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SELECTIVE REMINDING (SR) IN THE DIFFERENTIATION OF DEPRESSION FROM DEMENTIA

By

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ABSTRACT

SELECTIVE REMINDING (SR) IN THE DIFFERENTIATION OF DEPRESSION FROM DEMENTIA

By

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This study investigated the ability of the Selective Reminding Task, a test of verbal memory, to differentiate among elderly participants with mild dementia and mild depression. Participants were screened for mild depression and mild dementia and were administered the SRT. While the total number of words recalled distinguished between healthy and demented individuals, there was no distinction between participants with mild depression and those with mild dementia, or those with mild depression compared to healthy participants. A fourth group of participants with both mild depression and mild dementia was analyzed. Again, only recall was able to distinguish this group from the healthy participants, and recall did not differentiate among the impaired groups. In addition, age and education had no significant effects on the participants' performance. Gender appeared to have a significant effect on all SRT variables. The implications of these findings, as well as possiblities for future research, were discussed.

This thesis is dedicated to the memory of my loving mother
whose dream is realized with the completion of this work.
You deserved much more than you received.
I miss you.

Love,

Dave

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INTRODUCTION

Improvements in health care have caused a tremendous increase in the average life expectancy of individuals in our society. Regardless of the changes in modern medicine, no one has discovered how to expand the capacity or lifespan of the human brain. Thus, while we are able to slow the natural deterioration of our bodies and increase human lifespan, efforts to preserve the higher cortical functions of the brain, such as memory and abstract thinking, have been largely unsuccessful.

As a consequence, dementia, in general, and Dementia of the Alzheimer's Type (DAT), in specific, have become a topic of increasing concern to mental health professionals in recent years. 402 articles were published on Alzheimer's Disease in American Psychological Association Journals during the past 6 years: A sharp contrast to the 30 articles published on the same topic in the same journals during the nine previous years.

The generic term "dementia" refers to the impairment of higher brain functions, such as memory, abstract thought, and judgment (Botwinick, 1984). The diagnosis of dementia is given if the impairment stems from an organic base (DSM III-R, 1987). The organic brain disorders which cause dementia can be temporary, such as those due to malnutrition or brain toxicity, or permanent. The two most common causes of permanent dementia in the elderly are Multi-infarct Dementia

(MID) and Dementia of the Alzheimer's Type (DAT). MID occurs in approximately 12 to 17 per cent of dementia cases (Botwinick, 1984). It is vascular in origin, and is the result of many small infarcts, or strokes. The infarcts restrict the flow of blood through the brain tissue, resulting in dead brain tissue (McLean, 1987).

DAT is more prevalent and generally considered more debilitating than MID (Botwinick, 1984). Estimates of the prevalence of DAT in those aged 65 and over range from 2 to 4 percent by some accounts (DSM III-R, 1987; Gatz & Pearson, 1988), while others report that 15 percent of all elderly have senile dementia - 60 percent of which are of the Alzheimer's type (La Rue, Dessonville, & Jarvik, 1985). In a review of 14 empirical studies, McLean (1987) found that 52 percent of senile dementia cases were DAT.

The onset of the disease is described as "insidious" (DSM III-R, 1987). In many cases, Alzheimer's is not correctly diagnosed until the disease is in its later stages (McLean, 1987; La Rue, et. al, 1985). The existence of several diagnostic systems (e.g., DSM III-R, ICD-9, RDC, Gustafson and Nilsson) is one reason timely diagnosis of the disease is difficult. Each system uniquely defines the longitudinal course, clinical features and laboratory findings of the disease (McLean, 1987). As each diagnostic systems defines aspects of the disease differently, it becomes increasingly difficult to obtain a consensus definition of Alzheimer's. In general, however, Dementia of

the Alzheimer Type is:

> The presence of Dementia of insidious onset and a generally progressive, deteriorating course for which all other specific causes have been excluded by the history, physical examination, and laboratory tests. The Dementia involves a multifaceted loss of intellectual abilities, such as memory, judgment, abstract thought, and other higher cortical functions, and changes in personality and behavior (pp. 119-120, DSM III-R, 1987).

Unlike MID, the progressive nature of DAT eventually results in death. While a definitive diagnosis of DAT cannot be made until post-mortum autopsy, the use of CT-scans and MRIs can be used to distinguish MID. Frequently, however, cases of dementia are referred to as DAT, even though formal diagnoses have not been given.

This study was an attempt to identify and distinguish persons with dementia in its early stages from those with mild depression and from healthy individuals, using a test of verbal memory, the Selective Reminding Task (Buschke, 1973). References in this text to "dementia" concern the permanent dementias, without exception.

Diagnosing Dementia and Alzheimer's Disease

More prominent than the lack of consensus on definition is the inherent problem of identifying the disease. Because DAT and permanent dementia involves a chronic loss of "higher cortical functions", the clinical features of the disease tend to be general and varied. Its "insidious onset" and "generally progressive, deteriorating course" enhance the possibility of overlooking the early

symptoms, making dating the onset even more difficult. Changes caused by dementia (i.e. short-term memory loss, changes in behavior) are often similar to those expected in the normal aging process, again, making identification of the symptoms arduous. In addition, the symptom cluster of dementia overlaps with several other psychiatric diagnoses. In particular, cognitive impairment and changes in personality and behavior are also common to many other diagnoses (McLean, 1987). This overlap further complicates correct diagnosis as it decreases the specificity of the diagnostic criterion. Although memory impairment is the original presenting problem in most correctly diagnosed cases of DAT (Kendrick, 1982), the impairment progresses subtly which hinders identification of cognitive decline until it has reached a severe level (McLean, 1987a).

In the literature an additional diagnostic label has been utilized. The term "pseudodementia" is used to describe the syndrome where "functional psychiatric illness" (La Rue, et. al, 1985; Wells, 1979) creates memory problems which mimick dementia. Despite its widespread use, the diagnosis of "pseudodementia" has not been incorporated into DSM III-R.

A correct differential diagnosis between pseudodementia and dementia is considered by some to be crucial. For example, in cases of pseudodementia, since the cognitive impairment is usually transient and treatable the memory impairment which accompanies the disorder should disappear upon remission of the disorder. In contrast, dementia is

still considered to be largely untreatable and deterioration is generally progressive and steady: The memory impairments which accompany the disease are also generally considered to be irreversible (McLean, 1987). Hence, the different diagnoses require radically different treatment plans. A diagnosis of pseudodementia suggests psychotherapy or drugs as the subsequent treatment plan, whereas the diagnosis of DAT indicates a treatment plan which involves teaching coping strategies to the victim and family members (McLean, 1987a). Thus, according to this orientation, an expedient, correct differential diagnosis is important, and the detrimental side effects of diagnostic errors have been well documented (e.g, Kramer, 1982; McLean, 1987).

There have been several attempts to provide guidelines for distinguishing pseudodementia from true dementia. Of the various attempts, the criteria compiled by Wells (1979) are considered the most representative (La Rue, et. al, 1985; McLean, 1987). He delineates the differences with regard to clinical course, symptoms and behaviors, and cognitive dysfunction produced by the disorder. For example, sudden onset of symptoms and rapid progression of dysfunction are both indicative of pseudodementia. Although memory loss and other cognitive dysfunction are present in patients of pseudodementia, they are rarely considered the presenting problem. In addition, pseudodementia patients vehemently complain of their memory loss and are willing to openly demonstrate it, whereas dysfunction is either

unnoticed by dementia patients or carefully concealed. Actual performance on tasks is often inconsistent with expectations, given the nature of the symptom complaints of pseudodementia patients. For example, a patient who complains of poor concentration may still do very well on a task which requires concentration. Finally, other symptoms which differentiate pseudodementia from dementia include, complaints of memory loss for both recent and remote events, loss of social skills, and an absence of lability (Wells, 1979).

Others argue that depression and dementia in combination interact to produce a synergistic effect. Thus, attempts to differentiate between the two are futile. Instead of occupying their time distinguishing between dementia and depression, researchers should be investigating the clinical presentation that is the result of the combination of the two phenomena (Salzman & Gutfreund, 1987).

Despite guiding criteria, diagnostic errors still occur, as the features of pseudodementia vary on an idiographic basis. As a consequence, pseudodementia is not a singularly well-defined disorder. Instead, it consists of several non-organic psychiatric disorders which may present as dementia (McLean, 1987).

The disorder most commonly associated with pseudodementia is that of depression (Wells, 1979; McLean, 1987). It is highly prevalent in the elderly population. In fact, the two disorders are often presented in the literature

interchangeably even though to do so is an oversimplification (La Rue, et. al, 1985; McLean, 1987). Nonetheless, the prevalence of clinical depression in cases of pseudodementia is high. In a review of empirical literature, McLean (1987) estimates that depression is the cause of 60 percent of pseudodemetia cases. This seemingly high estimate suggests a significant overlap of the symptoms which define depression and dementia. In fact, cognitive impairment, i.e. memory loss, is often found in elderly depressived patients. Similarly, depression is present in 15 to 30 percent of dementia patients (McLean, 1987a). In addition, the prevalence of depression in the elderly is disproportionately high, with 10 to 15 percent of the geriatric population being severely affected (La Rue, et. al, 1985).

That depression is prevalent in the elderly is not surprising. In a society which places primary value on the individual's ability to be independent, produce, and compete, the average retired person does not fit the mold. Instead of being able to take comfort in his ability to share his wisdom and knowledge of years past with others, the older person has only the bitter reality of the waning years ahead and the knowledge that he is or is becoming the one thing society devalues most - dependent. The onset of sad affect and feelings of worthlesness are often accompanied by a decrease in activity and general loss of interest. Lack of effort and inattention to detail can contribute to memory loss. As a consequence, depression and dementia are frequently compared

in the literature on the elderly. In particular, numerous studies have investigated how the memory impairment in dementia patients differs from that found in patients with depression.

Memory and the Information-Processing Model

Studies of memory in the older adult have been dominated by the information-processing model of memory. This model assumes that: the individual actively participates in learning and remembering, that analysis of the quality and quantity of response patterns is informative, and that the path of learning can be traced through several hypothetical memory stages (Poon, 1985).

New information is originally registered in sensory memory. Sensory memory is either visual or auditory. The information is then held for storage in short-term (primary) memory (STM), a limited-capacity store. Information produced by STM is considered still "in mind" (Poon, 1985). Once information is in STM one of two things can occur - either the presentation of new information to STM erases the memory traces of the original information or the information is stored in long-term (secondary) memory (LTM). LTM has unlimited storage space. The final memory stage is tertiary (remote) memory in which remote, permanently stored information is retained. Of all the memory stages, only the functioning of LTM declines significantly with age (Poon, 1985). The decline in LTM manifests itself in the encoding

and retrieval of information.

Encoding is the process of storing information in LTM. In general, it occurs either through the effects of practice, i.e., repeating the information while it is in STM, or through recognition as the information may already be registered in long-term storage (LTS; Glanzer, 1972). The act of recalling stored information is referred to as retrieval. The ability to retrieve from LTS is assisted by higher-order encoding or successful recall (Tulving, 1962; Thompson, Wenger, & Bartling, 1978). Similarly, forgetting can be the result of an encoding deficit, a retrieval deficit, or an interaction involving both (Poon, 1985). For quantitative and qualitative analysis of memory patterns, a procedure which divides the learning process into measurable components is required. The Selective Reminding Task (SRT; Buschke, 1973), a frequently used measure of memory impairment, is such a procedure.

The Selective Reminding Task and Memory Impairment

The SRT provides distinct information on LTS, STM, Long term retrieval (LTR), list learning (Consistent LTR), and item learning (Random LTR; Buschke, 1973 & Buschke & Fuld, 1974). In the administration of the SRT the subject is instructed to learn a list of words (Buschke, 1973). The words are presented to the subject at two-second intervals. The subject is then asked to recall all the words in the list in any order. After each trial, the subject is then reminded

of only those words which were not recalled on the immediately preceeding trial. If a subject is able to recall a word which was not presented on that trial, he must be using retrieval from LTS, as "it [the item] was recalled even though the presentation and recall of other items interfered with the short-term retention of this item (p. 1021, Buschke & Fuld, 1974)." If, however, recall of a word only occurs after presentation, the subject is demonstrating STR (Buschke & Fuld, 1974).

Once an item has been retrieved from LTS, it is assumed that any subsequent inability to recall that item is the result of retrieval failure, not retention failure or loss from storage (Buschke & Fuld, 1974). This assumption has received support from research in which subjects were able to retrieve words without the aid of presentation, even though they had been previously unable to recall the words (Buschke, 1974; Buschke & Fuld, 1974).

The SRT also separates LTR into Consistent LTR (CLTR) and Random LTR (RLTR). CLTR represents the number of words which are consistently retrieved without presentation. That is, a participant demonstrates CLTR when they no longer require a reminder for a particular word. CLTR indicates how much of the entire list the subject has learned. Random LTR also represents the number of words retrieved without presentation, however it indicates how many of the words have been learned independent of the list. It is represented by words which are committed to LTS, but the presentation of

which requires a reminder from the administrator of the SRT (Buschke & Fuld, 1974). The consistency of retrieval which is inherent in CLTR is indicative of an "organized retrieval search" (Buschke, 1973). RLTR, however, with its inherent inconsistent retrieval, indicates the absence of such organization.

The number of words to be used on a list were never specified by Buschke, but an evaluation of the SRT using a mathematical learning model for patients with Dementia of the Alzheimer's Type (DAT) and controls indicates list length should be 10-12 words for patients with severe DAT and 15-20 words for controls and patients with mild DAT. The evaluation also found that the number of trials is theoretically optimal if it is greater than 10, but realistically optimal if the task involves between five and 10 trials (Kraemer, Peabody, Tinkleberg, & Yesavage, 1983).

Despite its widespread use, the efficacy of the SRT is a controversial issue. Some attempts to obtain normative data have produced discouraging results. For example, when the four different lists of the SRT were compared, one form (Form 1) was found to be significantly more difficult for normal college students than the other three forms (Hannay & Levin, 1985). Masur, et. al. (1989), however, found no differences in performance among the four forms using an elderly sample. None the less, although normative findings have been published in recent years, those findings concentrate on only Form 1 of the test. Morgan (1982)

produced normative data for children between 5 and 8 years of age. Banks, Dickson, and Plasay (1987) produced preliminary normative findings for 60 healthy elderly subjects, and Larrabee and his associates recently published normative data on the SRT using 271 participants. The normative findings are grouped into seven age groups ranging from 18 to 91 years of age (Larrabee, Tahan, Curtiss, & Levin, 1989). In addition, the procedure is not a standardized test (Loring & Papanicolaou, 1987).

Kraemer, et. al. (1983), present several explanations for the lack of normative data on the SRT. They maintain that parameters such as number of words in a list or number of trials in a task have not been specified. In addition, the type of list used and the scoring procedures have never been standardized. Finally, word familiarity and difficulty of the task are important intangibles when administering the task, thus each administration needs to be somewhat personalized.

Bishop, Dickson, and Allen (1988) conducted a study with sixty college students as subjects. The subjects were divided into four groups on the basis of intelligence (low average, average, high average, and superior). After administering the selective reminding task, the results indicated that intelligence is related to performance on this task. Individuals in the low average intelligence group performed signicantly poorer than subjects from the high average and superior intelligence groups on all aspects of

the task. These results suggest that intellectual level is correlated with performance on the SRT, since being of low average intelligence, in itself, is not an indicator of memory deficits. Patients with premorbid low average intelligence risk a false positive result from the SRT.

However, Ruff, Light, and Quayhagen (1989), in a study with 392 participants found no relationship between WAIS-R VIQ and performance of the SRT. Also, other studies have found no relationship between education and SRT performance (Masur, et. al, 1989; Ruff, et. al, 1989; Banks, et. al, 1987). Another study found that age did not have a significant effect on individual's performance in the SRT (Masur, et. al, 1989). This study, however, sampled a limited population (75-85 years old). One should be cautious, therefore, of generalizing from these findings.

In their critique of the SRT, Loring and Papanicolaou (1987) point to Buschke's distinction between long-term storage and retrieval as a methodological shortcoming. They argue that Buschke's assertion that a word has entered long-term storage once it has been recalled on two consecutive trials is arbitrary, and requires that any subsequent failure to recall is a retrieval failure. This does not account for the possibility that words may have been stored in a degenerate form. The eventual complete encoding and consistent retrieval are possible only after repeated presentations by the examiner. Hence, according to Loring and Papanicolaou, the operational definitions of storage and

retrieval are incomplete.

The results of one study points toward the presence of practice effects and low test-retest reliabilities (ranging from .45 to .65; Hannay & Levin, 1985). Another study, however, found high test-retest reliabilities, especially for LTR (.837), recall (.892), and CLTR (.918; Masur, et. al, 1989). Loring and Papanicolaou (1987) argue that practice effects suggest the SRT may measure the ability to learn how to execute a high ordered cognitive task, not just the ability to remember. The inability to learn could be partially responsible for a patient's poor performance on the procedure. As a consequence, Loring and Papanicolaou assert that "SR should not be used clinically as the sole measure of verbal memory" (p. 348). However, the study used healthy college students as subjects and, as the authors of the study point out, their performance may not be indicative of the unhealthy population which usually partakes in the SRT (Hannay & Levin, 1985). For example, some studies report the absence of practice effects for clinical patients participating in the SRT (Peters & Levin, 1977; Peters & Levin, 1979).

Several studies have found that the selective reminding procedure, in general (Weingartner, Kaye, Smallberg, Ebert, Gillin, & Sitaram, 1981), and the SRT, in particular (Larrabee, Largen, & Levin, 1985), to be very sensitive to the presence of DAT. For example, Larrabee, et. al. (1985), found that the SRT was the most sensitive measure of DAT

among several cognitive and memory measures (i.e. WAIS and WMS subtests). When the predictive value (sensitivity) of the SRT was 100 percent, the common error (specificity) was only one percent. In another study, an individual's LTS and LTR were found to have a predictive value in differentiating between elderly with DAT and healthy elderly (Masur, Fuld, Blau, Thal, Levin, & Aronson, 1989).

Alzheimer's, Depression, and Memory Impairment

With regard to the differences between memory impairment in dementia patients and depressed patients, several quantitative, qualitative, and theoretically-based differences exist. Memory loss in dementia patients is quantitatively more severe and qualitatively more diffuse than in depressed patients (Miller & Lewis, 1977; La Rue, D'Elia, Clark, Spar, & Jarvik, 1986). For example, La Rue, et. al (1986), administered a neuropsychology battery, including a selective reminding procedure, to elderly participants who were healthy (N=10), participants diagnosed as demented (N=10) as well as to participants diagnosed as depressed (N=10). They found that demented elderly scored significantly worse than depressives on measures of storage, retrieval, and consistent retrieval. Similarly, depressives scored significantly worse than healthy controls on measures of retrieval and consistent retrieval.

In another study (Hart, Kwentus, Hamer, & Taylor, 1987) 15 patients with mild DAT, 14 depressed patients, and

16 healthy controls were administered the SRT with low and high imagery words. The measures of total recall, CLTR, and LTS scores of the dementia subjects were all significantly lower when compared to both depressed patients and normal controls, whereas depressives were signficantly lower on measures of total recall and CLTR when compared to normal controls.

Memory impairment reported by DAT patients and depressed patients also differs in its theoretical underpinnings. The determinants of memory failure in dementia patients result in a decline in functioning in all areas of memory (Weingartner, Grafman, Boutelle, Kaye, & Martin, 1983). In contrast, memory loss in depressed patients is believed to stem from an inability to execute effortful processes. Effortful processes (i.e. memorization) require the expenditure of attention and effort. As a consequence, they use some of the limited resources available for processing information (Hasher & Zacks, 1979). Some researchers have found that depression further limits the resources available for processing information, as depressed patients showed greatest cognitive impairment in tasks which required sustained effort (Cohen, Weingartner, Smallberg, Pickar, & Murphy, 1982). In addition, patients, during depressive episodes, change how they process information. Processing tends to be weak and incomplete during these episodes (Weingartner, Cohen, Murphy, Martello, & Gerdt, 1981).

Hypotheses

Often times depression in the elderly is masked by apparent symptoms of dementia. Severity and pervasiveness of memory loss, seems one way of differentiating between the two. With even mild dementia, impairment of memory is more severe and comprehensive memory than with depression (Hart, et. al, 1987). One explanation of this difference in impairment is that depressed individuals do not have the resources to execute more effortful processes, even though they have the premorbid capability to do so (Cohen, et. al, 1982), whereas demented patients suffer from a general biologically-based breakdown of memory functions.

The main focus of this study is to examine within an elderly population the effects of mild dementia and mild depression, and how they differ from each other with regard to encoding and retrieval processes. The approach of this study is unique in that the participants in the dementia group have been screened for mild dementia using a brief neuropsychological test battery. No formal diagnses were given. Specifically, it is hypothesized that:

I) Subjects with mild dementia, as defined by a borderline or positive score on a neuropsychological test battery (SDAT-battery, Storandt, Botwinick, Danziger, Berg, & Hughes, 1984) will perform significantly worse on measures of total recall, long term storage (LTS), long term retrieval (LTR), and

consistent long term retrieval (CLTR) when compared to both subjects with mild depression and healthy controls.

II) Similarly, subjects with mild depression, as defined by a score of 10-20 on the BDI, but no dementia will perform significantly worse on measures of total recall, LTS, LTR, and CLTR when compared to healthy controls due to the formers' inability to execute effortful processes.

III) The ratio CLTR:LTR will be significantly higher for depressed subjects when compared to participants with mild dementia, and significantly different from the healthy group. Depressed persons have difficulty with memory processes which are effortful. Storing and retrieving new information requires more effort than consistently retrieving the same previously stored information. In addition, retrieving previously stored information requires an organized retrieval search which depressed persons would seem more capable of executing than persons with dementia. Therefore, it would seem that of the responses from LTR, depressed individuals would have a higher proportion of CLTR responses than subjects with mild dementia.

Method

Participants

Participants were 12 elderly persons screened for mild DAT, 14 aged with mild complaints of depression, and 54 healthy elderly individuals. They ranged in age from 55 to 91 (M = 70.31 years, SD = 6.75) and education from 6 to 28 years (M = 15.80, SD = 3.65). Of the 80 participants, 54 were women and 26 were men. Characteristics of the sample are presented in Table 1.

Participants were retirees from a local university. 163 individuals were interviewed and they were grouped based on their performance on a battery of tests. The DAT subjects scored borderline or positive ($x \geq -0.500$) on a brief battery developed for the differentiation of DAT from healthy individuals (Senile Dementia of the Alzheimer's Type {SDAT} - Battery; Storandt, et. al, 1984). Participants were placed in the depressed group if their score on the Beck Depression Inventory was between 10-20 (Beck & Beamesderfer, 1974) and their score on the SDAT-battery was below the borderline level. Individuals whose score was below the borderline level on the SDAT-battery and below 5 on the BDI were placed in the healthy control group. Individuals who scored positively on both measures were dropped from the study.

Table 1. Demographic Information on the Sample by Group

Group	N	Age		Educ*		Gender	
		M	SD	M	SD	Females	Males
Dementia	12	74.67	7.33	14.18	2.86	9	3
Depression	14	70.50	7.86	15.43	4.31	8	6
Healthy	54	70.26	5.50	16.43	2.83	37	17
Synergistic	7	69.22	6.55	11.17	3.60	7	0
Total Sample	87	70.78	6.36	15.60	3.44	26	61

* Three participants did not indicate the number of years they received formal education. Each was from a different group (Dementia, Healthy, and Synergistic). Thus, the means and standard deviations for each of these groups, as well as the Total Sample, were calculated using a smaller N.

Table 2. Screening Characteristics of Sample by Group

Group	N	BDI		SDAT	
		M	SD	M	SD
Dementia	12	3.33	1.44	.21	.52
Depression	14	12.39	2.99	-1.99	1.39
Healthy	56	2.57	1.82	-2.40	1.22
Synergistic	7	14.43	1.81	.32	.99

Measures

Senile-Dementia of the Alzheimer's Type Battery (SDAT Battery). The SDAT battery is a set of four psychological tests. Its purpose is to differentiate persons with SDAT in its early stages from normal older adults. The four tests were selected from a variety of tests based on correlational and discriminant analyses. The four subtests are the logical memory and mental control subtests of the Wechsler Memory Scale, Form A of the Trailmaking Test, and word fluency for letters S and P. The score of each subtest is individually multiplied by a coefficient supplied by Storandt, et. al. (1984). The products are summed together with a constant, also supplied by the authors, to detect the presence of DAT. In one study the SDAT battery correctly distinguished 98% of patients with DAT and healthy older persons matched for age, sex, and social position. Only two false alarms were reported (Storandt, et. al, 1984).

Beck Depression Inventory (BDI). The BDI is a self-report measure with a multiple-choice format. It purports to measure the presence and severity of depression in children and adults. It contains 21 items, each of which assesses a specific feature of depression by giving it a weight of zero to three points. Reliability and validity studies conducted in varied settings and populations strongly support the BDI as a measure for assessing depression. It has also received strong support from cross-validation studies (Stehouwer, 1985).

Selective Reminding Task (SRT). In addition to studies involving memory and the different dementias (e.g., Buschke, 1974, Caine, Ebert, & Weingartner, 1977; Fuld, Katzman, Davies, & Terry, 1977; Grady, Haxby, Berg, & Rapoport, 1987), the SRT has been used in research on memory and the efficacy of treatment for hyperactive children (Zametkin, Karoum, & Rapoport, 1987), the effects of chronic marijuana use (Page, Fletcher, & True, 1988), and the effects of certain drug treatments on memory (Shaw, Stokes, Mann, & Manevitz, 1987). For a more detailed discussion of the SRT, please see the subsection entitled "The Selective Reminding Task and Memory Impairment."

Procedure

The SDAT-battery, the SRT, and the BDI were administered as part of a larger study designed to assess an individual's overall coping skills with the aging process. Form letters were sent to retirees from a local university requesting their participation in a study investigating how elderly people cope with the aging process. Individuals who wanted to participate called the coordinator of the project; nearly 10 per cent of those sent letters responded. The coordinator of the project then referred their name to an examiner. All examiners had received training prior to interviewing subjects. Participants were not paid, however, they were promised a "feedback session" at which time the interviewer would inform the participant of the quality of their overall

functioning as compared with other elderly.

The entire interview process required between one-and-a-half and two-and-a-half hours. The process began with a semi-structured interview. Half way through the interview questions concentrated on the individual's perception of their memory. At this time the SDAT-battery was administered. Completion of the battery required approximately ten minutes, after which the semi-structured interview was completed. After the interview the SRT was administered using ten trials. The SRT required another ten minutes. After completion of the SRT, the participant were given the BDI and BSI. Each self-report measures required 15 to 20 minutes to complete. Five to seven working days after the interview session the participant was contacted to schedule their feedback session. All individuals who were interviewed received feedback.

Results

All analyses were conducted with the use of SPSS-X User's Guide - Third Edition (1988).

Initially, multivariate analyses of variance were conducted on five dependent variables, recall, LTS, LTR, CLTR, and CLTR:LTR. In the cases of significant findings, however, this method of analysis was not linearlly interpretable. As a consequence, univariate analyses were also conducted.

Hypotheses

Hypothesis I. Statistical analyses of the data only support a portion of the first hypothesis. It was predicted that individuals in the dementia group would score significantly less on all variables of the SRT than those participants in the depression and healthy groups. A multivariate analysis of variance conducted on all the variables indicated significance only for the number of words recalled {$F(2,77) = 4.32447$, $p < .05$; please see Table 2}. That is, the scores of each variable were analyzed across the three groups. Only in the case of recall did the scores differ from each other, depending on the group to which the participant belonged.

Univariate analyses revealed there were no significant differences between the dementia group and depression group. However, significance was found between the dementia group

Table 3. Means and Standard Deviations for all groups, across variables

Variable	Dem(N=12) M	Dem(N=12) SD	Dep(N=14) M	Dep(N=14) SD	Healthy(N=54) M	Healthy(N=54) SD	Syn(N=7) M	Syn(N=7) SD
Recall(a)	61.92	14.88	65.64	14.98	72.76	12.01	56.86	20.43
LTS(b)	44.50	18.56	48.14	22.38	56.09	21.13	36.43	28.01
LTR(c)	37.33	18.62	40.29	20.16	48.44	19.98	29.86	26.71
CLTR	21.75	19.19	23.36	15.89	27.46	17.92	17.86	23.56
CLTR/LTR	.50	.26	.53	.18	.52	.21	.45	.30

(a) MANOVA indicated significant differences across all groups at .05 level. ANOVAs revealed significant differences between Dementia group and Healthy group ($p < .05$), Depression group and Healthy group ($p < .10$), and Synergistic group and Healthy group ($p < .05$).

(b) MANOVA of all 4 groups indicated significant differences across all groups at .10 level. ANOVAs revealed significant differences between Dementia group and Healthy group ($p < .10$) and Synergistic group and Healthy group ($p < .05$).

(c) MANOVA of all 4 groups indicated significant differences across all groups at .10 level. ANOVAs revealed significant differences between Dementia group and Healthy group ($p < .10$) and Synergistic group and Healthy group ($p < .05$).

Univariate analyses revealed there were no significant differences between the dementia group and depression group. However, significance was found between the dementia group and control group for recall {$F(1,64) = 7.327$, $p < .05$; please see Table 2}. That is, the number of words recalled by a subjects in the control group was significantly greater than those recalled by subjects in the dementia group. Analysis of all the other variables, LTS, LTR, CLTR, CLTR/LTR, indicates that the range of scores on these variables from the dementia group and control group overlap to such a degree that they are indistinguishable, although there was a trend toward significance for LTS and LTR {$F(1,64) = 3.106$, $p < .10$ and $F(1,64) = 3.077$, $p < .10$, respectively; please see Table 2}. In addition, no significant differences were found among these variables between the dementia group and the depression group.

Hypothesis II. The second hypothesis predicted that the scores of the depression group would be significantly lower than the healthy group on all variables of the SRT. This hypothesis was not supported as no significant differences between the depression group and the control group among the variables. That is, there was overlap of the scores from the dementia group and those from the healthy group for all variables. However, a trend toward significance was discovered for the difference between the depression group and the control group for recall {$F(1,66) =$

1.537, $p < .10$}, in the expected direction (Please see Table 2).

Hypothesis III. The final hypothesis predicted that the ratio of CLTR:LTR could be used to differentiate among the groups. This is a ratio of words the recalled through an organized search compared to the total number of words retrieved from long-term memory (LTR). Specifically, it was predicted that the porportion of CLTR:LTR would be significantly greater for the depressed group, when compared to the dementia group. It was also predicted that the CLTR:LTR ratio of the depression group would be significantly different from the healthy group, although direction was not predicted. Again, this hypothesis was not supported, as no significant differences in the CLTR:LTR variable were found among the groups (please see Table 2).

In addition, several ad hoc analyses were conducted.

Ad Hoc Analyses

First, it was observed that the error term for CLTR:LTR was considerably lower than those for the other variables. One possible explanation for the low error term was that the two variables approximated each other in value. If this were so, one would expect little variance. A correlation analysis was conducted between CLTR and LTR and was found to be highly significant ($r = .9041$, $p < .001$; please see Table 3), indicating that the values of the two variables are indeed

Table 4. Correlation of CLTR and LTR

Variables	Covariance	r	p
CLTR - LTR	334.893	.904	.000

very similar.

Also, it was decided to gain further information about participants who tested positive for both mild dementia and mild depression. Consistent with other studies (Salzman & Gutfreund, 1987), it was speculated that the presence of both depression and dementia in these individuals would create a synergestic effect in which this group's scores on recall, LTS, LTR, CLTR, and CLTR:LTR, would be less than the other three groups.

A fourth group was created composed of seven subjects whose scores were drawn from the data pool. These participants tested positive for both mild dementia and mild depression. A multivariate analysis of the four groups indicated significance for recall {$F(3,83) = 4.5993$, $p < .01$}, and a trend for LTS {$F(3,83) = 2.48516$, $p < .10$}, and LTR {$F(3,83) = 2.55791$, $p < .10$; please see Table 2}. Univariate analyses reveals that this new group differs significantly from the control group on measures of recall {$F(1,59) = 9.108$, $p < .05$}, LTS {$F(1,59) = 4.985$, $p < .05$}, and LTR {$F(1,59)=4.965$, $p < .05$}, all in the expected direction. However, the synergistic group did not differ significantly from any of the other groups (Please see Table 2).

Next, multivariate analyses were conducted on the data with age, education, and gender of the participants as covariates. Initially, regression analyses were conducted on each covariate to determine whether it was a reliable

predictor of the variable. Then, analyses were conducted to evaluate the presence of a significant interaction between the covariate and the factor (group). The presence of an interaction suggests that changing the covariate effects the dependent variables differently in each group. If an interaction effect was present a final analysis was conducted to determine how the covariate effects the variable within the groups.

Age was found to have no predictive value on any of the four variables (please see Table 4). There was, however, a significant interaction effect between age and group along the CLTR:LTR ratio {$F(3,79) = 3.87$, $p < .05$; please see Table 5}. This indicates that age has a different effect on the CLTR:LTR ratio, depending upon the group. An age within group analysis of CLTR:LTR {$F(4,79) = 2.94$, $p < .05$; please see Table 6} reveals that age effects the variable, CLTR:LTR differently depending upon the group. Examination of the regression line for each of the four groups indicates that an interaction effect is present in the depression group ($p < .05$) and the healthy group ($p < .05$), but not the dementia or synergistic groups (please see Table 7). In addition, the slopes of the regression lines (see Table 7) indicate the, when present, interaction has a different effect for each group. For the healthy group, as age increases the CLTR:LTR ratio declines. In the depression group, however, as age increases, CLTR:LTR also increases.

Regression analyses indicated that education is not a

Table 5. Regression Analyses of Age, Education, and Gender as Covariates

Variable -Covariate	Sq Mul R	Mul R	Hyp MS	Error MS	F	Sig of F
Recall						
Age	.004	.011	64.073	188.278	.340	.561
Educ	.015	.123	231.444	191.309	1.210	.275
Gender	.125	.354	1937.890	165.426	11.715	.001
LTS						
Age	.000	.011	4.756	471.490	.061	.920
Educ	.003	.053	104.662	475.245	.220	.640
Gender	.067	.259	2591.430	439.946	5.890	.017
LTR						
Age	.001	.037	46.278	420.603	.110	.741
Educ	.003	.055	100.369	426.223	.235	.629
Gender	.083	.288	2868.494	386.186	7.428	.008
CLTR						
Age	.005	.067	124.728	336.159	.371	.544
Educ	.001	.029	22.731	342.545	.066	.797
Gender	.084	.290	2322.802	309.353	7.509	.008
CLTR/LTR						
Age	.002	.041	.007	.050	.140	.709
Educ	.004	.064	.016	.050	.325	.571
Gender	.073	.270	.302	.048	6.447	.013

D.F. for age and gender was (1,82).
D.F. for education was (1,79).

Table 6. Univariate Tests of Interactions (3,79)

Variable -Interaction	Hyp. MS	Error MS	F
Recall			
Group x Age	340.65	182.49	1.87
Group x Educ	681.35	171.97	3.96*
Group x Gender	318.30	161.60	1.97
LTS			
Group x Age	657.83	464.41	1.42
Group x Educ	948.45	456.57	2.07
Group x Gender	182.30	446.39	0.41
LTR			
Group x Age	747.25	408.20	1.83
Group x Educ	712.96	414.90	1.72
Group x Gender	240.77	389.82	0.62
CLTR			
Group x Age	852.78	316.54	2.69
Group x Educ	274.96	345.21	0.80
Group x Gender	319.47	309.10	1.03
CLTR/LTR			
Group x Age	0.46	0.05	3.86*
Group x Educ	0.06	0.05	1.22
Group x Gender	0.10	0.05	2.22

* Sig. at p < .05
D.F. = 3,79 for Group x Age
D.F. = 3,76 for Group x Education
D.F. = 2,80 for Group x Gender

Table 7. Age within Group Analysis of CLTR:LTR

Source of Variation	SS	DF	MS	F	Sig of F
Within+Residual	3.60	79	.05		
Age within Group	.54	4	.13	2.94	.025
Group	.54	3	.18	3.91	.012

Table 8. Significance of Regression Lines in Age by Group Interaction of CLTR:LTR

Group	N	Corr	R-squared	Sig	Slope
Dementia	12	-.03	.00	.919	-0.00
Depression	14	.54	.29	.046	0.01
Healthy	56	-.34	.11	.014	-0.01
Synergistic	7	.52	.28	.226	0.02

valid predictor of any of the four variables (please see Table 4). An interaction effect between education and group was discovered along the recall variable {F(3,76) = 3.96, p < .05; please see Table 5}. An education within group analysis of recall {F(4,76) = 3.31, p < .05} also suggests that the effects of education vary across the groups (please see Table 8). Examination of the regression line for each group reveals that the effects of education on recall are significant only in the presence of depression (p. < .05; please see Table 9). In the depression group, as education increases the number of words recalled increases (slope = .01; please see Table 9).

Analyses of gender revealed that it has significant effects on all the dependent variables: recall {F(1,82) = 11.71, p < .001}, LTS {F(1,82) = 5.89, p < .05}, LTR {F(1,82) = 7.43, p < .01}, CLTR {F(1,82) = 7.51, p < .05}, CLTR:LTR {F = 6.45, p < .05; please see Table 4}. Women performed better than men on every variable (please see Table 10).

Table 9. Education within Group Analysis of Recall

Source of Variation	SS	DF	MS	F	Sig of F
Within+Residual	14835.24	80	185.44		
Educ within Group	2248.81	4	564.20	3.03	.022
Group	2509.13	3	836.68	4.51	.006

Table 10. Significance of Regression Lines in Education by Group Interaction of Recall

Group	N	Corr	R-squared	Sig	Slope
Dementia	12	-.24	.06	.450	-1.31
Depression	14	.65	.42	.029	2.26
Healthy	56	-.14	.02	.309	-0.65
Synergistic	7	.52	.27	.231	-0.00

Table 11. Performance on Dependent Variables by Gender

Variable	Women		Men	
	M	SD	M	SD
Recall	64.72	15.25	71.75	13.94
LTS	48.98	22.53	56.10	21.37
LTR	40.02	21.26	48.59	20.53
CLTR	22.31	18.07	29.70	18.37
CLTR:LTR	.47	.20	.55	.22

Discussion

The results of this study indicate that only the recall variable can be used to gain information regarding the identification and differentiation of memory loss. This finding is consistent with an earlier study which found that the total number of words recalled and CLTR are more sensitive discriminators of DAT than the WAIS and other cognitive measures (Larrabee, et. al, 1985). It is also consistent with a recent longitudinal study in which 385 nondemented voluntary subjects were administered the SRT. Thirty-six of these participants were eventually diagnosed with dementia at which time their performances on the SRT one to two years prior to diagnosis were compared with those of the healthy participants. Of all the variables on the SRT, recall was found to have the greatest predictive value (Masur, Fuld, Blau, Crystal, & Aronson, 1990).

Even though an individual's recall score can distinguish a healthy participant from an impaired participant, it does not distinguish between those that are in the dementia group and those within the depression group. In addition, predicting whether a participant is healthy or impaired using the recall score will not always be accurate, as there was only a trend toward significance between the depression and control groups. If this trend were significant, a participant's recall score would be a more accurate distinction between groups of healthy and impaired

individuals.

A trend toward significance was also discovered between the dementia group and control group for LTS and LTR. If this trend were statistically significant, these variables would also be viable options for distinguishing between impaired and healthy individuals. However, similar to the recall variable, LTS and LTR could not specify from which impairment an individual suffers.

The third hypothesis, that the ratio of CLTR:LTR would be significantly greater for depressed subjects than participants with mild dementia, was not supported. It was suggested by this author, that the ratio would provide more information as to a participant's pattern of retrieving information. Specifically, it was expected that of the words regained from long term memory depressed individuals would retrieve a higher porportion of words using an "organized retrieval search" (CLTR) than participants with mild dementia. A correlational analysis of CLTR and LTR was conducted and found to be highly significant indicating that CLTR and LTR are closely related. Thus, with knowledge of the value of LTR, one could predict the value of CLTR fairly accurately, and visa versa.

In review, Buschke and Fuld (1974) maintain that LTR is an individual's ability to retrieve words from long term storage. LTR can be simplified into two other variables - CLTR and RLTR. CLTR represents an individual's ability to consistently retrieving words without presentation and is

indicative of how much of the entire list has been learned. RLTR indicates an individuals ability to retrieve words from LTS with the aid of a reminder and represents how many words are learned independent of the list. The value of LTR equals the sum of CLTR and RLTR.

The significant correlation between CLTR and LTR indicates that the two values approximate each other. As a consequence, one can assume that there is very little variability in the value of RLTR. These findings not only question the value of the CLTR:LTR ratio, they also suggest that LTR, CLTR, and RLTR measure the same phenomenon. Future studies should consider executing correlational analyses of these variables; if such a finding were repeated, it would indicate that using all three variables is unnecessary.

Other studies (Salzman & Gutfreund, 1987) have reported that the presence of both depression and dementia in individuals with both mild depression and mild dementia created a synergistic effect. This study offered tentative support for this finding. In support of the "synergistic" theory, this study found that the value of the variables recall, LTS, and LTR, were all significantly smaller in this synergistic group when compared with the healthy group. In addition, brief examination of the means of all five variables reveals that, without exception, the synergistic group produced the lowest scores of any group. Once again, however, these scores did not differ significantly from the other experimental groups. Certainly, if a synergistic

effect were present one would expect that differentiating the mixed group from the other experimental groups would be easier. It would appear, however, that while the scores are lower for the synergistic group, the differences are not great enough for significance. One possible expalanation for this is the small number of participants in the synergistic group (7). Difficulties in sampling, including sample size, are discussed in more detail later.

The analyses of age, education, and gender, as covariates does not offer much additional information. Age appears to have no significant main effects on the variables. This finding supports and expands on the earlier findings of Masur, et. al. (1989), as a wider range of age was sampled in this study (range of 55-91 years old as compared to 75-85 years old).

An interaction effect was found with CLTR/LTR, only. Further analysis revealed that the interaction effect was present in the depression and healthy groups. In addition, the interaction affected these groups in opposite ways. In the depression group the relationship was positive, while it was inverted in the healthy group. The interaction is unusual as one would expect the covariate to have a uniform effect across all groups. The heterogeneity could be due to chance. The validity of CLTR:LTR as a variable has already been discussed. If the heterogeneity were due to error, one would want to reconsider the possibility that the ratio of CLTR:LTR is not a valid measure.

Another potential explanation is that CLTR:LTR does, indeed, measure a phenomenon unique to the other dependent variables. This phenomenon would be susceptable to changes in the age of the participant when the participant is depressed or healthy, but not demented. The efects of the healthy group lend credence ot the theory that memory loss is an age-related phenomenon that occurs in healthy elderly, and not always a dementing process. However, the effects of age on the depression group are suspect. It would seem to make the statement: In the presence of depression, as an individual gets older, a higher porportion of all the words that person can recite are retrieved via an organized search pattern. This statement is counterintuitive. One would expect that, if there were any interaction it would be as age increases performance on the task would decrease, regardless of the presence of depression. Conceptually, the phenomenon being measured is obscure. As a consequence, the former rationale, that the heterogeneity of variance is due to chance and that CLTR:LTR is not a valid measure is the preferred explanation. Before any conclusions are drawn, however, this finding would have to be replicated. If chance is the source of the variance, one would expect future studies to not produce similar findings.

Education appears to have no main effects on the variables. A finding which is supported by earlier studies (Masur, et. al, 1989; Ruff, et. al, 1989; Banks, et. al, 1987). An interaction effect between education and group was

discovered, however. It seems that in the presence of depression, as education increases, the number of words recalled increases. None of the other groups appear susceptable to this interaction. This finding is also difficult to explain. One would expect homogeneity across the groups, and there is no apparent explanation as to why the presence of depression facilitates this interaction.

One possibility is that education does effect an individuals ablility to recall words. Individuals with dementia are not effected by education because the dementing process does not discriminate by education. For this hypothesis to be valid, however, one would expect an interaction effect in the healthy group also. The only apparent valid assumption is that this heterogeneity was due to chance. This finding is worthy of investigation in future studies.

Gender appears to have a main effect on all the variables. Women out-performed men on every measure of memory. It could be that women have better memories than men. A more likely reason for this main effect, however, may be the disproportion of female subjects to male subjects. Overall, there are twice as many female subjects as male subjects, and in the synergistic group, all seven participants are female.

According to these findings, among all the variables made available by administering the SRT, only the overall number of words recalled (recall) provides consistent

information about the subjects. And the amount of information that can be provided by the recall variable is also limited. Although a subject's recall score can be used to indicate whether the person is healthy or impaired, it cannot distinguish whether the individual's score is low because of dementia, depression, or a combination of the two. In addition, the group score for healthy individuals and depressed individuals overlap, so that a person's score may indicate depression, even if that person is supposedly "healthy". The opposite scenario is also possible. Thus, even distinguishing between healthy and unhealthy individuals based only on the total number of words recalled is less than perfect.

There are two possible explanations as to why, in this study, the SRT has not proven to be a viable predictor of a participant's overall functioning. First, there is a limitation in the sample population used in this study. Of the 87 subjects tested in this study, only 33 could be placed in one of the experimental groups, with twelve in the dementia group, fourteen in the depression group, and seven subjects in the synergestic group. The low number of subjects in the experimental groups requires greater differences in order to achieve significant results. Further, sampling difficulties exist in the gender breakdown of this subject pool. As mentioned previously, twice as many women as men were tested for this study, and one of the comparison (ad hoc analysis) groups contains no men. Future

studies using the SRT should take these sampling difficulties into consideration, though it is well known that women have a longer lifespan than men.

Another potential explanation for the present findings in this study may be the difficulty level of the SRT. Many participants, even those who were placed in the control group, commented on the difficulty of the test. If the SRT is too difficult for this population, one would expect a low ceiling effect. This effect will truncate the range of scores, making it more difficult to have scores from the four groups which do not overlap. Therefore, the difficulty of the SRT may have caused the scores to group together, making it extremely difficult to achieve significant results.

To the credit of the SRT, it does not appear that education or age have a significant impact on the subject's performance.

While this study is a preliminary investigation, it has provided us with many suggestions for future studies involving the SRT and its ability to distinguish between depressed, demented, and healthy individuals.

First, it is recommended that a larger and more evenly distributed sample be used. As mentioned previously, the small number of impaired individuals in this study required greater differences in order to obtain significant findings, as does the skewed gender distribution.

On the other hand, considering that this sample was drawn from an overall population of "able elderly" it may be

that this population is more homogeneous than we anticipated. Perhaps the impact of depression and memory impairment is less evident than the media and other publicists suggest.

Further, the findings of this study indicate that the scores of the different groups overlap, also affecting the findings. This issue could be addressed in one of several ways. One could use an easier SRT, thereby circumventing the hypothesized ceiling effect found in this study. Kraemer, Peabody, Tinkleberg, and Yesavage (1983) recommend using lists that are 15-20 words in length with controls and patients with mild DAT to avoid the ceiling effect. Although this would not make the SRT easier for the participant, it should allow for a wider range of scores.

Currently, the words on the SRT are chosen because they are unrelated and, therefore, difficult to "chunk" (Buschke, 1973). However, using lists which contain some related words would provide more information as to how individuals in the three groups code and retrieve words, while also making the SRT easier for the participant, thereby expanding the potential range of scores. In addition, using the SRT with delayed recall and delayed recognition has been found to successfully discriminate demented elderly from normal elderly (Branconnier, Cole, Spera, & DeVitt, 1982). Perhaps these methods would have equally high discriminative validity in differentiating memory loss due to dementia from memory loss due to depression.

Another method future studies can use to avoid

overlapping of scores is to define the groups more strictly. For example, mild dementia in this study was defined by a borderline score, whereas future studies may wish to use a more conservative cutoff score. Similarly, future studies may wish to use individuals who test positive for a more moderate to severe depression. More stringent definitions of the groups would decrease the chances of scores overlapping.

Finally, one may wish to compare the present SRT to memory measures which test a broader range of functions and more clearly focus on such memory corelates of concentration and attention. In any case the present study raises further questions which should challenge future researchers.

APPENDICES

APPENDIX A

Beck Depression Inventory (BDI)

Date: _____

Name: _____ Marital Status: _____ Age: _____ Sex: _____

Occupation: _____ Education: _____

This questionnaire consists of 21 groups of statements. After reading each group of statements carefully, circle the number (0, 1, 2 or 3) next to the one statement in each group which best describes the way you have been feeling the past week, including today. If several statements within a group seem to apply equally well, circle each one. Be sure to read all the statements in each group before making your choice.

1	0	I do not feel sad.
	1	I feel sad.
	2	I am sad all the time and I can't snap out of it.
	3	I am so sad or unhappy that I can't stand it.
2	0	I am not particularly discouraged about the future.
	1	I feel discouraged about the future.
	2	I feel I have nothing to look forward to.
	3	I feel that the future is hopeless and that things cannot improve.
3	0	I do not feel like a failure.
	1	I feel I have failed more than the average person.
	2	As I look back on my life, all I can see is a lot of failures.
	3	I feel I am a complete failure as a person.
4	0	I get as much satisfaction out of things as I used to.
	1	I don't enjoy things the way I used to.
	2	I don't get real satisfaction out of anything anymore.
	3	I am dissatisfied or bored with everything.
5	0	I don't feel particularly guilty.
	1	I feel guilty a good part of the time.
	2	I feel quite guilty most of the time.
	3	I feel guilty all of the time.
6	0	I don't feel I am being punished.
	1	I feel I may be punished.
	2	I expect to be punished.
	3	I feel I am being punished.
7	0	I don't feel disappointed in myself.
	1	I am disappointed in myself.
	2	I am disgusted with myself.
	3	I hate myself.
8	0	I don't feel I am any worse than anybody else.
	1	I am critical of myself for my weaknesses or mistakes.
	2	I blame myself all the time for my faults.
	3	I blame myself for everything bad that happens.
9	0	I don't have any thoughts of killing myself.
	1	I have thoughts of killing myself, but I would not carry them out.
	2	I would like to kill myself.
	3	I would kill myself if I had the chance.
10	0	I don't cry any more than usual.
	1	I cry more now than I used to.
	2	I cry all the time now.
	3	I used to be able to cry, but now I can't cry even though I want to.
11	0	I am no more irritated now than I ever am.
	1	I get annoyed or irritated more easily than I used to.
	2	I feel irritated all the time now.
	3	I don't get irritated at all by the things that used to irritate me.
12	0	I have not lost interest in other people.
	1	I am less interested in other people than I used to be.
	2	I have lost most of my interest in other people.
	3	I have lost all of my interest in other people.
13	0	I make decisions about as well as I ever could.
	1	I put off making decisions more than I used to.
	2	I have greater difficulty in making decisions than before.
	3	I can't make decisions at all anymore.

_____ Subtotal Page 1 CONTINUED ON BACK

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14
0 I don't feel I look any worse than I used to.
1 I am worried that I am looking old or unattractive.
2 I feel that there are permanent changes in my appearance that make me look unattractive.
3 I believe that I look ugly.

15
0 I can work about as well as before.
1 It takes an extra effort to get started at doing something.
2 I have to push myself very hard to do anything.
3 I can't do any work at all.

16
0 I can sleep as well as usual.
1 I don't sleep as well as I used to.
2 I wake up 1-2 hours earlier than usual and find it hard to get back to sleep.
3 I wake up several hours earlier than I used to and cannot get back to sleep.

17
0 I don't get more tired than usual.
1 I get tired more easily than I used to.
2 I get tired from doing almost anything.
3 I am too tired to do anything.

18
0 My appetite is no worse than usual.
1 My appetite is not as good as it used to be.
2 My appetite is much worse now.
3 I have no appetite at all anymore.

19
0 I haven't lost much weight, if any, lately.
1 I have lost more than 5 pounds.
2 I have lost more than 10 pounds.
3 I have lost more than 15 pounds.

I am purposely trying to lose weight by eating less. Yes _____ No _____

20
0 I am no more worried about my health than usual.
1 I am worried about physical problems such as aches and pains; or upset stomach; or constipation.
2 I am very worried about physical problems and it's hard to think of much else.
3 I am so worried about my physical problems that I cannot think about anything else.

21
0 I have not noticed any recent change in my interest in sex.
1 I am less interested in sex than I used to be.
2 I am much less interested in sex now.
3 I have lost interest in sex completely.

_____ Subtotal Page 2

_____ Subtotal Page 1

_____ Total Score

APPENDIX B

Senile Dementia of the Alzheimer's Type Battery

(SDAT-battery)

SUBJECT NUMBER_____
DATE_____

I. LOGICAL MEMORY
Write response verbatim in the space provided. Score half or whole points as trained.

"I am going to read to you a little story of just a few lines. Listen carefully and try to remember it just the way I say it, as close to the same words as you can remember. When I am through I want you to tell me everything I read to you. You should tell me all you can remember even if you are not sure. Are you ready?"

READ STORY

A) Anna Thompson/ of South/ Boston/	←——→
employed/ as a scrub woman/	←——→
in an office building/ reported/	←——→
at the City Hall/ Station/	←——→
that she had been held up/	←——→
on State Street/ the night before/	←——→
and robbed/ of fifteen dollars./	←——→
She had four/ little children/	←——→
the rent/ was due/	←——→
and they had not eaten/	←——→
for two days./ The officers/	←——→
touched by the woman's story/	←——→
made up a purse/ for her./	←——→
Total	←——→

"Now what did I read to you? Tell me everything and begin at the beginning." RECORD

SUBJECT NUMBER_____
DATE_____

"Now I am going to read you another little story and see how much of it you can remember. As with the first story, try to remember it just the way I say it. Ready?"

READ STORY

B) The American/ liner/ New York/ ——
struck a mine/ near Liverpool/ ——
Monday evening./ ——
In spite of a blinding/ ——
snowstorm/ and darkness/ ——
the sixty/ passengers including eighteen/ ——
women/ were all rescued/ ——
though the boats/ were tossed about/ ——
like corks/ in the heavy sea./ ——
They were brought into port/ ——
the next day/ by a British steamer./ ——
Total ——

"Now what did I read to you? Tell me everything and begin at the beginning." RECORD

LOGICAL MEMORY:

A) Number of memories _____
B) Number of memories _____
Total _____

$$\frac{\text{Total number of memories}}{2} = \text{_____}$$

SUBJECT NUMBER_____
DATE_____

MENTAL CONTROL:
1. "I want to see how well you can count backwards from 20 to 1 like this--20, 19, 18--all the way back to 1. Ready. Begin."

20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

Time	Errors

2. "I want to see how quickly you can say the alphabet for me--A, B, C. . . Ready. Begin."

A B C D E F G H I J K L M N O P Q R S T U V W X Y Z

Time	Errors

3. "I want to see how quickly you can count by 3's beginning with 1. Like this--1, 4, 7. Ready. Begin."

1 4 7 10 13 16 19 22 25 28 31 34 37 40

Time	Errors

MENTAL CONTROL:
For tests (1) and (2) score 2 if no error within time limit of 30 seconds, score 1 if one error within 30 seconds, and score 1 credit extra if subject repeats correctly with no errors within 10 seconds. For test (3) score 2 if no errors within time limit of 45 seconds, score 1 if one error within 45 seconds, and score 1 credit extra if subject repeats correctly with no errors within 20 seconds. There is a maximum of 3 points possible on each test.

Score Test 1 _____
Score Test 2 _____
Score Test 3 _____

Total Score _____

TRAILMAKING:

"On this page (POINT) are some numbers. Begin at number 1 (POINT TO NUMBER 1) and draw a line from 1 to 2 (POINT TO 2), 2 to 3 (POINT TO 3), 3 to 4 (POINT TO 4), and so on, in order, until you reach the end (POINT TO THE CIRCLE MARKED END). Draw the lines as fast as you can. Ready. Begin." TIME SUBJECT.

"Good. Let's try the next one. Ready. Begin." TIME SUBJECT

TRAILMAKING:
Number of seconds on drawing 2 _____
Number of errors on drawing 2 _____
Number of lifts on drawing 2 _____

$\frac{1000}{\text{seconds}}$ = _____

SUBJECT NUMBER_____
DATE_____

WORD FLUENCY:
"I'm going to say a letter of the alphabet and then I want you to tell me all of the words you can think of that begin with that letter. But proper names are not allowed, so if the letter were "B" you would not say "Boston" or "Bob." The letter is "S." Now tell me all the words you can think of that begin with the letter "S." Ready. Begin." TIME FOR ONE MINUTE NOTING EACH 15 SECOND INTERVAL.
"Fine. We're going to do the same thing again, but this time tell me all the words you can think of that begin with the letter "P." Ready. Begin." TIME FOR ONE MINUTE NOTING EACH 15 SECOND INTERVAL.

Words beginning with "S"	Words beginning with "P"

WORD FLUENCY:
Sum of "S" words _____
Sum of "P" words _____

Total number of words _____

CANONICAL FUNCTION (REPORT TO 3RD SIGNIFICANT DIGIT):

				+3.588
Logical Memory	= (-.445)	(_____)	=	-_____
Mental Control	= (+.130)	(_____)	=	+_____
Trailmaking	= (-.066)	(_____)	=	-_____
Word Fluency	= (-.036)	(_____)	=	-_____

TOTAL SCORE =_____

TRAIL MAKING

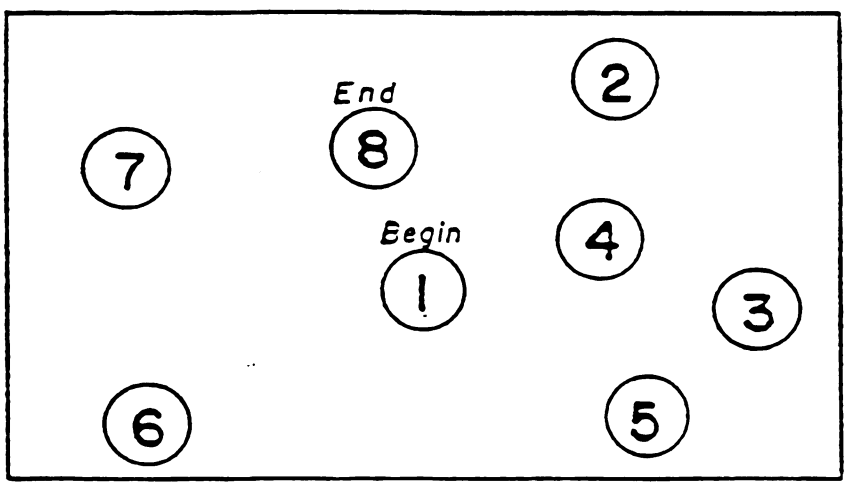
Subject #: _____

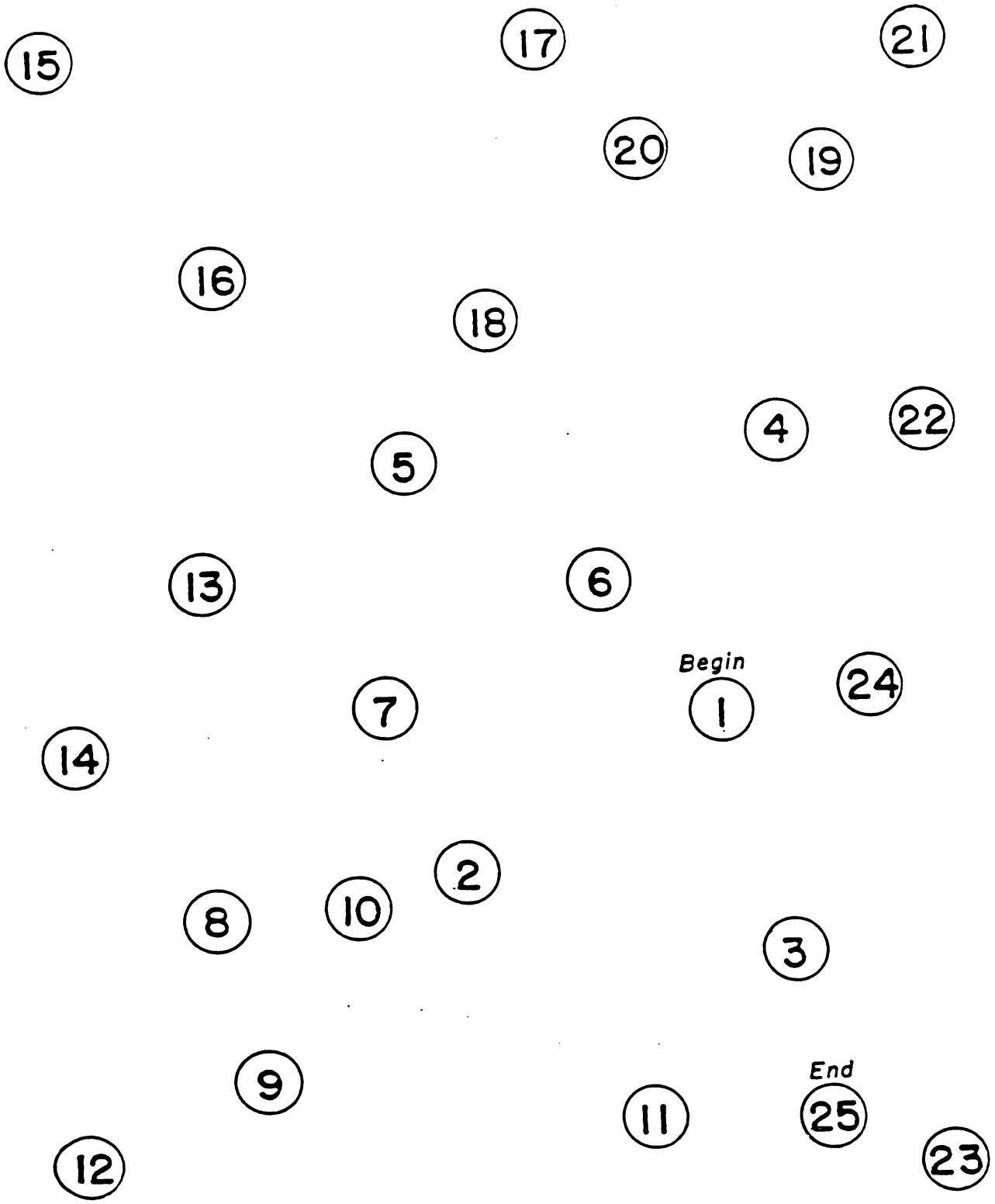
Interviewer: _____

Date: _____

Part A

SAMPLE




15
17
21
20
19
16
18
4
22
5
13
6
Begin
24
7
1
14
2
8
10
3
End
9
11
25
12
23

APPENDIX C

Selective Reminding Task (SRT)

SUBJECT NUMBER _____
DATE _____

First Trial:
"I'm going to read a list of words to you. Listen carefully so you can repeat them back to me. READ WORDS
Go ahead." RECORD WORDS
"Fine. Now I will tell you which words you forgot and when I'm through I'll have you tell me the entire list again.
You forgot. . . (READ WORDS THEY FORGOT) Now try to tell me the entire list again. Go ahead."
All Subsequent Trials:
AFTER THEY HAVE SAID ALL THE WORDS THEY CAN REMEMBER
"Fine. Now I will tell you which words you forgot, and when I'm through I'll have you tell me the entire list again.
You forgot. . . (READ WORDS THEY FORGOT) Now try to tell me the entire list again. Go ahead."

	1	2	3	4	5	6	7	8	9	10	11	12	
shine													shine
disagree													disagree
fat													fat
wealthy													wealthy
drunk													drunk
pin													pin
grass													grass
moon													moon
prepare													prepare
prize													prize
duck													duck
leaf													leaf

Intrusions: RECORD WORD SAID WITH RESPONSE NUMBER IN ( ).

1	7
2	8
3	9
4	10
5	11
6	12

SUBJECT NUMBER _____
DATE _____

	1	2	3	4	5	6	7	8	9	10	11	12	SUM
Recall													
LTS													
LTR													
CLTR													
STR													
Random													
Reminders													

SCORING

1. Mark all blank spaces on the scoring sheet with a large X.

2. Examine each word row (1-12). When two trials are recalled in a row, underscore in red those trials and all subsequent trials in that row (whether the word has been consistently recalled or not). This represents long term storage.

3. Trace each word row backwards, from right to left, and place an arrow in the numbered square following the last square with an X. There should be no arrows in the 12th column (see sample). This represents consistent long term storage.

4. Add the number of words recalled down each column and enter the totals in the row marked RECALL.

5. Count down each column, the squares with numbers (recalled words) that are underlined in red and enter total in the row marked LONG TERM RETRIEVAL (LTR).

6. Subtract the LTR row from the RECALL row now by column and enter the results in the row marked SHORT TERM RECALL (STR). When the line marked LTR and STR are added together, they will equal the line marked RECALL.

7. Add cumulatively down the columns only those numbered blocks having arrows, and enter the totals in the row marked CONSISTENT LONG TERM RETRIEVAL (CLTR).

8. Count down each column, the squares (with an X or number) underlined in red and enter the totals in the row marked LONG TERM STORAGE (LTS).

9. Subtract the row marked CLTR from the (LTR) row by column and enter the remainder in the row marked RANDOM (RANDOM LTR).

10. Sum across the LTR row and enter total at the end on the right.

11. Sum across the CLTR row and enter total at the end on the right.

LIST OF REFERENCES

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American Psychiatric Association. (1987). Diagnostic and Statistical Manual of Mental Disorders (3rd ed.-revised). Washington D.C: Author.

Banks, P. G., Dickson, A. L., & Plasay, M. T. (1987). The verbal selective reminding test: Preliminary data for healthy elderly. Experimental Aging Research, 13, 203-207.

Beck, A. T. & Beamesderfer, A. (1974). Assessment of depression: The depression inventory. In P. Pichot (Ed.), Psychological Measurements in Psychopharmacology: Vol. 7. Modern problems in pharmacopsychiatry (pp. 151-169). Basel, Switzerland: Karger.

Bishop, E. G., Dickson, A. L., & Allen, M. R. (1988). The Relationship Between Intellectual Level and Buschke's Selective Reminding Test. Poster presented at the January, 1988 meeting of the International Neuropsychological Society, New Orleans, LA.

Botwinick, J. (1984). Pathological aging. Aging and behavior (pp. 129-142). New York: Springer.

Branconnier, R. J., Cole, J. O., Spera, K. F., & DeVitt, D. R. (1982). Recall and recognition as diagnostic indices of malignant memory loss in senile dementia: A Bayesian analysis. Experimental Aging Research, 8, 189-193.

Buschke, H. (1973). Selective reminding for analysis of memory and learning. Journal of Verbal Learning and Verbal Behavior, 12, 543-550.

Buschke, H. (1974). Spontaneous remembering after recall failure. Science, 184, 579-581.

Buschke, H. & Fuld, P. A. (1974). Evaluating storage, retention, and retrieval in disordered memory learning. Neurology, 24, 1019-1025.

Caine, E. D., Ebert, M. H., & Weingartner, H. (1977). An outline for the analysis of dementia: The memory disorder of Huntingtons disease. Neurology, 27, 1087-1092.

Cohen, R. M., Weingartner, H., Smallberg, S. A., Pickar, D., & Murphy, D. L. (1982). Effort and cognition in depression. Archives of General Psychiatry, 39, 593-597.

Fuld, P. A., Katzman, R., Davies, P., & Terry, R. D. (1982). Intrusions as a sign of Alzheimer dementia: Chemical and pathological verification. Annals of Neurology, 11, 155-159.

Gatz, M. & Pearson, C. G. (1988). Ageism revised and the provision of psychological services. American Psychologist, 43, 184-188.

Glanzer, M. (1972). Storage mechanisms in recall. In G. H. Bower (Ed.), Psychology of Learning and Motivation, (Vol.5). New York: Academic Press, 129-193.

Grady, C. L., Haxby, J. V., Horwitz, B., Berg, G., & Rapoport, S. I. (1987). Neuropsychological and cerebral metabolic function in early vs late onset dementia of the Alzheimer type. Neuropsychologia, 25(5), 807-816.

Hannay, H. J. & Levin, H. S. (1985). Selective reminding test: An examination of the equivalence of four forms. Journal of Clinical and Experimental Neuropsychology, 7(3), 251-263.

Hart, R. P., Kwentus, J. A., Hamer, R. M., & Taylor, J. R. (1987). Selective reminding procedure in depression and dementia. Psychology and Aging, 2, 111-115.

Hasher, L. & Zacks, R. T. (1979). Automatic and effortful processes in memory. Journal of Experimental Psychology: General, 108, 356-388.

Kendrick, D. C. (1982). Why assess the aged? A clinical psychologist's view. British Journal of Clinical Psychology, 21, 47-54.

Kraemer, H. C., Peabody, C. A., Tinklenberg, J. R., & Yesavage, J. A. (1983). Mathematical and empirical development of a test of memory for clinical and research use. Psychological Bulletin, 94(2), 367-380.

Kramer, B. L. (1982). Depressive pseudodementia. Comprehensive Psychiatry, 23, 538-544.

La Rue, A., D'Elia, L. F., Clark, E. O., Spar, J. E., & Jarvik, L. F. (1986). Clinical tests of memory in dementia, depression, and healthy aging. Journal of Psychology and Aging, 1, 69-77.

La Rue, A., Dessonville, C., & Jarvik, L. F. (1985). Aging and mental disorders. In J.E. Birren & K.W. Schaie (Eds.). Handbook of the Psychology of Aging. New York: Van Nostrand Reinhold Company.

Larrabee, G. J., Largen, J. W., & Levin, H. S. (1985). Sensitivity of age-decline resistant ("hold") WAIS subtests to Alzheimer's disease. Journal of Clinical and Experimental Neuropsychology, 7, 497-504.

Larrabee, G. J., Trahan, D. E., Curtiss, G., & Levin, H. S. (1989). Normative data for the verbal selective reminding test. Neuropsychology, in press.

Loring, D. W. & Papanicolaou, A. C. (1987). Memory assessment in neuropsychology: Theoretical considerations and practical utility. Journal of Clinical and Experimental Neuropsychology, 9(4), 340-358.

Masur, D. M., Fuld, P. A., Blau, A. D., Crystal, H., & Aronson, M. K. (1990). Prediciting development of dementia in the elderly with the Selective Reminding Test. Journal of Clinical and Experimental Neuropsychology, 12(4), 529-538.

Masur, D. M., Fuld, P. A., Blau, A. D., Thal, L. J., Levin, H. S., & Aronson, M. K. (1989). Distinguishing normal and demented elderly with the Selective Reminding Test. Journal of Clinical and Experimental Neuropsychology, 11(5), 615-630.

McLean, S. (1987). Assessing dementia. Part I: Difficulties, definitions and differential diagnosis. Australian and New Zealand Journal of Psychiatry, 21, 142-174.

McLean, S. (1987a). Assessing dementia. Part II: Clinical, functional, neuropsychological and social issues. Australian and New Zealand Journal of Psychiatry, 21, 284-304.

Miller, E. & Lewis, P. (1977). Recognition memory in elderly patients with depression and dementia: A signal detection analysis. Journal of Abnormal Behavior, 86, 84-86.

Morgan, S. F. (1982). Measuring long-term memory storage and retrieval in children. Journal of Clinical Neuropsychology, 4(1), 77-85.

Page, J. B., Fletcher, J., & True, W. R. (1988). Psychosociocultural perspectives on chronic cannabis use: The Costa Rican follow-up. Journal of Psychoactive Drugs, 20(1), 37-65.

Peters, B. H. & Levin, H. S. (1977). Memory enhancement after physostigmine treatment in the amnesic syndrome. Archives of Neurology, 34, 215-219.

Peters, B. H. & Levin, H. S. (1979). Effects of physostigmine and lecithin on memory in Alzheimer disease. Annals of Neurology, 6, 219-221.

Poon, L. W. (1985). Differences in human memory with aging: Nature, causes, and clinical implication. In J.E. Birren & S.K. Schaie (Eds.), Handbook of the Psychology of Aging. New York: Van nostrand Reinhold Company.

Ruff, R. M., Light, R. H., & Quayhagen, M. (1989). Selective Reminding Tests: A normative study of verbal learing in adults. Journal of Clinical and Experimental Neuropsychology, in press.

Salzman, C. & Gutfreund, M. J. (1987). Clinical techniques and research strategies for studying depression and memory. In L. Poon (Ed.), Handbook of Clinical Memory Assessment of Older Adults. Washington, D. C.: American Psychological Association Press.

Shaw, E. D., Stokes, P. E., Mann, J. J., & Manevitz, A. Z. (1987). Effects of lithium carbonate on the memory and motor speed of bipolar outpatients. Journal of Abnormal Psychology, 96(1), 64-69.

Stehouwer, R. S. (1985). Beck Depression Inventory. In D. J. Keyser & R. C. Sweetland (Eds.). Test Critiques. New York: Test Corporation of America, 83-87.

Storandt, M., Botwinick, J., Danziger, W. L., Berg, L., & Hughes, C. P. (1984). Psychometric differentiation of mild senile dementia of the Alzheimer type. Archives of Neurology, 41, 497-499.

Thompson, C. P., Wenger, S. K., & Bartling, C. A. (1978). How recall facilitates subsequent recall: A reappraisal. Journal of Experimental Psychology: Human Learning and Memory, 4(5), 210-221.

Tulving, E. (1962). Subjective organization in free recall of "unrelated" words. Psychological Review, 69, 344-354.

Weingartner, H., Cohen, R. M., Murphy, D. L., Martello, J., & Gerdt, C. (1981). Cognitive processes in depression. Archives of General Psychiatry, 38, 42-47.

Weingartner, H., Grafman, J., Boutelle, W., Kaye, W., & Martin P.R. (1983). Forms of memory failure. Science, 221, 380-382.

Weingartner, H., Kaye, W., Smallberg, S. A., Ebert, M. H., Gillin, J. C., & Sitaram, N. (1981). Memory failures in progressive idiopathic dementia. Journal of Abnormal Psychology, 90, 187-196.

Wells, C. E. (1979). Pseudodementia. American Journal of Psychiatry, 136, 895-900.

Zametkin, A. J., Karoum, F., & Rapoport, J. L. (1987). Treatment of hyperactive children with D-Phenylalinine. American Journal of Psychiatry, 144(6), 792-794.