are reading a newspaper or magazine article, how often do you have trouble remembering what you have read ...

	always			sometimes			never
a. in the opening paragraphs, once you have finished the article.....	1	2	3	4	5	6	7
b. three or four paragraphs before the one you are currently reading.....	1	2	3	4	5	6	7
c. the paragraph before the one you are currently reading.....	1	2	3	4	5	6	7

d. three or four sentences before the one you are currently reading.....	1	2	3	4	5	6	7
e. the sentence before the one you are currently reading.....	1	2	3	4	5	6	7

38. How often do you use the following techniques to remind yourself about things?

	always			sometimes			never
a. keep an appointment book....	1	2	3	4	5	6	7
b. write reminder notes.....	1	2	3	4	5	6	7
c. make lists of things to do..	1	2	3	4	5	6	7
d. make grocery lists.....	1	2	3	4	5	6	7
e. have others remind you.....	1	2	3	4	5	6	7
f. plan your daily schedule in advance.....	1	2	3	4	5	6	7
g. mental repetition.....	1	2	3	4	5	6	7
h. associations with other objects.....	1	2	3	4	5	6	7
i. keep objects in the identical place so you always know where to find them.....	1	2	3	4	5	6	7
j. keep things you need to do in a prominent place where you will notice them.....	1	2	3	4	5	6	7

We would like to thank you for agreeing to participate in our research and completing the questionnaire and various forms.

Please provide your address and telephone number in the space provided below. This information is necessary as we will either be telephoning you within the next two weeks to arrange a second session or, at least, mailing you information, within a few months, concerning the results of the study.

Telephone Number: _____

Address: _____

_____

Postal Code: _____

If possible, please list the time(s) when you are most likely to be reached at the above telephone number:

_____

_____

Tear Here Tear Here

If you have any comments or questions concerning this study, please contact:

Brad Isaak
Department of Psychology
Duff Roblin Bldg.
University of Manitoba, Fort Garry Campus
Winnipeg, R3T 2N2

Again, thank you!

Appendix E

WORKING MEMORY TASK

NOTE: The printed instructions should be supplemented or paraphrased to ensure the maximum opportunity to perform well on the task.

All asterisks (*) precede instructions to interviewers. All bolded instructions are to be presented to the subjected.

0-LAG

In a moment I will be playing you a tape with some recorded numbers on it. To start with, I would like you just to repeat each number out loud as soon as you hear it. So, if you hear 9, you say 9 right away. Okay? Let's practice one set. Are you ready? 9 2 7 5 1

* When the task is understood, say:
Good, do the same thing with these numbers.

Begin Tape

TRIAL 1:

presented item	5	3	8	6	2	7	3	9	1	2
expected response	5	3	8	6	2	7	3	9	1	2
subject's response	—	—	—	—	—	—	—	—	—	—

correct to first error _____

(Scoring note: Each correct digit must be given within the alotted time interval to be scored as correct. For example, the first digit (5) must be repeated by the person before the next digit (3) is presented.)

TRIAL 2:

presented item	1	7	5	9	2	8	3	6	2	7
expected response	1	7	5	9	2	8	3	6	2	7
subject's response	—	—	—	—	—	—	—	—	—	—

correct to first error _____

1-LAG

This time I want you to wait until you hear the SECOND number before you say the first number. This means you will be ONE number behind all the way through. When you hear the first

number, don't say anything, just remember that number. When you hear the second number, say the first number. Just remember you will always be one number behind. Do you understand?

* IF NOT, say:
Let's say the tape says 9, 2, 7, 5, 1 (show card). After you hear the number 2 (point), you are to say 9 (point). After you hear the number 7, you are to say the number 2, and so on. Do you have any questions? (Remove card) Let's practice one set. Are you ready? 9 2 7 5 1

* Use the display card pointing to the numbers as you re-explain the task as necessary.

* When the task is understood, say:
That's right. You may find it helpful to close your eyes or look away to concentrate.

Now remember, wait until you hear the second number before you say the first one.

* Begin Tape

TRIAL 1:

presented item	7	9	2	5	7	1	8	2	9	4	1
expected response		7	9	2	5	7	1	8	2	9	4
subject's response		—	—	—	—	—	—	—	—	—	—

correct to first error _____

TRIAL 2:

presented item	3	5	9	1	8	6	3	9	4	2	7
expected response		3	5	9	1	8	6	3	9	4	2
subject's response		—	—	—	—	—	—	—	—	—	—

correct to first error _____

2-LAG

This time I want you to wait until you hear the THIRD number before you say the first number. This means you will be TWO numbers behind all the way through. When you hear the first two numbers, don't say anything, just remember those numbers. So when you hear the third number, say the first number and when you hear the fourth number, say the second number. Just remember you will always be two numbers behind. Do you understand?

* IF NOT, say:
Let's say the tape says 9, 2, 7, 5, 1 (show card). After you hear the number 7 (point), you are to say 9 (point). After you hear the number 5, you are to say the number 2, and so on. Do you

have any questions? (Remove card) Let's practice one set. Are you ready? 9 2 7 5 1

* Use the display card pointing to the numbers as you re-explain the task as necessary.

* When the task is understood, say:
That's good. You may find it helpful to close your eyes or look away to concentrate.

Now remember, wait until you hear the third number before you say the first one.

* Begin Tape

TRIAL 1:

presented item	9	4	5	8	3	1	8	2	7	3	9	1
expected response			9	4	5	8	3	1	8	2	7	3
subject's response			—	—	—	—	—	—	—	—	—	—

correct to first error _____

TRIAL 2:

presented item	5	2	6	9	4	1	7	2	5	3	7	4
expected response			5	2	6	9	4	1	7	2	5	3
subject's response			—	—	—	—	—	—	—	—	—	—

correct to first error _____

Appendix F

SELF-REFERENT ENCODING TASK

For this next task, I would like you to indicate whether or not the following adjectives are descriptive of you. The adjectives will appear on the computer monitor. Before each adjective, the words "GET READY" will appear on the screen for a few seconds. Then, when the adjective appears, if it is descriptive of you, I want you to press the key marked YES, if it is not descriptive of you, press the key marked NO. Make your decision as quickly as possible and then return your index finger to the red dot.

POSITIVE CONTENT	DEPRESSED CONTENT
_____ AMIABLE	_____ AFFLICTED
_____ AMBITIOUS	_____ AWKWARD
_____ CAPABLE	_____ BLEAK
_____ CONSTRUCTIVE	_____ DESPERATE
_____ DECISIVE	_____ DRAINED
_____ EAGER	_____ DULL
_____ ENTERPRISING	_____ HELPLESS
_____ EXUBERANT	_____ HESITANT
_____ GENUINE	_____ INFERIOR
_____ IMAGINATIVE	_____ INSECURE
_____ INFLUENTIAL	_____ OVERWHELMED
_____ INTELLIGENT	_____ PASSIVE
_____ LIVELY	_____ POWERLESS
_____ PERSEVERING	_____ SICK
_____ POLITE	_____ UNAPPEALING
_____ PROMPT	_____ UNLOVED
_____ SKILLFUL	_____ UNSUCCESSFUL
_____ SPONTANEOUS	_____ WEAK
_____ UNSELFISH	_____ WEARY
_____ WITTY	_____ WORTHLESS

Appendix G

AUTOBIOGRAPHICAL MEMORY TASK

INSTRUCTIONS:

In a few moments, I will read some words to you. In response to each word, I would like you to recall some particular memory from your life of which that word reminds you. It is important that you recall a memory that is of a specific time --- one particular occassion.
For example, if I said the word EXCITED, you might respond with, "Three years ago when I was in the airport waiting to board the jet for my flight to Hawaii, I was really excited."
To get some practice before we begin, try the word "FRIGHTENED" (you might respond with "There was this time that I walked into a person's backyard and this huge dog started barking and running towards me.")

Do you have any questions?
IF NO, say:
Then let's begin. Remember, it is important that you recall a memory that is of a specific time -- one particular occasion. You will have one minute in which to recall each memory.

[NOTE:
Record whether or not it is specific, and, if unsure, say:
"Can you think of a specific time - one particular occasion?"]

1. HAPPY

[LATENCY TO RESPONSE: _____ seconds]

_____

_____

_____

_____

2. SORRY

[LATENCY TO RESPONSE: _____ seconds]

_____

_____

_____

_____

3. SAFE

[LATENCY TO RESPONSE: _____ seconds]

4. ANGRY

[LATENCY TO RESPONSE: _____ seconds]

5. INTERESTED

[LATENCY TO RESPONSE: _____ seconds]

6. CLUMSY

[LATENCY TO RESPONSE: _____ seconds]

7. **SUCCESSFUL**

[LATENCY TO RESPONSE: _____ seconds]

8. **HURT**

[LATENCY TO RESPONSE: _____ seconds]

9. **SURPRISED**

[LATENCY TO RESPONSE: _____ seconds]

10. **LONELY**

[LATENCY TO RESPONSE: _____ seconds]

Appendix H

Working Memory Task - Summary of Results of Repeated Measures ANOVA

Tests of Hypotheses for Between Subjects Effects

Source	DF	F	Pr>F
AGE	1	16.67	0.0001
DEP	1	0.03	0.8733
AGE*DEP	1	1.23	0.2731
ERROR	54		

Univariate Tests of Hypotheses for Within Subjects Effects

Source	DF	F	Pr>F
LAG	1	57.13	0.0001
LAG*AGE	1	4.14	0.0468
LAG*DEP	1	0.02	0.8815
LAG*AGE*DEP	1	0.06	0.8076
ERROR (LAG)	54		

Note. AGE = Age (Young, Elderly); DEP = Level of Depressive Symptoms (High, Low); LAG = Lag Condition (1,2).

Appendix I

Self-Referent Encoding Task (SRET) - Summary of ANOVA Results

Dependent Variable	Source	DF	F	Pr>F
Endorsement				
Between Subjects Effects	AGE	1	4.16	0.0463
	DEP	1	5.37	0.0243
	AGE*DEP	1	0.13	0.7173
	ERROR	54		
Within Subjects Effects	CONT	1	346.50	0.0001
	CONT*AGE	10	0.84	0.3623
	CONT*DEP	1	62.51	0.0001
	CONT*AGE*DEP	1	11.01	0.0016
	ERROR (CONT)	54		
Reaction Time				
Between Subjects Effects	AGE	1	3.38	0.0714
	DEP	1	14.64	0.0003
	AGE*DEP	1	0.42	0.5190
	ERROR	54		
Within Subjects Effects	CONT	1	3.65	0.0613
	CONT*AGE	1	5.33	0.0248
	CONT*DEP	1	3.21	0.0787
	CONT*AGE*DEP	1	0.33	0.5705
	ERROR (CONT)	54		
Words Recalled				
Between Subjects Effects	AGE	1	0.36	0.5497
	DEP	1	0.36	0.5497
	AGE*DEP	1	3.63	0.0621
	ERROR	54		
Within Subjects Effects	CONT	1	6.70	0.0124
	CONT*AGE	1	2.01	0.1623
	CONT*DEP	1	0.01	0.9415
	CONT*AGE*DEP	1	0.06	0.8069
	ERROR (CONT)	54		
PWRS				
Between Subjects Effects	AGE	1	1.53	0.2212
	DEP	1	1.49	0.2272
	AGE*DEP	1	1.25	0.2691
	ERROR	54		
Within Subjects Effects	CONT	1	8.77	0.0046
	CONT*AGE	1	0.00	0.9955
	CONT*DEP	1	0.47	0.4944
	CONT*AGE*DEP	1	0.06	0.8020
	ERROR (CONT)	54		

Note. AGE = Age (Young, Elderly); DEP = Level of Depressive Symptoms (High, Low); Endorsement = Number of words rated as self-descriptive; PWRS = Proportion of Words Recalled rated as Self-descriptive; CONT = Adjective Content (Depressed, Nondepressed)

Appendix J

Autobiographical Memory Task - Summary of ANOVA Results

Dependent Variable	Source	DF	F	Pr>F
FRL				
Between Subjects Effects	AGE	1	1.18	0.2812
	DEP	1	3.19	0.0797
	AGE*DEP	1	1.46	0.2325
	ERROR	54		
Within Subjects Effects	CONT	1	0.02	0.8780
	CONT*AGE	1	5.87	0.0188
	CONT*DEP	1	0.01	0.9304
	CONT*AGE*DEP	1	0.45	0.5049
	ERROR (CONT)	54		
FRS				
Between Subjects Effects	AGE	1	13.93	0.0005
	DEP	1	0.27	0.6083
	AGE*DEP	1	0.77	0.3836
	ERROR	54		
Within Subjects Effects	CONT	1	0.00	0.9451
	CONT*AGE	1	0.28	0.5979
	CONT*DEP	1	0.87	0.3564
	CONT*AGE*DEP	1	0.22	0.6410
	ERROR (CONT)	54		

Note. AGE = Age (Young, Elderly); DEP = Level of Depressive Symptoms (High, Low); FRL = First Response Latency; FRS = Number of First Responses that were Specific Autobiographical Memories; CONT = Adjective Content (Depressed, Nondepressed).

Appendix K

Subject Selection

Because 7 of the 15 elderly high DS adults scored in the high DS range on only the GDS, it was decided to change the criterion for the elderly high DS group to a score in the high DS range on at least the GDS. However, these altered criteria meant that two of the elderly high DS adults, who scored in the high DS range on only the CES-D, and four of the young high DS adults, who scored in the high DS range on only the GDS, could not be used in the data analyses. Because this would mean a loss of power, the analyses were run both with these subjects' data present, that is, based on lenient subject selection criteria, and absent, based on stringent subject selection criteria, to see if any differences were found. Since no significant differences were revealed, it was decided that the results presented would be those based on the lenient subject selection criteria (i.e., a score in the high DS range on at least one of the two self-report measures).

Appendix L

CONSENT FORM

Please read the following information very carefully.

1. The aim of this study is to determine how mood affects your mental processing. Testing will include tasks such as completing questionnaires, making personal judgments and processing verbal information.

2. This study will involve two sessions for some of the participants, and, therefore, only people who would be willing to take part in a second session should commit to the first session.

3. Participants are free to drop out of the study AT ANY TIME and WITHOUT PENALTY. If you are receiving introductory psychology credits for your participation, you will receive one hour of credit for attending the first session and additional credit if you are contacted for and attend a second session as well. If you decide to drop out of the study at any time during the first or second session, you will still receive the corresponding one or more hours of credit.

4. You can be assured that:

   a) We are interested only in group results in this study.
   b) All data collected from the study will be kept strictly confidential with the use of code numbers in place of participants' names.
   c) Any materials containing identifying information, including the decoding key for the code numbers, will be stored in a locked file.
   d) Access to the above materials will only be permitted to the experimenter, Brad Isaak, and his advisor, Dr. Dennis Dyck.

Please complete the following, if you so choose, AFTER having read the above information.

I, _____, understand the information
(Print your name)
given on this page and do hereby consent to take part in the aforementioned research.

Date: _____ Signature _____