AN ABSTRACT OF THE THESIS OF

DEBORAH RAE DOUGAN for the degree of DOCTOR OF PHILOSOPHY

in EDUCATION presented on MAY 12, 1983.

TITLE: THE EFFECT OF A MEMORY RETRAINING PROGRAM AS A NEUROPSYCHOLOGICAL REHABILITATION TECHNIQUE FOR NONTOXIC CHRONIC ALCOHOLICS.

Redacted for privacy

Abstract Approved: _____
Dr. Frank R. Cross

The Purpose of the Study

This study was undertaken to design, implement, and assess the effectiveness of a memory retraining program. The design was a true experimental design with pretest/posttest control group and randomized selection of experimental group. The principle hypothesis was that there would be a significant difference between the treatment group and the control group in memory test scores from pretest to posttest.

The Procedures

A total of 59 subjects, 90% male and all over 18, participated as treatment in an Alcohol Treatment Program. Data was collected from four 4-week programs. The Dooks Memory Test and Trailmaking A and B were used to evaluate memory. Subjects who gave informed consent were pretested the first day of the program and posttested the last week. The subjects for the treatment condition were then chosen at random; control subjects were involved in other treatment

modalities. At the end of the program a seminar summarizing the memory retraining program was offered to control subjects.

The Memory Retraining group met two days a week in 90-minute sessions for four weeks. The content of the course emphasized observation, attention, and concentration. Association strategies were used with emphasis on imagery techniques. Both treatment and control group members were posttested with alternate forms of the Dooks Memory Test, and with the Trailmaking Test A and B.

Summary of Results

The analysis of covariance produced a significant main effect of the Memory Retraining Program. Additionally, three of the six subtests also showed a significant main effect. These results point to a significant effect of the Memory Retraining Program on the experimental group.

The statistical analysis also pointed to a significant effect from Age and IQ. There were no interaction effects between age and treatment or IQ and treatment, and no other independent variables (education, duration, days since last drnk, depression) were significant. The L.S.D. test indicated that the significant difference in Age was between the youngest and oldest divisions, and that the significant difference in IQ was between the "Dull Normal" group and the "Bright" group. These results suggested a significant difference between these groups on performance on the memory test. There was a low correlation between IQ and memory change scores.

Summary of Conclusions

The results of this study point to the potential effectiveness

of a memory retraining program for a variety of educational levels, age groups, and IQ scores. This program was also effective for the specific population of alcoholics regardless of the length of abstinence, length of drinking history, or severity of depression.

THE EFFECT OF A MEMORY RETRAINING PROGRAM AS A NEUROPSYCHOLOGICAL REHABILITATION TECHNIQUE FOR NONTOXIC CHRONIC ALCOHOLICS

by

Deborah Rae Dougan

A THESIS

submitted to

Oregon State University

in partial fulfillment of
the requirements for the
degree of

DOCTOR OF PHILOSOPHY

Completed May 12, 1983

Commencement June 1984

APPROVED:

Redacted for privacy

Professor of Education, in charge of major;
Head of Department of Educational Psychology and Foundations

Redacted for privacy

Dean of Graduate School

Date thesis is presented May 12, 1983

Typed by Deborah R. Dougan.

ACKNOWLEDGEMENTS

Although I extend deep appreciation to all the unnamed persons who have affected this journey, I would like to give special thanks to the following persons.

I would like to thank Dr. Frank Cross, Chair of my Committee, for his expert executive direction; as well as the other Committee members-- Dr. Charles Warnath, Dr. Mary Jane Wall, Dr. Gary Tiedeman and Dr. Jodi Engel.

I would also like to thank my friend Annie Laczkowski, my husband Dave Evenson and my family for their unsolicited and unbiased moral support.

I would like to thank Malt (Dr. R.N. Malatesha) for an introduction to Neuropsychology, and Dr. Bruce Brooks for an introduction to Clinical Psychology.

Above all, none of this would have been possible without the influence and support of the two women who serve as role models for me-- Dr. Sharyne Merritt and Dr. Jodi Engel. Thank you Sharyne for your creative genius, sound counsel and perspectives on Life. Words cannot express my thanks to Jodi for her inimitable example or for her unflagging enthusiasm and zest.

TABLE OF CONTENTS

LIST OF TABLES

THE EFFECT OF A MEMORY RETRAINING PROGRAM AS A NEUROPSYCHOLOGICAL REHABILITATION TECHNIQUE FOR NONTOXIC CHRONIC ALCOHOLICS

CHAPTER I

INTRODUCTION

Laboratory research has confirmed the connections between neuropsychological factors and cognitive functioning. Application of these findings to the field of education suggests the possibility of educational training programs which compensate for neurologically-related deficiencies. It is the goal of this project to design an educational training program which will address the problem of retraining memory in detoxified alcoholics. Memory impairment among alcoholics goes beyond the depressant functions of alcohol immediately after consumption. High levels of alcohol use for prolonged periods of time tend to impair the functioning of adaptive abilities dependent on organic brain function. Examples of some adaptive abilities are: performance tasks that involve speed and fairly complex perceptual-motor abilities; cerebellar movements such as balance and coordination; and memory, particularly new memory rather than old.

Background of the Study

Research among brain-damaged individuals has shown that patients can be trained to use techniques such as mnemonics, association, and imagery as an alternate link to overcome memory deficits

(Lewinsohn, et al., 1977; Luria, 1963). Alcohol rehabilitation programs have not yet addressed the need for rehabilitation of memory. The intersection of these two research areas--memory training of brain-impaired individuals and retraining of alcoholics--point to the potential value of a memory retraining program for alcoholics. The project designed, implemented, and assessed one such program: Memory retraining for detoxified alcoholics.

Statement of the Problem

The principle focus of this investigation was to determine the effectiveness of a memory retraining program on memory of detoxified alcoholics. The challenge of measuring memory necessitated the formulation of a testing instrument since current memory tests do not evaluate, in one test, the combination of concentration skills, association strategies, imagery, and/or organization. With the developed instrument, memory and concentration were tested the first day of the program and the last week, for both experimental and control groups. Additional independent variables (i.e., age, sex, education, IQ, etc.) were systemmatically investigated to determine extraneous effect on memory. In relationship to the statement of the problem and the design, which was a true experimental design with pretest/posttest control group and randomized selection of experimental group, the following questions were considered:

IS THERE A SIGNIFICANT DIFFERENCE IN MEMORY TEST SCORES BETWEEN THE TREATMENT AND THE CONTROL GROUP?

1. Is there a significant difference between treatment and control group for each of the subtests of the Memory Test?
2. Is there a relationship between concentration and memory based on test scores?
3. Is there a difference between the treatment and control group in the effect of length of abstinence on memory?
4. Is there a difference between treatment and control group of the relationship between age and memory?
5. Is there a difference between treatment and control group of the relationship between sex and memory?
6. Is there a difference between treatment and control group of the relationship between education and memory?
7. Is there a difference between treatment and control group of the relationship between IQ and memory?
8. Is there a difference between treatment and control group of the difference between duration of drinking and memory?
9. Is there a difference between treatment and control group of the relationship between depression and memory?

Need for Research

The significance of research in this area arises from the pervasiveness of the problem and therefore the urgent need for training and rehabilitation. Alcohol abuse is the third most prevalent health problem in the United States,with an estimated nine million alcoholics or problem drinkers (Ray, 1978). Current efforts need improvement in preventing and treating alcohol-related problems. There is no question that chronic alcohol consumption impairs memory, a problem which has not yet been

addressed in rehabilitation programs. Beyond the problem of alcohol abuse, drug abuse has also been steadily increasing, especially noticeable among students (Goodwin, 1975; Hochhauser, 1978; Nagaraja, 1977). Specific effects of drug use on intellect, learning, and memory are yet a topic of dispute. However the potential deleterious effects of such drug use on emerging adolescent cognitive processes is a risk too high to take. This program of memory rehabilitation will benefit any memory impairment, especially difficulties in learning or memory based on a lack of concentration or attention. Improved memory and concentration abilities will facilitate retention, make more efficient use of time, increase alertness, and subsequently improve self-esteem.

Advances in physiological science, brain research, and neuropsychology are just beginning to explain the mechanism of brain/behavior interrelationships. This rehabilitation program presupposes certain aspects of the physiology of specific cognitive processes, particularly memory. For example, experimental research (Scoville & Milner, 1957) suggests that the ability to learn new material is located in the hippocampal structures of the limbic system. However the study of amnesia and its neuropathology lead to a general conclusion that neither the hippocampal region nor the diencephalic midline can be the locus of the structural alterations of long-term memory since most old memories seem not to be affected. Thus at the present time, the available information about amnesia and memory is largely descriptive, and the reader must choose between competing theories. The recency of confirmation of findings in these fields

may suggest reasons this type of study has not yet been attempted.

Other factors inherent in research with humans complicate the ability to control the variability in the study. Drinking history, for example, will vary with individuals; the variable "amount of alcohol consumed" presents the problem of the unreliability of self-report. A treatment program of this design lends itself to the problems of individual differences, e.g., the degree to which individuals are motivated, the length of abstinence, the degree to which individuals can use imagery or association techniques. These elements may also suggest reasons for no previous attempt at this topic of study.

Approval for Research

This research was conducted in conjunction with a predoctoral internship in Clinical Psychology at a state mental hospital. The Hospital Research Committee granted approval of the study under the provisions of the research guidelines. The main responsibility of the psychology intern position was to make a commitment to patient care, and this project was carefully scrutinized for benefits for the patients.

CHAPTER II

REVIEW OF LITERATURE

Alcoholic Korsakoff's Syndrome has long been recognized and studied as the progressive deterioration of cerebral tissue due to chronic alcohol ingestion (Butters & Cermak, 1976, 1980). The single most distinguishing characteristic of the alcoholic Korsakoff patient is the severe deficit of anterograde amnesia (Butters & Cermak, 1980; Oscar-Berman & Zola-Morgan, 1979). The amnesic symptoms of Korsakoff's syndrome have long been topics of research, especially in the areas of the functional anatomy of memory (Kovner, et al., 1981; Oscar-Berman & Zola-Morgan, 1979), as well as with specific coding deficits, verbal and visuospatial (Cermak, Butters, & Moreines, 1974; Oscar-Berman & Zola-Morgan, 1979). On the other hand, systemmatic study of memory impairment of chronic alcoholics is a recent endeavor, facilitated by advances in neuropsychology, neurology, and psychopharmacology (Fabian, Jenkins, & Parsons, 1981; Freund, 1973; Kleinknecht & Goldstein, 1972; Ryback, 1971; Tarter, 1973). As Korsakoff's is a progressive disease, deficits of chronic alcoholics exist on a continuum with deficits of Korsakoff patients (Butters, et al., 1977; Kapur & Butters, 1977; Ryan, et al., 1980). Thus the extensive study of Korsakoff Syndrome has provided the substructure for inquiry into symptoms of cognitive impairment of chronic alcoholics.

Although the Korsakoff patient and the chronic alcoholic have similar deficits, the chronic has the advantage of reversibility of

symptoms with extended abstinence from alcohol (Jones & Parsons, 1971; Jonsson, Cronholm, & Izikowitz, 1962; Kish, et al., 1980; Leber, Jenkins, & Parsons, 1981; Long & McLachlan, 1974). Amnesia is also prevalent in degrees of severity in patients who have sustained brain damage from other than alcohol (Cermak & Butters, 1976; Huppert, 1977; Lewinsohn, et al., 1977; Warrington & Weiskrantz, 1971, 1982; Winocur & Weiskrantz, 1976). Memory rehabilitation with brain-damaged patients is a fledgling program, yet has seen remarkable success (Lewinsohn, et al., 1977; Luria, 1963). Memory rehabilitation with chronic alcoholics would appear to have genuine merit but has yet to be undertaken.

Although Psychology theorists advance various models of human memory (Cermak, 1972; Hilgard & Bower, 1975; James, 1890; Waugh & Norman, 1965), the findings of studies of the neurology of alcohol suggest that physiological attention is a principal determinant of short-term memory retention in recovering alcoholics (Kish, et al., 1980; Oscar-Berman, 1980; Portnoff & Dougan, 1982). This research relied upon the theory of Levels of Processing, which addresses the process of rapid analysis of stimuli at different stages, as a framework for memory research (Cermak, 1972; Craik & Lockhart, 1972; Sutherland, 1968; Treisman, 1964). Thus a classical theory of human memory in conjunction with current neuropsychological findings produce a functional framework within which to examine the memory process in chronic alcoholics.

The similarities of the symptoms of amnesia between brain-damaged patients and Korsakoff alcoholics extend beyond diagnostics and assessments of the deficits. Rehabilitation strategies for both

populations concentrate on the use of mental imagery (Basso, Bisiach, & Luzzatti, 1980; Cermak, 1975; Cutting, 1978; Kapur, 1978; Lewinsohn, et al., 1977). Mental imagery, a nonverbal symbolic process, has long been recognized as an effective mediation technique in associative learning and memory (Atwood, 1971; Bower & Reitman, 1972; Bowers, 1931; Paivio, 1969; Paivio, Yuille, & Madigan, 1968; Papineau & Lohr, 1981; Park, 1980; Poon & Walsh-Sweeney, 1981; Strosahl & Ascough, 1981). Yet memory rehabilitation with chronic alcoholics has yet to be proposed. In one study (Binder, 1978) recovering male alcoholics were tested with a paired-associate learning task and a cognitive predictor battery, which included verbal memory and visuospatial functions. The subjects were assigned to one of three experimental conditions: (1) instructions to use visual imagery; (2) instructions to use verbal mediation; or (3) no instructions. The findings of this study suggested that recovering alcoholics can benefit from the second treatment condition: instructions to use verbal mediation, which was mnemonic aid instruction. The proposed study intends to implement a memory rehabilitation program with emphasis upon attention and concentration, using visual imagery techniques to mediate associative learning and facilitate memory.

One premise of this study was the contention that memory acquisition at any level is influenced by attention to stimuli, and alcohol abuse impairs concentration skills. It follows that memory will improve over a detoxification period as a function of abstinence, as well as from additional training that emphasizes concentration skills. Concentration is both a physiological and

cognitive function, and can be affected in neurologically-intact individuals. Kish, et al. (1980) reported that the crucial changes in the recovery period tend to occur between the second and third week of abstinence with little change thereafter. This period is well beyond the point that residual blood alcohol is found and possibly reflects improvement in general health and nutritional status as well. Not only do these findings suggest a schedule for the most effective implementation of a treatment program, but it is also clear that there is a component of cerebral impairment found immediately subsequent to heavy drinking that is reversible. Thus this project focused on improvements of memory based on physiological and conscious fluctuations of attention.

Theoretical Considerations

The theoretical basis for this hypothesis will begin with a discussion of theories of memory from Cognitive Psychology. The next topic addressed, the neurology of alcohol, will cover the effect of alcohol on the brain, central nervous system effects on arousal and attention, and particularly the effect of alcohol on memory. Luria's theory of rehabilitation will then be presented, followed by a discussion of the use of imagery and association techniques to improve memory deficits.

Introduction

There are no universally accepted definitions of learning and memory. All studies of learning and memory face the obvious but troublesome fact that learning and memory cannot be studied directly. We can only observe behavior and make inferences about

learning and memory on the basis of the observations. The terms "learning" and "memory"were used here to refer to the acquisition and retention of changes, presumably in the central nervous system, produced by experience.

A generation ago memory was studied as a relatively simple process of imprinting, storing, and reproducing traces. With computer techniques, these ideas have been shown to be grossly inadequate and scientists now interpret remembering and recalling as complex acts of information-processing that take place in consecutive stages and represent cognitive activity. What is more, there has been much progress in the biological analysis of the nature of memory that reveals that ribonucleic acid has a role in imprinting and storage. Experiments have shown that the brain contains special neurons that function not so much to receive and analyze new information but to compare new information with traces of past experience and to regulate changes if the new coincides with the old. Research into the neuronal mechanisms of activation, attention, and memory indicates that the nervous system is altered in many ways by experience. Understanding the specific ways that neurobiological changes alter behavior remains for future research.

Stages of Memory

Over 80 years ago William James (1890) suggested two forms of memory: primary memory--"the rearward portion of the present space of time"; and secondary memory--"the recall of events already dropped from consciousness". Primary has since been renamed "recent," "immediate," or "short-term" and secondary has been

called "distant," "delayed," or "long-term." Retention has also been subdivided by Shuttleworth & Morris (1966) as follows:

1. Immediate memory (IM) or 'widespread neuronal activity lasting a few seconds to one minute';
2. Short-term memory (STM) or 'transduction of neural activity into macromolecular form', and
3. Long-term or remote memory (RM) or 'widespread storage of macromolecular engrams.'

This subdivision has also been supported behaviorally in studies of patients with bilateral lesions of the hippocampal complexes (Penfield & Milner, 1958), patients with transient global amnesia (Shuttleworth & Morris, 1966), and patients with alcohol amnesia (Ryback, 1970).

Theories of Memory

Traditionally, models of human memory have been dominated by a concept of stores and the transfer of information among them (Broadbent, 1958; Waugh & Norman, 1965). The underlying explanation of the multistore theories is that information is transferred from one store to another, and the different stores are distinguished by the different retention characteristics and changes of the memory code. There are many inconsistencies with the multistore approach.

Limited capacity is an essential feature of the information-flow approach, but it is unclear if the limitation is one of processing capacity, storage capacity, or some interaction between the two. Another question centers around the type of coding that differentiates short-term store from long-term store: Is the coding acoustical, semantic, articulatory, or visual? A third argument against the stores theory of memory challenges the aspect that

memory stores are to be distinguished by their forgetting characteristics. The retention function should be invariable across the different experimental conditions but retention depends upon study time, amount of material presented, familiarity and meaningfulness of the material. The stores approach of memory also does not address the roles of perceptual, attentional, and rehearsal processes, which are the input to memory.

Thus many theorists now agree that perception involves rapid analysis of stimuli at a number of levels (Sutherland, 1968; Treisman, 1964). The preliminary stages concern the analysis of physical or sensory features such as lines, angles, brightness, and loudness, while later stages are more concerned with matching input with stored information from past learning. The later stages are concerned with pattern recognition and meaning. Memory trace can also be understood as a by-product of perception and the existence of that trace could be a function of the depth to which the stimulus has been analyzed. Stimuli can also be retained over short intervals by continuous processing at a particular depth. Thus as opposed to a model of stores theory of memory, the levels of processing model offers a different perspective from which to interpret memory processes.

Craik and Lockhart (1972) advance some arguments against the currently popular view that human memory is most usefully viewed as a series of stages or stores. Following such attention theorists as Treisman (1964) and Sutherland (1968), they suggest instead that incoming stimuli are analyzed to different levels or depths depending on amenability of the stimulus to deep processing, the nature of the

task, and the amounts of time and attention that the subject devotes to processing the items. "Depth" refers to a continuum of processing running from shallow sensory analyses that require little attention, to deeper semantic processes through which the stimulus is identified, interpreted, and enriched by associations with stored knowledge. Craik and Lockhart (1972) argue that the memory trace can be considered the record of those analyses performed during perception and comprehension of the stimulus and that deeper processing results in longer lasting traces. According to this view, both the qualitative nature of the trace and its persistence over time depend entirely on the cognitive operations performed during the initial processing of the events. The premise of the proposed study is derived from these theories: that attention to the original stimuli, concentration on the characteristics, and coding of the material with association techniques will more effectively process the information for later retrieval.

Levels of Processing theory. The series of processing stages can be seen as "depth of processing" where greater "depth" is a greater degree of cognitive analysis. After a stimulus is recognized, it may undergo further processing by elaboration, such as when a word is recognized it may trigger association or images based on the person's past experiences. Similar levels of processing exist in perceptual analyses of sounds, sights, and smells.

One result of this analysis is a memory trace and the persistence of the trace is a function of depth of analysis. Deeper levels of analysis are associated with longer-lasting and stronger traces. Highly familiar, meaningful stimuli are compatible with

existing cognitive structures and such stimuli will be processed to a deeper level more rapidly than less meaningful stimuli and will be deeply ingrained. Thus speed does not predict retention but retention is a function of depth, amount of attention devoted to a stimulus, compatibility with analyzing structures, and processing time available.

Thus memory can be analyzed by levels of perceptual processing, and can be viewed as a continuum from the transient sensory analysis to the more permanent semantic-associative operation. Additionally, stimuli can be retained by recirculating information at one level of processing, i.e., "keeping items in consciousness." The amount of information that can be retained depends upon the level of processing. At deeper levels the subject can rely upon learned rules and past knowledge and the material can be more efficiently handled with greater retention. The operation of rehearsal or circulating information at one level could be referred to as primary memory, where material is still being processed or attended to. When attention is diverted from the stimuli, information will be lost according to the level of processing--slower rates at deeper levels. In summary, the memory trace is best described in terms of depth of processing with deeper analysis leading to a more consistent trace. While information may be retained in primary memory, this will not necessarily improve retention. When attention is diverted information is lost at a rate which depends upon the level of analysis.

This theoretical model seems to suggest that memory can be facilitated by encouraging deeper levels of processing. This

study purports to encourage careful scrutiny of incoming stimuli and to interpret material by association or imagery techniques, thereby making material meaningful to the subject and also encouraging deeper levels of processing.

The Neurology of Alcohol

Introduction

It has been proven absolutely by post mortem studies of the brains of alcoholics (Birnbaum & Parker, 1977; Butters & Cermak, 1980) that alcohol causes brain damage if enough is consumed over a long-enough period of time. Ethyl alcohol (C_2H_5OH) is an organic solvent, a poison. It is a sedative-hypnotic drug; this drug has a dose-dependency effect. Drugs of this type produce first sedation at low doses, a hypnoid state at intermediate doses, and anesthesia or coma at higher doses. Alcohol has a depressing or sedating effect on the nervous system.

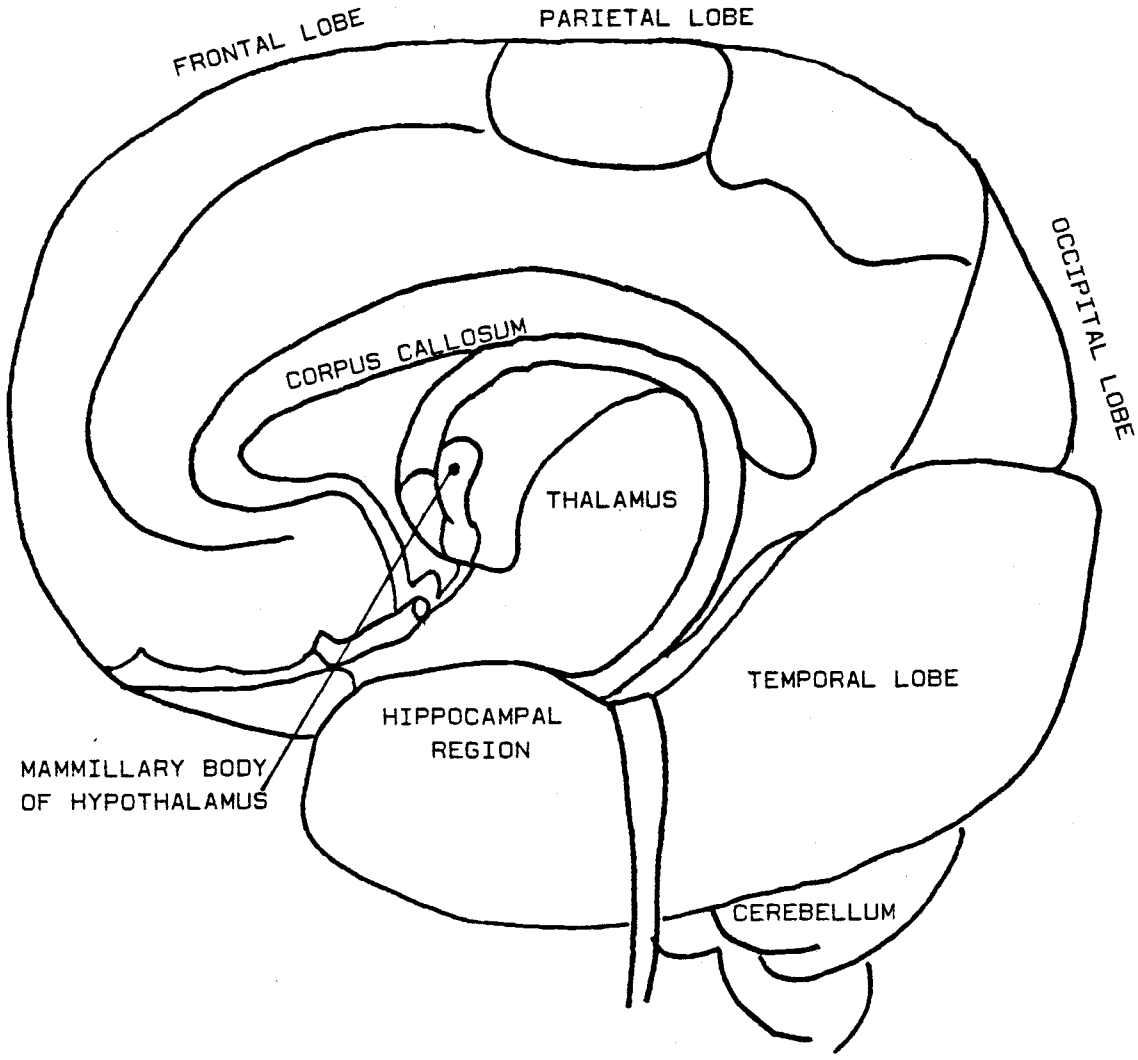
Effects of Alcohol on the Brain and the Nervous System

Alcohol has two main effects on the brain: direct neurotoxic effects and vitamin deficiency effects. Alcohol affects the brain as a whole, but also has an affinity for three basic areas; it is not certain why these areas rather than others are the most vulnerable to the toxic effects of alcohol. (See Figure 1)

1. The FRONTAL LOBES regulate behavior and mood, control attention and sustain concentration, and are responsible for goal-directed thinking and logical reasoning and planning.

FIGURE 1

Midsaggital slice of the right hemisphere of the brain. The hippocampal region is usually hidden by the temporal lobe. Major brain structures in the limbic system include: hippocampus, amygdala, mammillary bodies of the hypothalamus, anterior nuclei of the thalamus, and the cingular cortex.



2. The LIMBIC SYSTEM is a group of structures deep within the brain that regulate information registration and retrieval--the memorization process.
3. The CEREBELLUM regulates balance, coordination, and smoothness of movement, continuity of eye tracking, and the maintenance of muscle tone.

Each of these brain areas are affected during the three primary stages of alcohol-caused brain impairment: intoxication, detoxification, and damage.

Symptoms Produced by Intoxication

Frontal lobes. The euphoric feeling is caused by the sedative effect of alcohol on the frontal lobes, which release their control over lower areas that control sexual and aggressive drives. Concentration and attention are also obliterated when the frontal lobes are depressed by alcohol. Planning is disrupted and judgment is affected, and an individual often acts impulsively and without regard to the consequences of any actions. The self-critical ability supplied by the frontal lobes is also impaired so that individuals have difficulty judging the social appropriateness of their behavior.

Limbic system. The effect of alcohol intoxication on the limbic system is to reduce the efficiency of memory processes. Severe intoxication can produce blackouts which are periods of time where the person cannot remember the drinking episode after they become sober.

Cerebellum. The cerebellum is particularly affected during intoxication. The drunken person sways while standing, reels when

walking, is unable to coordinate movements such as touching their fingers to their nose, slurs their speech and has jerky eye movements which make it hard to focus or track an object. Their limbs may also feel loose and floppy or weak.

Detoxification

These toxic effects of brain impairment will vanish in the average person after the period of alcohol intoxication has ended. After about 72 hours, the last of the alcohol has been excreted from the body. In persons who have been drinking large amounts of alcohol chronically, however, the toxins left behind produce edema or swelling of brain tissue which persists long after the alcohol itself has been excreted.

Therefore, an alcoholic may show clear on blood tests but still show signs of concentration, memory, and coordination problems. In many cases these symptoms are temporary and will subside as the brain shrinks to normal, the rate of recovery depending upon the person's own metabolism, and on the number of years and the amount of alcohol that the person has ingested. Therefore there will usually be some recovery of brain function if the person stops drinking but it may take anywhere from one to six months before the edema subsides. In cases of severe chronic alcoholism, even after the edema subsides, the symptoms persist because of massive permanent degeneration of brain tissue.

Permanent Damage

Neuropathologists examine the post mortem brains of certain alcoholics at autopsy and find shrinkage or atrophy of the cerebral

cortex, particularly the frontal lobes. The atrophied tissue is replaced by a visible accumulation of fluid, a condition known as "wet brain." There are also reports of enlarged brain ventricles, as well as massive spaces of brain cells in the limbic and cerebellar areas.

As might be expected, the alcoholic with permanent brain damage has exaggerated symptoms of frontal, limbic, and cerebellar impairment. As with frontal lobe damage from causes other than alcohol, there is mental deterioration with loss of abstract or logical reasoning, and tendencies for concrete thinking. Poor judgment and defective emotional control may accompany this. The person may become careless of their sense of social values, their behavior may become crude, inconsiderate, or even obscene. Characteristics of irritability, quarrelsomeness, and aggressiveness may appear. In some cases a chronic alcoholic psychosis of the paranoid type may appear.

As with limbic damage from causes other than alcohol, there are problems with memory, particularly new memory rather than old. The person may not remember names, faces, places, the location of things, or what they have read or heard.

Finally, permanent cerebellar symptoms can result. There may be tremor of intentional movement, staccato speech in which each syllable is separately said, eye movement paralysis, disturbances of balance, and incoordination of eye-hand dexterity.

Vitamin Deficiency Effects

In addition to the direct neurotoxic effects, alcohol also affects nutrition resulting in vitamin depletion. Alcohol supplies

a readily-usable source of energy for the body since alcoholic beverages are very high in calories. Therefore many alcoholics do not feel hungry if they are drinking, and do not eat regularly or adequately. Consequently such a diet is badly lacking in vitamins. As a result, various disorders related to vitamin deficiency, such as peripheral neuritis, Wernicke's disease, and Korsakoff's disease, can occur.

Physical Effects of Alcohol

One effect of alcohol on the central nervous system is the dilation of peripheral blood vessels. This increases the heat loss from the body; this heat loss and cooling of the interior of the body is great enough to cause a slowdown in some biochemical processes.

Central nervous system effects. Alcohol is like any other general anesthetic: It depresses the central nervous system. In contrast to gaseous anesthetics, alcohol is almost completely metabolized in the body and the rate of oxidation is slow. The mechanism for the central nervous system effect is that alcohol acts directly on neuronal membranes and not at the synapse. Alcohol also acts on the neuron's capability to produce electrical impulses and thus process information properly. Furthermore, the effect of alcohol on the central nervous system is directly proportional to the level of alcohol in the blood.

At the lowest effective blood level the reticular system begins to malfunction and results in the cerebral cortex not being regulated and losing its integrational and inhibitory ability

even before the alcohol blood level reaches the point at which the cerebral cortex is directly affected. The consequent behaviors are the same as with other depressant drugs: Complex, abstract, and poorly-learned behaviors are disrupted at the lower alcohol levels; then better-learned and simpler behaviors are affected; lastly, certain inhibitions may be reduced.

> The apparent stimulation results from the unrestrained activity of various parts of the brain that have been freed from inhibition as a result of the depression of inhibitory control mechanisms. (Ritchie, 1975)

In summary, alcohol impairs functioning of the reticular system, which disrupts cortical functions, resulting in behavioral changes. A successful rehabilitation program would acknowledge central nervous system effects and capitalize on the effects of abstinence. For example, patients would not be considered for an alcohol treatment program until at least two weeks following detoxification, due to the edema of neuronal tissues that cloud consciousness and interfere with cognition.

Memory and Alcohol

Memory

While biological science continues to unfold the complexes of the memory process, neuropsychology has just begun to systematically study the anatomical localization of memory in the brain. The brain structure primarily involved in memory processes is the hippocampus, which is a part of the limbic system. Other structures included in this area are the amygdala, the mammillary bodies of the hypothalamus, the anterior nuclei of the thalamus,

and the cingulate cortex. (See Figure 1). The limbic system also controls normal emotional and motivational processes.

Abstract reasoning

Another general area of deficit in the chronic alcoholic appears to involve the abilities involved in abstract reasoning and problem solving. As mentioned, there is now evidence of frontal lobe damage after chronic long-term alcohol ingestion, either directly or as a result of damage to the dorsomedial nucleus of the thalamus (Goodwin & Hill, 1975; Lhermitte & Signoret, 1976; Luria, 1966). Deficits in information processing, difficulty in focusing attention, poor formation and use of strategies for resolving problems, and perseveration are characteristic of human patients with frontal lobe damage. This type of damage is generally seen in long-term chronic alcoholics, as well as with patients with Korsakoff's syndrome, where severe anterograde amnesia is an immediate diagnostic clue.

The psychopathology of alcohol Korsakoff's syndrome has been studied extensively since the 19th century. Only recently have researchers begun systemmatic examination of the more subtle area of memory dysfunction as it is observed in chronic alcoholic patients who have not yet reached the Korsakoff stage. Some of the more subtle features include attention and motivational deficiencies, which would suggest deleterious effects of memory. Tangential to general motivation, awareness of the relevance or significance of new material is important for the person to attend to that item, and an interest will facilitate the association of internal and external stimuli (Hilgard & Bower, 1975).

Learning and memory depend upon attention and motivation; a level of arousal is needed to process information and arousal and attention are heightened by motivation (Bower, 1981). Memory is a complicated process and mood and memory, both disrupted in alcoholic diseases, are very much interrelated.

Based on the known physiological effects of alcohol on the central nervous system, coupled with the influence of motivational states, it would follow that the length of abstinence would improve both attention and motivation. Studies with normal subjects have shown that the more actively a subject attends to a given question, irrelevant or relevant, the larger the skin conductance response it evokes as measured by polygraph and the more likely it is to be recalled later (Waid, Orne & Orne, 1981). The results of this study indicated that memory for information may be enhanced by the process of physiological arousal at the time the information is received.

There seems to be little evidence of significant differences between alcoholics and nonalcoholics regarding learning ability and general intelligence. Several studies suggest that the phenomena of selective forgetting is common to both groups (Greiner, 1961; Jonsson, Cronholm, & Izibowitz, 1962; Mendelson & LaDou, 1964). These studies also failed to find significant differences in the type of material recalled. The most significant differences were found with tasks requiring short-term memory and remote memory during the withdrawal or detoxification period. Another study (Claeson & Carlsson, 1970) shows alcoholics demonstrated difficulty with short-term memory tasks even after all

withdrawal symptoms had disappeared. These results suggest some possibilities: The subjects had sustained permanent memory impairment or, although withdrawal symptoms had disappeared, edema or swelling of the tissues of the brain may have yet existed. These studies confirm the effect of alcohol on cognitive functions, particularly memory, and these findings suggest the need for a rehabilitation program to retrain memory functions.

Rehabilitation

Introduction

Professor A. R. Luria, Soviet neuropsychologist, has made outstanding contributions to the field of neuropsychology and is recognized as one of the most outstanding psychologists of our time. He brings to his direct clinical observations results obtained in related disciplines. More than a quantitative clinical evaluation of brain impairment based on behavioral observation, Luria promotes the idea of qualitative analysis. Further than developing a programmatic instrument for evaluation, Luria (1963, 1966) circumscribes a theoretical position that substantiates the clinical investigation. The premise of this current research is based on Luria's theoretical constructs, advancing functional systems and the interrelatedness of the effect of brain damage. What is more, this idea suggests a method of rehabilitation that would utilize intact areas of the brain.

The genesis of the notion of cellular localization of functions is credited to Hughlings Jackson, an English neurologist of the 1860s. In Jackson's (1958) observation of epileptic fits, he noticed a seemingly paradoxical phenomena; that a lesion of a

circumscribed area of the brain never leads to complete loss of a function. On the basis of his observations, Jackson postulated a theory that every function performed by the central nervous system was not necessarily the domain of a narrowly circumscribed group of cells or center for a particular function. Rather, each function was first represented at a "low" level (spinal or brain stem), re-represented at a "middle" level (motor or sensory division of the cerebral cortex), and represented again at a "higher" level (the frontal division of the brain). In summary, the localization of a symptom or the impairment of a function that accompanies a lesion cannot be identified with the localization of the function. The function is much more complex and has completely different cerebral organization (Luria, 1966).

Behavioral processes are mediated by functional systems involving many different areas of the brain. As behavior becomes more complex, it becomes more dependent on many areas within the cerebral hemispheres. Consequently any task which is complex enough or demands sustained or continued attention is likely to be severely impaired by damage to any part of the cerebral hemispheres. Each hemisphere does not act as a unitary organ but as a collection of separate areas contributing in a distinct way to the actions of the hemisphere and brain as a whole.

On the basis of function, Luria (1966) subdivided the cortex into primary, secondary, and tertiary areas. Each primary area is either a sensory input or motor output area. The major functions of these areas are to obtain and initially organize information and then send information to the muscles so movement will occur.

The destruction of primary areas does not interfere with cognitive processes but does cut off sensory information and prevents some voluntary activities.

Secondary areas, adjacent to primary areas, organize the information received by primary areas into meaningful units. Tertiary areas receive information from secondary areas and act to integrate information received from different senses, as in the combining of visual and auditory data. These areas are responsible for higher cognitive functions such as reading. It can be seen that although each part of the brain plays a unique role in behavior, no part can operate effectively without the others.

Neuropsychological rehabilitation

Luria (1963) suggests that when one area of the brain is destroyed, as with the chronic abuse of alcohol, it interrupts the functional systems dependent on that area. Recovery of lost abilities depends upon reformulation of the functional systems responsible for those abilities. The reformulation may take place in one of three ways. First, a functional system may be reformed by including higher centers of the brain. For example, patients with a lesion in the motor area might be unable to tap a finger on command unless the patients were asked to tap their age. This request would involve higher cortical centers to a greater extent. Secondly, a task may be executed by involving more basic systems of the brain, by using "shaping" to approximate the behavior. For example, a patient with injury in the motor speech area might be unable to say the letter "p", although the

patient may be able to blow through pursed lips. Starting with the more basic motion could advance the patient to the requested task. Finally, another area may substitute for the lost area. This is more likely in a case where both hemispheres of the brain may be involved in a task, such as memory functions which are bilateral. Loss on one side can be compensated for by increasing participation of the opposite side in the appropriate functional system. For example, both parietal lobes can be involved in spatial tasks; loss on one side can be compensated for by increased participation of the opposite parietal lobe. New areas of the brain can also be involved by providing alternate methods of conducting a task.

Thus overt behavior is maintained although the manner in which the brain executes the behavior has changed. The formation of an effective new functional system depends on the integrity of the areas which form the new system. Rehabilitation provides training that will enable the brain to efficiently form the most workable alternate functional system. The major technique is providing a situation in which the brain receives feedback on its performance. The feedback allows the brain to assess the accuracy of its attempts to reformulate the functional system. The lack of clear feedback is one factor limiting spontaneous improvement that a subject makes without therapy. In this study the experimental subjects received daily feedback with each exercise. They were also able to immediately compare their posttest scores with pretest scores to evaluate for themselves their progress.

Rehabilitation of memory

The basic rehabilitation strategy for memory impairment is to build upon the abilities of the brain as a whole to take over memory functions. The patient starts with simple memory problems and works up to more complex ones. The basic rehabilitation plan involves practice on many items of increasing complexity. Difficulty can be controlled in several ways: (1) by varying the relationship between the items to be memorized--the less the relationship between the items, the harder it is to remember; (2) by changing the amount of time allowed to elapse between giving the items to be remembered and the recall of those items. In more difficult trials the time between recall and exposure can be filled by irrelevant activities--this task most closely approximates the real world; and (3) by varying the degree of concreteness versus abstractness of the items.

Imagery and association. One strategy that facilitates memory acquisition with a normal population promises success with memory that has been impaired by alcohol. The utilization of sensory imagery has been known since the writing of Aristotle (Bowers, 1931). Imagery once played a prominent role in memory and was regarded as the mental representative of concrete meaning (Bowers, 1931). The significance of imagery lies in the fact that it serves as a mediation in memory processes. Based on Luria's (1966) notion that the brain can be reformulated to compensate for lost abilities, alcoholic subjects could learn to use mediational strategies, such as imagery and/or association, to recover lost functions.

Word imagery has been considered a process analogous to visual perception in which information is coded according to its spatial organization (Paivio, 1971). Performance and subjective report data resulting from experimental tests indicate that imagery-concreteness is the most potent stimulus attribute yet identified among meaningful items. Imagery is a preferred mediator when the images are concrete. Any attempt to use association strategies will make the material meaningful (Smith & Noble, 1969). Because of their consistent association with specific objects and events, concrete nouns are assumed to be particularly effective stimuli for the arousal of sensory images, which are also thought of as conditioned sensations. Furthermore, stimulus-evoked images seem to function as mediators of response recall in learning situations much as they have long been assumed to do in mnemonic techniques that involve the use of imagery. The major effective psychological attribute underlying linguistic abstractness-concreteness is imagery (Paivio, 1965). Both imagery and association techniques are encouraged in this study to organize information and make it meaningful for deep processing in memory.

Individual differences

The use of imagery as a rehabilitation technique precipitates the question of the effect of individual differences in imaging ability; that is, performance differences that can be linked to the presence of vivid as opposed to dim mental imagery. The question is whether vivid imagery on selected tasks can be linked to more efficient performance than would be possible with dim

imagery. The distinction is not moot, especially in light of the current information-processing literature that highlights individual differences. Some theorists differentiate between visual and verbal individuals; a visual person would be likely to process incoming information with visual-concrete imagery whereas a verbal person would use verbal-auditory information-processing strategies (Strosahl & Ascough, 1981). Disagreement around the precise nature of this controversy stems from the question of equating a vivid imager with a visualizer. The individual differences assumption states that persons have habitual processing styles that suggest a propensity to execute specific tasks. Additionally, deficiencies in imaging ability may be minimized through increased verbal activity. Studies regarding individual differences (Neisser, 1970) raise the possibility that subjective experience of imagery is fundamentally distinct from the way imagery is used as an information-processing strategy.

Conclusion

As physiological science is better able to localize and predict the effects of alcohol on the brain, neuropsychologists will be able to design more effective rehabilitation programs. Knowing as we do that alcohol destroys brain tissue and affects central nervous system arousal as a subsequent reaction, memory impairment is an expected consequence. Since attention is an integral component to memory acquisition, effective rehabilitation strategies might focus on concentration skills. In addition to concentration skills, association techniques would encourage

processing on deeper levels and the use of imagery as a mediational strategy will encourage nonverbal coding of verbal information.

CHAPTER III

METHODOLOGY

The methodological procedures for this research included the selection and description of the population for the study, the selection and design of testing instruments, the design of procedure, and the analysis of the data.

Population of the Study

The population for this study consisted of consenting patients (Appendix A: Informed Consent) admitted to the Alcohol Treatment Program at Eastern State Hospital. Eastern State Hospital is located in the northeastern corner of Oklahoma, 60 miles northwest of Tulsa and 60 miles southwest of Joplin, Missouri. Eastern State serves nearly one-half of the state of Oklahoma, including the most populous counties of the state. (See Table I for statistics regarding patients admitted to the Program in 1980 and 1981.) The subjects of this study, all over the age of 18 and considered detoxified, were involved in the programs from September 1982 through January 1983. Admissions to this program were voluntary and no cases were included of either major psychiatric illness (e.g., schizophrenia or affective disorder) or a history of adventitious neurologic insult (e.g., stroke or significant head trauma). No patient tested was on any current medication, except multivitamins.

Characteristics of the population. Table II provides a summary of the characteristics of this sample, including sex, age, education,

TABLE I

OFFICE OF THE
SUPERINTENDENT

STATE OF OKLAHOMA
DEPARTMENT OF MENTAL HEALTH

EASTERN STATE HOSPITAL
VINITA, OKLAHOMA
74301

ADDRESS ALL COMMUNICATIONS CONCERNING PATIENTS TO THE SUPERINTENDENT, GIVING THEIR FULL NAME. FOR PROMPT REPLY PLEASE ENCLOSE SELF-ADDRESSED STAMPED ENVELOPE

ALCOHOLISM FOLLOWUP REPORT

May 23, 1980

	TOTAL	MALE	FEMALE
May 79	13	8	5
Jun	9	6	3
Jul	9	9	0
Aug	10	9	1
Sep	9	9	0
Oct	5	5	0
Nov	12	9	3
Dec	9	9	0
Jan 80	9	7	2
Feb	4	4	0
Mar	8	6	2
Apr	5	3	2
	102	84	18

82% males
18 females
1 of 6 female

White 69%
Native Am 24%
Black 7%

Divorced 44%
Married 36%
Single 12%
Widow 4%
Separated 4%

Avg Age 35
Avg Ed 11.5

Rate of re-hospitalization: 5%
Length of Abstinence:
One month: 57%
Three months: 30%
Four months: 18%

Employment status: 75% unemployed when first admitted to the program
62% employed after one month from completion of program

Family status: 40% living with parents or other family member
20% living with spouse
40% living alone

* *

ADMISSIONS TO ALCOHOL UNIT--1981--

Jan	30
Feb	32
Mar	39
Apr	31
May	29
Jun	49
Jul	54
Aug	39
Sep	48
Oct	46
Nov	30
Dec	25
	452

Med Detoxification: 452
Completed ATP: 95
Total Cost: $617,334.00
Cost per: $ 1,365.00

Females: 57 (1 out of 8)

ADMISSIONS TO ALCOHOL TREATMENT PROGRAM

	Males	Females
1/5 - 1/30	11	0
2/30- 3/13	12	0
3/30- 4/24	8	1
5/11- 6/5	3	3
6/22- 7/17	6	1
8/3 - 8/28	9	4
9/14-10/9	10	0
10/26-11/20	13	2
11/30-12/23	9	3
	81	14

TABLE II
CHARACTERISTICS OF SAMPLE

	TOTAL %	EXP	%E	CONTROL	%C	TOTAL
SEX						
MALE	89.75	28	93.3	25	86.2	53
FEMALE	10.25	2	6.7	4	13.8	6
AGE - Range: 18 to 61						
X		35.73		37.03		36.38
s.d.		9.91		11.24		
range		21 to 59 yrs		18 to 61 yrs		
EDUCATION-Mode: 12 yrs						
Range: 6th - College						
X		11.87		10.62		11.25
s.d.		1.90		2.53		
range		6th-College Grad		6th-College Grad		
LENGTH OF ABSTINENCE						
DAYS SINCE LAST DRINK						
Range: 4 to 99						
X		22.13		21.59		21.86
s.d.		21.56		21.93		
range		4 to 99 days		5 to 99 days		
mode		7 days		14 days		
AGE OF ONSET						
Range: 7-49 yrs						
X		20.57		23.97		22.27
s.d.		8.42		9.60		
range		7 to 47 yrs		10 to 49 yrs		
mode		16 yrs		16 yrs		
DURATION						
Range: 1-51 yrs						
X		14.40		12.48		13.44
s.d.		8.44		10.57		
range		3 to 31 yrs		1 to 51 yrs		
mode		7 yrs		7 yrs		

length of abstinence, age of onset, and duration. There were 53 males and 6 females in the total sample--90% male. For the total sample, ages ranged from 18 years to 61 years, with a mean of 36; education ranged from 6th grade to college graduate, but the mean was 11 years and the mode was 12 years. Days since last drink ranged from 4 days to 99 days, with a mean of 22 days. Age of onset ranged from 7 years to 49 years, with a mean of 22 years and a mode of 16 years. Duration of drinking ranged from 1 year to 51 years, with a mean of 13 years and a mode of 7 years. This sample, although predominantly male, ranged widely on all other variables.

Program. The Alcohol Treatment Program was a four-week program and all patients admitted were screened by the program physician and treatment team. The criterion for inclusion was confirmation of a diagnosis of "Alcohol Dependence" or "Alcohol Abuse" as derived from the Diagnostic and Statistical Manual of Mental Disorders III (1980). All of the patients lived at the Hospital in the same building for the four weeks. Although they were considered for weekend "home visits," drinking alcohol was prohibited on these visits.

The program consisted of lectures and didactic groups presented by psychologists, social workers, nurses, and outside speakers; Alcoholics Anonymous meetings and a study group of the 12 Steps of Alcoholics Anonymous; as well as regularly scheduled recreation programs, occupational therapy classes, and music therapy.

Testing Instruments

The tests used for this study can be considered as two batteries. The Dooks Memory Test, forms A and B, and the

Trailmaking Test A and B were administered to all subjects as pretest and posttest; three other measures were used as independent or control variables.

Development of the Dooks Memory Test. Based on the findings that memory of brain-damaged individuals could be retrained with a program that focused on attention and concentration skills and association strategies and imagery techniques, the veritable task was to locate or devise a testing instrument that could assess these functions. Traditional memory tests primarily tap verbal learning and correlate highly with standardized intelligence tests. The Wechsler Memory Scale tests verbal as well as abstract figural memory and associative learning but is also highly correlated with measures of intelligence. The Luria-Nebraska Neuropsychological Battery is an inventory for the assessment of brain/behavior relationships and is used primarily with brain-damaged individuals. The Memory Scale of the Luria Battery is one of 14 scales and is designed to measure verbal, visual, and rhythmic recall of short-term memory. The Memory Scale of the Luria, however, does not assess association strategies nor aspects of memory that are important in daily life.

The Journal of Clinical Neuropsychology recently (1981) published an analysis of the data from a new instrument for quantitative measurement of memory: the New York Memory Scale (Appendix B). It was specifically designed for "assessment of information storage and retrieval in longitudinal studies of organic brain disease, including aging, and it is particularly suitable for studies of possible memory enhancement with drugs" (Randt, Brown, & Osborne, 1981, p. 184).

The different parts of the test assess various aspects of memory including rote, associative, discourse, and incidental. Some features of this test include: five alternate forms for repeated measurements; controlled learning exposure; separation of acquisition from retrieval; fixed intervals of recall after delays with distraction; and multiple trials for reacquisition. The test focuses on transfer to and retrieval from secondary or long-term memory of specific names, places, items, and events. The three most attractive features of the test for use in this study were: 1. brevity (20 to 25 minutes) to accommodate shortened attention spans; 2. generous but limited time allowances for completion; and 3. the use of simple concrete items with high face validity rather than abstract materal. The above description provides evidence for the choice of the New York Memory Test for the pilot study.

Pilot study. A pilot study was conducted with nine patients. No control group was used. The New York Memory Test was used to test memory,and the memory retraining program for the pilot group was identical to the planned memory retraining program. The results are reported in Appendix C. Although the test has been standardized, a ceiling effect was noted with this group. These results encouraged the author to devise a more appropriate instrument.

Dooks Memory Test. Taking into consideration the results of the pilot study, the Dooks Memory Test was then designed. Two of the six subtests from the New York Memory Test were used, three of the six were revised, and the "Incidental Learning" subtest was deleted because it measures attention to peripheral information

and not attention to relevant information. Additionally, the feature of testing for acquistion after subsequent subtests, reacquisition at that time, and testing after a 24-hour period seemed repetitive and was deleted for the sake of economy of time. Trailmaking A and B from the Halstead-Reitan Neuropsychological Battery were added to the Dooks Memory Test to validate the measures of attention and concentration. (Appendix D: Instruments)

Of the five subtests on the New York Memory Test, two were retained for the Dooks Memory Test. "Repeating Numbers" is administered in the same manner as the Wechsler Memory and Adult Intelligence Scales, for which extensive normative data is available. Forward digit span tests ordered recall from primary memory while backward repetition involves the additional step of reorganizing information. Digit span is useful in the demonstration of attention and concentration and proved an adequate measure for inclusion on the memory test. "Short Story" measures recall on 20 prime words from a paragraph. The instruction that is given is to recall as much as possible of the paragraph immediately after it is presented. There are no trials to acquisition with this subtest and success with this task reflects an ability to immediately integrate and store new information for immediate and later recall, thus involving semantic aspects of secondary memory. This subtest was retained as an adequate measure for inclusion on the memory test for measure of memory for information relevant to daily life.

The three subtests that were revised reflected a ceiling effect; since subjects easily executed top scores on these, the number of items in each was doubled. "Five Items" was increased to ten, with

three trials to acquisition. Monosyllabic words with high and concrete imagery comprise the list and the restricted reminder technique of repeating only those words not recalled, was used to evaluate storage and retrieval, direct attention to the items not yet learned, and minimize over-learning of the items already registered in secondary memory. This technique separates learning and retrieval from retrieval alone. Imagery, association, or some kind of organization strategy would improve one's chance of success on this subtest.

"Paired Words" was increased from 6 to 16 word pairs with varied conceptual relationships. These associations range from combined words such as "ear-ring", to words with internal association such as "head/hair" to unassociated pairs such as "job/song." Imagery and association techniques are recommended for this subtest.

"Picture Recognition" was doubled from 15 to 30 items. Subjects are asked to remember 14 easily recognized line drawings of common objects, which are shown for two seconds. Immediately following the initial exposure, a series of 30 drawings are shown and the subject is asked to indicate recognition of the original 14 pictures which are distributed haphazardly in the second set of drawings. This subtest measures visual recognition and primary memory.

Two subtests were added: One subtest was designed identical to "Five Items" with the additional feature of an interference task; and the other subtest was an item from the Memory Scale on the Luria Nebraska Neuropsychological Battery. "Recall with Interference" was designed based on the assumption that a series of words can be retrieved after a ten-second delay filled with serial subtractions

has been transferred to secondary memory. The subtest "Picture/ Word" is excerpted from an item on the Memory Scale of the Luria. Detailed pictures are shown to the subject for three seconds while a word is read simultaneously. The subject is instructed to remember which word is associated with which picture. Imagery and association techniques would facilitate acquisition on this subtest.

Trailmaking, a test from the Halstead-Reitan Neuropsychological Battery, consists of two parts: A and B. Each part involves 25 circles distributed randomly on a piece of white paper 8½ by 11 inches. In part A there is a number (from 1 to 25) written inside each circle. In part B there is either a number (from 1 to 13) or a letter(from A to L) written inside each circle. The subject is given a pencil and is told to connect the circles, progressing from circle 1 to circle 2 to circle 3 and to work as quickly as possible. Trailmaking A is a general measure of visuospatial scanning ability and motor and sequencing skills. The subject must be able to count to 25. Trailmaking B, alternating between numbers and letters, requires more language skills and the ability to switch flexibly between the two different sets. Both tests require attention and concentration, and pretest and posttest results will be compared.

Data was collected on all subjects relative to age, sex, education, occupation, length of abstinence, length of steady drinking, age of onset, and estimated amount of weekly alcohol. The three measures that were also used as control variables were: the Vocabulary test of the WAIS-R, the Zung Depression Scale, and

a self-report memory evaluation.

Vocabulary WAIS-R. Vocabulary is a basic measure of verbal skills that are relatively insensitive to brain damage (Golden, 1978). Vocabulary as a test of intelligence may stem from the fact that the number of words someone knows is a measure of learning ability, fund of verbal information, and general range of ideas. WAIS-R Vocabulary scores correlate with total score on the IQ test as follows: Ages 25-34--0.86; Ages 45-54--0.87.

Zung SDS (Self-report Depression Scale). This test lists 20 items, each of which relate to a specific characteristic of depression. This test is intended to rate depression as a disorder and is not intended to differentiate the different types of depression. It serves to quantitatively measure the intensity of depression; high scores are not in themselves diagnostic but indicate the presence of symptoms which may be significant.

Self-report memory evaluation. This form is a series of brief questions asking the subjects to rate the severity of their memory problems.

Design

The design most appropriate to answer the research question in this study was a pretest/posttest control group with randomized selection of the experimental group subjects.

	EXPERIMENTAL	CONTROL
PRETEST	n=30	n=29
TREATMENT	//////////	
POSTTEST	n=30	n=29

This design controls the hypotheses that threaten internal validity primarily by randomization and the use of a control group. Although the interaction of pretesting with the treatment is a threat to external validity using this design, it was not feasible due to the small sample population to implement a Solomon Four-Group design which would have eliminated the question of the pretest effect. Reactive arrangements do not threaten external validity as the memory retraining program was offered as part of each subject's treatment for alcoholism and was not heralded specifically as "an experiment." The interaction of the selection and the treatment is not controlled by this design primarily due to the randomization factor. As Campbell and Stanley (1963) state on page 17, "Generalization is never fully justified logically," and with this population, sex and socioeconomic status are the only factors that limit the representativeness of this sample.

Procedure

1. On the first day of the Program, all subjects who had given consent (Appendix A) were tested individually by trained psychology practicum students and the Project Director. All test procedures were followed precisely, according to standard directions (Appendix D). The subjects were tested with the Trailmaking A and B, and the Dooks Memory Test, form A or B. All subjects were then asked to complete the three additional measures: Self-report memory problems, Zung Depression Scale, and the Vocabulary subtest of the WAIS-R.

2. Half of the number tested were chosen at random for the Memory Retraining group. (If the program had an odd number the extra person was included in the experimental group.) Those not chosen served as the control group and had alternate programs available to them, such as biofeedback training and individual counseling sessions. The control group received the benefit of the assessment of their memory functions.

3. The Memory Retraining Group met two sessions per week for four weeks. The course (Appendix E) emphasized observation of stimuli, paying attention, and concentration skills. Additionally, memory strategies were taught based on association and imagery. Class time was used to practice exercises (Appendix F), and homework assignments (Appendix G) were given that covered material offered in the other sessions of the program. The homework assignments were cumulative, based on the premise that memory is also enhanced by repetition. The first fifteen minutes of each class were devoted to recalling homework assignments. The ultimate goal of the class was to memorize the "12 Steps of Alcoholics Anonymous " using imagery and association techniques.

4. The last week of the session, all patients including control group were tested and the test results were available for their perusal.

5. An analysis of covariance was computed to determine if significant differences existed between experimental and control group mean scores in terms of the effect of the

treatment. The F statistic was used for the significance testing of differences between adjusted mean scores.

Analysis of the Data

While the original analysis of data planned was a t-test, an analysis of covariance was preferred for the main hypothesis. This provides tighter control over internal validity by adjusting means for initial pretest differences between experimental and control groups. Two-way analyses of variance were implemented with the independent variables age, education, length of abstinence, duration of history of drinking, severity of depression, and WAIS-R vocabulary IQ.

The following analysis of covariance table established the model for the testing of significance between the mean scores. The degrees of freedom have been adjusted to accommodate the covariance design and are based upon a total number of 59 for the experimental and control samples.

ANCOVA Layout

Source of Variation	Degrees of Freedom	Adjusted Sum of Squares	Mean of Squares	
Between groups	1	A	A/1	MS_{grps}/MS_{error}
Within (error)	57	B	B/57	
Total	58	C		

Null hypotheses. The main question upon which this study was designed is whether there is a significant difference of memory test scores between the treatment and the control group. The difference between pretest and posttest scores of each group

were compared to determine whether the application of the memory retraining treatment had an effect. The following hypothesis was tested:

H_o: $\bar{X}$ Experimental = $\bar{X}$ Control

H_a: $\bar{X}$ Experimental > $\bar{X}$ Control

An analysis of covariance allowed statistical equivalence of the independent variables (experimental/control) with respect to the dependent variables. This permitted observation of the performance of the groups which were unequal with regard to each variable as though they were equal. Group differences were compensated for plus a number of variables relevant to the dependent variable were statistically adjusted by using residualized or regressed gain scores. The group differences then did not confound the analysis of the independent/dependent relationship. When the F statistic was large enough to reject the null hypothesis, the difference was more than a simple chance occurrence.

While the above is the major thrust of the study, additional hypotheses were also tested. Analysis of covariance was used to investigate the following hypothesis:

Is there a significant difference between treatment and control group for each of the subtests of the memory test?

H_o: $\bar{X}$ Experimental = $\bar{X}$ Control

H_a: $\bar{X}$ Experimental > $\bar{X}$ Control

A Pearson-r correlation was used to investigate the following question:

2. Is there a relationship between concentration as measured by Trails A and B and memory scores?

H_o: There is no relationship between Trails and memory.

H_1: As Trails scores improve, memory scores improve.

H_2: As Trails scores worsen , memory scores worsen.

H_3: As Trails scores improve, memory scores worsen.

H_4: As Trails scores worsen, memory scores improve.

Two-way analyses of variance were conducted with the following independent variables for treatment effects.

3. Is there a significant difference between treatment and control group of the relationship between age and memory?

There is no treatment effect.

There is no age effect.

There is no interaction effect.

4. Is there a significant difference between treatment and control group of the relationship between length of abstinence and memory?

There is no treatment effect.

There is no effect by length of abstinence.

There is no interaction effect.

5. Is there a significant difference between treatment and control group of the relationship between education and memory?

There is no treatment effect.

There is no education effect.

There is no interaction effect.

6. Is there a significant difference between treatment and control group of the relationship between IQ and memory?

There is no treatment effect.

There is no IQ effect.

There is no interaction effect.

7. Is there a difference between treatment and control group of the difference between duration of drinking and memory?

There is no treatment effect.

There is no effect of duration of drinking.

There is no interaction effect.

8. Is there a significant difference between treatment and control group of the relationship between depression and memory?

There is no treatment effect.

There is no effect of depression.

There is no interaction effect.

An L.S.D. (Least Significant Differences) test was computed for those independent variables that proved significant, in order to determine which two groups were significantly different.

CHAPTER IV

RESULTS

Analysis of Covariance

An analysis of covariance was conducted to determine whether a significant difference existed between composite pretest/posttest scores for the experimental and control groups. There was a main effect of the treatment on the experimental group, $F(1,56) = 21.303$, $p < .001$ (Table III). The covariate for this analysis, the composite score on the Dooks Memory Test, was significant ($p < .05$). Therefore the null hypothesis was rejected and the treatment condition was found to have a significant between-groups effect.

There was a significant main effect between treatment and control groups on three subtests: "Simple Recall Total," $F(1,56) = 14.674$, $p < .001$, with a significant ($p < .001$) covariate (Table IV); "Paired Associates--Word-Word," $F(1,56) = 10.324$, $p < .002$, with a nonsignificant covariate (Table V); and "Simple Recall with Interference, 1st Trial," $F(1,56) = 9.210$, $p < .004$ and "Simple Recall with Interference, Total," $F(1,56) = 17.835$, $p < .001$, with a significant ($p < .001$) covariate for both scores (Table VI).

The following subtests failed to show a significant treatment effect: Digits Forward, Digits Backward, and Digits Total; Simple Recall, 1st trial; Paired Associates--Picture-Word; and Short Story. Trailmaking Test A and B did not show a significant treatment effect. See Table VII for a summary of the pretest significance for the subtests of the Dooks Memory Test.

TABLE III

ANALYSIS OF COVARIANCE SUMMARY TABLE FOR PRETEST/POSTTEST DIFFERENCES OF COMPOSITE MEMORY TEST SCORES BETWEEN EXPERIMENTAL AND CONTROL GROUPS

Source	d.f.	SS	MS	F	SIG of F
Composite Pretest	1	1157.725	1157.725	5.292	.025*
Group	1	4660.407	4660.407	21.303	.001**
Residual	56	12250.942	218.767		
TOTAL	58	17838.949	307.568		

*$p < .05$

**$p < .001$

TABLE IV

ANALYSIS OF COVARIANCE SUMMARY TABLE FOR PRETEST/POSTTEST DIFFERENCES OF SCORES FROM SUBTEST 'SIMPLE RECALL' BETWEEN EXPERIMENTAL AND CONTROL GROUPS

1st TRIAL

Source	d.f.	SS	MS	F	SIG of F
1st Trial Simple Recall Pretest	1	94.334	94.334	32.673	.001**
Group	1	9.016	9.016	3.123	.083
Residual	56	161.684	2.887		
TOTAL	58	260.034	4.483		

TOTAL TRIALS

Source	d.f.	SS	MS	F	SIG of F
TOTAL Simple Recall Pretest	1	716.856	716.856	24.026	.001**
Group	1	437.818	437.818	14.674	.001**
Residual	56	1670.872	29.837		
TOTAL	58	2894.847	49.911		

*$p < .05$

**$p < .001$

TABLE V

ANALYSIS OF COVARIANCE SUMMARY TABLE FOR PRETEST/POSTTEST DIFFERENCES OF SCORES FROM SUBTEST 'PAIRED ASSOCIATES--WORD-WORD' BETWEEN EXPERIMENTAL AND CONTROL GROUPS

Source	d.f.	SS	MS	F	SIG of F
Word-word Pretest	1	18.481	18.481	2.630	.110
Group	1	72.548	72.548	10.324	.002*
Residual	56	393.523	7.027		
TOTAL	58	476.678	8.219		

*$p < .05$

TABLE VI

ANALYSIS OF COVARIANCE SUMMARY TABLE FOR PRETEST/POSTTEST DIFFERENCES OF SCORES FROM SUBTEST 'SIMPLE RECALL WITH INTERFERENCE' BETWEEN EXPERIMENTAL AND CONTROL GROUPS

1st TRIAL

Source	d.f.	SS	MS	F	SIG of F
1st Trial Simple Recall Pretest	1	90.823	90.823	20.187	.001**
Group	1	41.436	41.436	9.210	.004*
Residual	56	251.954	4.499		
TOTAL	58	367.390	6.334		

TOTAL TRIALS

Source	d.f.	SS	MS	F	SIG of F
TOTAL Simple Recall Pretest	1	963.235	963.235	16.831	.001**
Group	1	1020.726	1020.726	17.835	.001**
Residual	56	3204.959	57.231		
TOTAL	58	5146.678	88.736		

*$p < .05$

**$p < .001$

TABLE VII

SUBTEST SUMMARY TABLE OF MEANS AND STANDARD DEVIATIONS AND SIGNIFICANCE OF COVARIATES

SUBTEST	Means & s.d. EXP	CONTROL	ENTIRE POP	d.f.	Covariates MS	F	SIGNIF of F
Simple Recall							
1st Trial	.87	.35	.61	1	94.33	32.67	.001**
	2.40	1.78	2.12				
TOTAL trials	6.93	1.07	4.05	1	716.856	24.03	.001**
	7.32	5.46	7.06				
Digits Forward	.47	.38	.42	1	20.15	17.59	.001**
	1.11	1.32	1.21				
Digits Backward	.60	.31	.46	1	9.42	9.09	.004*
	1.04	1.14	1.09				
Recall with							
Interference	2.53	1.24	1.90	1	90.82	20.19	.001**
1st Trial	2.66	2.21	2.52				
TOTAL trials	11.77	3.62	7.76	1	963.24	16.831	.001**
	9.39	7.58	9.42				
Paired Associates							
Word-Word	2.27	.17	1.24	1	18.48	2.63	.110
	2.83	2.54	2.87				
Short Story	.83	.14	.49	1	85.23	10.74	.002*
	3.24	2.84	3.04				
Trails A	-5.17	-5.10	-5.14	1	2570.46	24.61	.001**
	13.58	10.47	12.05				
Trails B	- 2.70	-19.79	-11.10	1	20892.68	26.64	.001**
	24.98	39.47	33.74				

*$p < .05$

**$p < .001$

Analysis of Variance: Independent Variables

There was a significant main effect of Age, $F(2,52) = 3.960$, $p < .025$, and IQ, $F(3,50) = 5.874$, $p < .002$ (Table VIII). There were no interaction effects between age and treatment, or between IQ and treatment, and none of the other variables proved significant (education, duration of drinking history, days since last drink, or depression). For Age, L.S.D. = 10.77, $p < .05$, indicating that the difference appeared between the "Under 30" group ($\bar{X} = 21.78$) and the "Over 40" group ($\bar{X} = 9.22$). For IQ, L.S.D. = 13.92, $p < .05$, indicating that the difference in IQ appeared between the "Dull Normal" group ($\bar{X} = 5.00$) and the "Bright" group ($\bar{X} = 20.33$). The null hypothesis for both Age and IQ was rejected: there was an Age and IQ effect within each variable but no effect on the success of the treatment. (See Tables IX through XIV for the breakdown of the independent variables.)

Pearson r Correlation

There was a low correlation ($r = .2830$, $p < .05$) between IQ and memory change scores. The first alternate hypothesis was retained: "As IQ improves, memory change scores improve." (See Table XV).

TABLE VIII

ANALYSIS OF COVARIANCE SUMMARY TABLE FOR COMPOSITE MEMORY SCORE DIFFERENCES BY INDEPENDENT CONTROL VARIABLES

SOURCE	SIGNIF OF COMPOSITE PRETEST COVARIATE	d.f.	MS	F	SIGNIF OF F
Age	.013*	2	809.375	3.960	.025*
Age X Treatment		2	.197	.001	.999
Education	.013*	2	124.028	.554	.578
Ed X Treatment		2	206.983	.925	.403
Days since last drink	.042*	2	307.937	1.392	.258
Days X Treatment		2	56.472	.255	.776
Duration	.019*	2	266.592	1.191	.312
Duration X Treatment		2	79.303	.354	.703
Depression	.104	3	194.184	.857	.470
Depression X Treatment		3	122.133	.539	.658
WAIS-R IQ	.001**	3	989.218	5.874	.002*
IQ X Treatment		3	224.616	1.334	.274

*$p < .05$

**$p < .001$

TABLE IX

MEANS AND STANDARD DEVIATIONS OF COMPOSITE MEMORY SCORE DIFFERENCES FOR THE POPULATION BY AGE

AGE	EXPERIMENTAL	CONTROL	ENTIRE POPULATION
< 30	29.20	12.50	21.78
	17.88	16.70	18.89
	n=10	n= 8	n=18
30-40	19.09	3.92	11.17
	11.73	14.36	15.02
	n=11	n=12	n=23
> 40	18.67	- .22	9.22
	18.89	9.12	17.36
	n= 9	n= 9	n=18

TABLE X

MEANS AND STANDARD DEVIATIONS OF COMPOSITE MEMORY SCORE DIFFERENCES FOR THE POPULATION BY EDUCATION

EDUCATION (years)	EXPERIMENTAL	CONTROL	ENTIRE POPULATION
< 12	26.50	3.17	10.94
	14.36	8.86	15.48
	n= 6	n=12	n=18
12	21.83	7.45	15.81
	16.14	17.92	18.11
	n=18	n=13	n=31
> 12	19.67	2.50	12.80
	20.99	15.61	20.12
	n= 6	n= 4	n=10

TABLE XI

MEANS AND STANDARD DEVIATIONS OF COMPOSITE MEMORY SCORE DIFFERENCES FOR THE POPULATION BY DAYS SINCE LAST DRINK

DAYS SINCE LAST DRINK	EXPERIMENTAL	CONTROL	ENTIRE POPULATION
< 14	20.91	- .75	9.61
	14.31	8.46	15.85
	n=11	n=12	n=23
14-30	21.07	8.92	15.22
	16.31	17.81	17.82
	n=14	n=13	n=27
> 30	29.00	9.50	20.33
	22.59	10.34	20.02
	n= 5	n= 4	n= 9

TABLE XII

MEANS AND STANDARD DEVIATIONS OF COMPOSITE MEMORY SCORE DIFFERENCES FOR THE POPULATION BY DURATION

DURATION (years)	EXPERIMENTAL	CONTROL	ENTIRE POPULATION
< 10	23.90	6.50	13.19
	21.68	13.68	18.87
	n=10	n=16	n=26
10-20	22.23	7.12	16.48
	13.80	17.97	16.85
	n=13	n= 8	n=21
> 20	20.28	-3.20	10.50
	14.39	5.41	16.43
	n= 7	n= 5	n=12

TABLE XIII

MEANS AND STANDARD DEVIATIONS OF COMPOSITE MEMORY SCORE DIFFERENCES FOR THE POPULATION BY DEPRESSION SCORES

DEPRESSION SCORES	EXPERIMENTAL	CONTROL	ENTIRE POPULATION
< 50 normal	16.00 16.88 n=10	4.00 17.49 n=11	9.71 17.86 n=21
50-59 mild	25.78 14.89 n= 9	.75 9.14 n= 8	14.00 17.70 n=17
60-69 moderate	29.37 17.38 n= 8	9.83 8.59 n= 6	21.00 17.08 n=14
> 69 severe	14.33 11.50 n= 3	9.00 20.17 n= 4	11.28 15.99 n= 7

TABLE XIV

MEANS AND STANDARD DEVIATIONS OF COMPOSITE MEMORY SCORE DIFFERENCES FOR THE POPULATION BY WAIS-R IQ SCORE

WAIS-R VOCABULARY IQ

	EXPERIMENTAL	CONTROL	ENTIRE POPULATION
< 70 Borderline	19.33 14.21 n= 6	2.83 6.79 n= 6	11.08 13.67 n=12
70-89 Dull Normal	17.20 17.06 n= 5	- .55 11.80 n=11	5.00 15.58 n=16
90-110 Average	21.55 20.44 n=11	15.12 18.64 n= 8	18.84 19.44 n=19
> 110 Bright	28.87 11.51 n= 8	3.25 10.63 n= 4	20.33 16.56 n=12

TABLE XV

PEARSON CORRELATION COEFFICIENTS

TRAILS A X TRAILS B X DIFFERENCE OF COMPOSITE MEMORY SCORES X IQ

	TRAILS A	TRAILS B	COMPOSITE DIFF	IQ
TRAILS A	1.000	.3049* p=.009	-.1809 p=.085	.0996 p=.226
TRAILS B	.3049* p=.009	1.000	.0873 p=.255	.0846 p=.262
COMPOSITE DIFF	-.1809 p=.085	.0873 p=.255	1.000	.2930* p=.012
IQ	.0996 p=.226	.0846 p=.262	.2930* p=.012	1.000

*$p < .05$

CHAPTER V

DISCUSSION

Summary of Findings

This study was designed to determine the effect on memory of a memory retraining program. The following section offers a discussion of the results and an evaluation of this study. After the summary of findings, limitations will be discussed, then recommendations and suggestions for future studies, and lastly, implications.

The results of this study confirm the hypothesis that, for this population, there was a significant difference between treatment and control group in the effect of the memory retraining program. The treatment group showed a significant gain in the composite memory scores as a result of the program. The analysis of covariance provided additional statistical confidence that the treatment condition caused the improvement instead of initial differences between the experimental group and the control group. An analysis of the subtests of the Dooks Memory Test answered the question, "What specific aspects of memory improved?" All subtests except "Paired Associates: Word-Word" were significant (including the Trailmaking Tests A and B) as measure of a pretest-posttest change.

Three subtests showed a significant difference in improved memory between the experimental and control groups. Both "Simple Recall" and "Recall with Interference" were significant at the .001 level.

Associates: Word-Word" subtest was also significant. The question persists of how the experimental subjects achieved success with these three subtests above the other three.

There was no significant difference between the experimental group and the control group on the "Digit Span" subtest. This test measures attention and concentration skills, and the results of this study indicate that there was no difference between groups. This seems to suggest that change in attention was the same for both groups,so improved attention did not seem to affect the treatment. This finding coincides with the results of the Trailmaking Test. There is a low positive correlation between Trails A and Trails B,indicating that improvement on one correlates with improvement on the other. However, there is no correlation between either Trailmaking A or B and the difference between the composite memory scores, which was used as a measure of overall memory improvement. The conclusion from these results is that the effect of the treatment condition does not appear to be influenced by fluctuations in attention and concentration.

The "Short Story" subtest showed no significant differences between the experimental and control groups. This test was an opportunity for a practical application of memory techniques, and these results suggest that the memory retraining program was not effective in teaching strategies that could transfer to relevant situations. However, there were also no significant differences between groups for the "Picture-Word" subtest. Subjects could have applied the techniques taught in the memory retraining

class to this subtest, yet there were no significant differences in scores.

The three subtests that showed significant differences were apparently most amenable to the transference of the techniques and strategies described in the class. Attention and concentration were emphasized in the class but apparently did not affect the memory scores. Fluctuations in attention are extremely difficult to measure and psychometric tools are merely gross measures. In summary, it appears that the memory retraining program at large was conducive to memory improvement; which strategies were particularly effective is not known.

Independent Control Variables. Ninety percent of the sample was male,so it was not possible to determine the difference of treatment effects by sex. Six independent control variables were analyzed in two-way analysis of variance tables, again using covariance to adjust the initial means between experimental and control groups. Only two variables, age and IQ, were found to have significant effects and there were no treatment interactions with any of the variables.

In this study educational levels of the sample spanned from the 6th grade to college graduate and yet did not influence the results of the effectiveness of the treatment. Slightly more than half of the sample population had a high school education. For the variable "duration," nearly half of the sample had under ten years history of drinking. Theoretically, duration would have an effect on the amount of brain damage and consequent memory loss that may have occurred. In this study where duration ranged from

one to 51 years, there was no significant effect on the memory improvement of the experimental subjects. The largest difference between experimental and control, however, was seen in the "greater than 20" division where the mean for the control was -3.20 and the mean for the experimental was 20.28. The findings of the effect of duration on the treatment suggest that this particular memory retraining program was effective for people regardless of the length of time they have been drinking.

"Days since last drink" was hypothesized to be a major determinant in the effectiveness of this program. However, just as "Digit Span" on the memory test failed to show significance, and just as the correlation of memory improvement with Trailmaking A and B failed to show significance, "length of abstinence" also failed to show significance. That is to say, physiological and cognitive attention, although integral facets of the memory process, did not affect memory improvement, as measured in this study. "Length of abstinence" from drinking ranged from four days to over 100 days. The mean number of days since last drink for the total population of the sample was 21.86 days which is close to the optimum time for rehabilitation.

Depression was another variable that failed to show significance and therefore seems to not affect the success of the treatment program. Studies have shown (Bower, 1981) that affective states influence memory. This observation also follows from studies on the functional localization in the brain in that memory and mood processes both seem to have bases in the limbic system. Additionally, the population for this study were chronic alcoholics and many

theories purport that alcoholism has affective components (Butters & Cermak, 1980). A high number of depressed persons would therefore be expected in this study and this affective state should consequently influence memory. Of the 59 subjects, 12% reported severe depression, 24% reported moderate depression, 29% reported mild depression and 36% reported normal symptoms. From this study it appears that depression did not significantly affect the success of the memory retraining program.

Although there is no significant interaction between age and the treatment condition, age was found significant and a comparison of the means of the age groups indicated that the "under 30" group and the "over 40" group differed from each other. These findings indicate that without the memory retraining program, age is a significant factor in the measurement of memory improvement at the extremem ends of the age continuum. However, the treatment program was able to equalize the age differences and all age groups met with success from the strategies and techniques that were learned. There was also a significant main effect for IQ suggesting that there is a significant difference between IQ groups. In comparing the means of the difference IQ groups, there was a significant difference between the "Bright" group and the "Dull Normal" group. This finding would be expected within a normal distribution of IQs within the population at large.

Evaluation of the Study

While this study shows significant effects both between pretest and posttest, and also between experimental and control groups,

there are additional aspects of the study to be discussed in an evaluation. While an analysis of covariance is a useful tool in equalizing the initial differences between treatment and control groups, there is no way to account for the effect of pretest upon posttest. Although alternate forms of the Dooks Test were used, there is an inherent learning effect in the pretest/posttest situation. Both experimental and control groups however, had the same advantage of the practice effect. The results of this study do not show a practice effect with the Trailmaking test, which is a simplistic task requiring very basic skills. Although the practice effects of pretesting and posttesting appear unavoidable, there seems to be little effect.

Where the treatment program was found to have a significant effect, it is not known what particular techniques or strategies produced this effect. Given the individual differences in the study, as well as the characteristics of the population, it would be tedious to determine the effects of one specific strategy. To test one specific strategy, individuals should be screened and chosen for homogeneous characteristics, as well as assessed for premorbid information-processing strategies and degree of abilities. With this select group, strategies could be taught and subjects should be limited to use of that strategy only. In this study, individual propensities were taken into account only by capitalizing on the differences and encouraging subjects to use the strategy "that works best for you." Therefore, although it is not known which strategies were effective, it <u>is</u> known that there was improved memory, which was the desired effect.

The results show that the subjects of the control group made slight improvement in memory. This might have been a practice effect from pretest to posttest, it might have been an effect of abstinence from alcohol, it might have been an effect of the rest of the Alcohol Treatment Program lectures, or it may have been a combination of all these factors. The ideal situation would have been to have the control group in a placebo condition. In this study control subjects were involved in biofeedback, GED classes, or individual counseling sessions (the last of which were also available to experimental subjects at times other than during the memory retraining sessions.) The experimental group was given special attention also with the memory retraining as was the control group in the individual sessions. If there was a Hawthorne effect with the experimental group, it was not apparent during the session where memory retraining, although considered part of the treatment, was affectionately considered a form of punishment for the experimental group.

The possibility of a halo effect was recognized from the onset of the project. Given the constraints of time and scheduling, the Project Director conducted most of the pre- and posttesting. This method was at least successful in assuring that the test was administered by standard directions. There is also the possibility of a halo effect upon the entire project. The project was a dissertation and the brain-child of the Project Director; it is obvious there would be an inordinate amount of enthusiasm invested in the treatment group. This also points to the absence of any inter-rater reliability.

Did the Dooks Memory Test measure "memory"? and was the improvement temporary or permanent? How to measure memory became the question of how to operationally define a variable that could be manipulated and measured. Great lengths were taken to design an instrument that could specify precisely how the concept of memory could be measured and yet retain the full meaning of the concept. It is possible that the results of this study suggest that the subjects were successful in learning the techniques taught them and yet may have been unable to transfer this learning to a general aptitude to improve memory. The answer to the second question above, "Was the improvement permanent?" would begin to answer the question of whether the treatment was successful in improving memory.

Above all, the success of this study points to an exciting integration of neuropsychological findings with educational programs in a clinical setting. This program was designed to combine elements of all three disciplines by the presentation of lecture material on the neurology of alcohol, with the educational aspect of the memory retraining, highlighted by the use of Program materials for homework assignments. The consummate effect was one of emphasizing the importance of a deliberate change in behavior. The memory retraining program was a subliminal reminder of the detrimental consequences of alcohol on the brain. Memory loss is a function of lack of practice and the aging process without the additional effect of brain damage. This program provided an assessment of damage already sustained and a realization of the future directions of continued alcohol abuse.

Limitations

The sample for this study was a group of chronic alcoholics, 90% male, who were nontoxic at the time of the study. They had come for treatment for their problem with alcohol to a state mental hospital. Their volunteer status may suggest motivation for treatment and hence a motivation for the memory retraining, as part of the treatment program. State mental hospitals generally provide services for the low income strata of our society and the subjects for this study were blue-collar workers when they were employed. In light of the results of this study, a memory retraining program with this focus would be effective with all age groups and at all educational levels. Length of abstinence would not be a limiting factor of the effectiveness of such a program; nor would duration of drinking or severity of depression. This particular program could be tailored to meet the needs of a homogeneous group and it is also undetermined as yet to what extent this program can be generalized across etiology of memory impairment. The effectiveness of this memory retraining program can not logically be generalized, according to the restraints of statistical inference, beyond male chronic alcoholics of a low socioeconomic status. Yet memory at all levels can be improved and memory dysfunction pervades all populations. In research design, techniques of control are perhaps essential in insuring the validity of results found. These same techniques of control also raise the questions of generalizability of the results which then lead to other experiments. This is the process that makes research an ongoing process with new problems to investigate and new knowledge to acquire.

Suggestions for Further Study

1. In a replication of this study, the following recommendations are offered:
   A. Use a placebo group or a no-treatment control group.
   B. Use "blind" judges: have all testing administered by "blind" assistants. Either have the same tester for pretest and posttest of each subject or different tester for pretest and posttest for each subject.
   C. Use automated equipment or at least use a projector for visual subtests, in the interest of reliability of test results.
2. Use a Solomon-Four Group Design to eliminate pretest effects.
3. Have several treatment conditions where specific strategies (i.e., association vs. imagery vs. organization) are instructed.
4. Have selection criteria to create a homogeneous group. In addition to independent control variables, selection to criteria might include motivation for the program, and high vs. low imaging abilities.
5. Improve curriculum with relevant practical exercises and a greater number of visual practice exercises.
6. Select groups with special characteristics and tailor the curriculum to the group's needs.
7. Design a longitudinal study. Pretest 7th grade children with correlated IQ scores and neurological data and then posttest the same group during the 12th grade with self-report drug histories.
8. Posttest for change in depression scores and/or motivation.

Implications

The intent of this research was to design, implement, and evaluate a memory retraining program. The program was based on attention to and concentration upon stimuli. Strategies were taught for coding information by association, imagery, and organization techniques. The results show that the program was effective, that the experimental group made significant gains over the control group in scores on the memory test. The results also showed that the experimental group made significant gains over the control group on specific aspects of memory as measured by the subtests on the memory test. In general, it can be concluded that this memory retraining program has the potential to serve as an effective vehicle for improving memory. It is highly recommended to be included in alcohol treatment programs, drug rehabilitation programs, and rehabilitation of cognitive functions of brain-damaged patients.

It is also recommended, however, that future training in this area be individualized. Even with a group possessing homogeneous characteristics, individual assessment and ongoing feedback are essential to the effectiveness of this type of cognitive retraining. As in any educational program, the human factors enter to tip the balance of motivation and success. Although the results of this study showed an effect of the treatment quantitatively, it is felt that much greater progress might have been made on an individual level.

The success of this program suggests three conclusions. First, a memory retraining program could have tremendous impact in alcohol and drug rehabilitation programs. Without qualification, the results and findings of this research can easily be generalized

and applied to similar programs. Yet the characteristics of this sample that specifically describe an alcoholic population (such as drinking history and length of abstinence) do not appear to affect the results. This would suggest a second conclusion: a memory retraining program of this design also has potential for a variety of other groups. Above all, the success of this program applauds the synthesis of the science of neuropsychology with the applications of education for the needs of clinical psychology. While quantitative analysis of this data showed an effect, the promise of indiviudalization of cognitive/memory retraining paints a picture of promise. There is no way to over-emphasize the effect and importance of motivation and feedback relative to individual progress.

REFERENCES

Atwood, G. An experimental study of visual imagination and memory. Cognitive Psychology, 1971, 2, 290-299.

Basso, A., Bisiach, E., & Luzzatti, C. Loss of mental imagery: A case study. Neuropsychologia, 1980, 18, 435-442.

Binder, M. L. Visual imagery and verbal mediation as memory aids in recovering alcoholics. (Doctoral dissertation, Wayne State University, 1978). Dissertation Abstracts International, 1979, Apr., Vol 39 (10-B) 5055.

Birnbaum, I. M., & Parker, E. S. (Eds.). Alcohol and human memory. New York: John Wiley & Sons, 1977.

Bower, G. H. Mood and memory. American Psychologist, 1981, 36(2), 129-148.

Bower, G. H. & Reitman, J. S. Mnemonic elaboration in multilist learning. Journal of Verbal Learning and Verbal Behavior, 1972, 11, 478-485.

Bowers, H. Memory and mental imagery. British Journal of Psychology, 1931, 21, 271-282.

Broadbent, D. E. Perception and communication. New York: Pergamon Press, 1958.

Butters, N. & Cermak, L. S. Neuropsychological studies of alcoholic Korsakoff patients. In G. Goldstein & C. Neuringer (Eds.), Empirical Studies of Alcoholism. Cambridge, Massachusetts: Ballinger, 1976.

Butters, N. & Cermak, L. S. Alcoholic Korsakoff's Syndrome. New York: Academic Press, 1980.

Butters, N., Cermak, L. S., Montgomery, K., & Adinolfi, A. Some comparisons of the memory and visuoperceptive deficits of chronic alcoholics and patients with Korsakoff's disease. Alcoholism: Clinical and Experimental Research, 1977, 1, 73-80.

Campbell, D. T., & Stanley, J. C. Experimental and quasi-experimental designs for research. Chicago: Rand McNally Publishing Co., 1963.

Cermak, L. S. Human memory: Research and theory. New York: Ronald Press, 1972.

Cermak, L. S. Imagery as an aid to retrieval for Korsakoff patients. Cortex, 1975, 11, 163-169.

Cermak, L. S. & Butters, N. The role of language in the memory disorder of brain damaged patients. Annals of the New York Academy of Science, 1976, 280, 857-867.

Cermak, L. S., Butters, N., & Moreines, J. Some analyses of the verbal encoding deficit of alcoholic Korsakoff patients. Brain and Language, 1974, 1, 141-150.

Claeson, L.-E. & Carlsson, C. Cerebral dysfunction in alcoholics, a psychometric investigation. Quarterly Journal of Studies on Alcohol, 1970, 31, 317-323.

Craik, F. I. M. & Lockhart, R. S. Levels of processing: A framework for memory research. Journal of Verbal Learning and Verbal Behavior, 1972, 11, 671-684.

Cutting, J. A cognitive approach to Korsakoff's syndrome. Cortex, 1978, 14(4), 485-495.

Fabian, M. S., Jenkins, R. L., & Parsons, O. A. Gender, alcoholism, and neuropsychological functioning. Journal of Consulting and Clinical Psychology, 1981, 49(1), 138-140.

Freund, G. Chronic central nervous system toxicity of alcohol. Annual Review of Pharmacology, 1973, 13, 217-227.

Golden, C. J. Diagnosis and Rehabilitation in Clinical Neuropsychology. Springfield, Illinois: Charles C. Thomas, 1978.

Goodwin, D. W. & Hill, S. Y. Chronic effects of alcohol and other psychoactive drugs on intellect, learning, and memory. In J. Rankin, (Ed.), Alcohol, Drugs, and Brain Damage. Ontario: Addiction Research Foundation, 1975.

Greiner, D. S. Selective forgetting in alcoholics. Quarterly Journal of Studies on Alcohol, 1961, 22, 580-587.

Hilgard, E. R. & Bower, G. H. Theories of Learning. Prentice-Hall, 1975.

Hochhauser, M. Educational implications of drug abuse. Journal of Drug Education, 1978, 8(1), 69-76.

Huppert, F. A. & Piercy, M. Recognition memory in amnesic patients: A defect of acquisition? Neuropsychologia, 1977, 15, 643-652.

Jackson, J. H. In J. Taylor (Ed.) Selected Writings of John Hughlings Jackson. New York: Basic Books, 1958.

James, W. The Principles of Psychology. New York: Holt, 1890. Vol. 1, Chapter 16.

Jones, B. & Parsons, O. A. Impaired abstracting ability in chronic alcoholics. Archives of General Psychiatry, 1971, 24, 71-75.

Jonsson, C.-O., Cronholm, B. & Izikowitz, S. Intellectual change in alcoholics, psychometric studies on mental sequels of prolonged intensive abuse of alcohol. Quarterly Journal of Studies on Alcohol, 1962, 23, 221-242.

Kapur, N. Visual imagery capacity of alcoholic Korsakoff patients. Neuropsychologia, 1978, 16(4), 517-519.

Kapur, N. & Butters, N. An analysis of the visuoperceptual deficits in alcoholic Korsakoffs and long-term alcoholics. Journal of Studies on Alcohol, 1977, 38, 2025-2035.

Kish, G. B., Hagen, J. M., Woody, M. M. & Harvey, H. L. Alcoholics' recovery from cerebral impairment as a function of duration of abstinence. Journal of Clinical Psychology, 1980, 36(2), 584-589.

Kleinknecht, R. A. & Goldstein, S. G. Neurological deficits associated with alcoholism. A review and discussion. Quarterly Journal of Studies on Alcohol, 1972, 33, 999-1019.

Leber, W. R., Jenkins, R. L. & Parsons, O. A. Recovery of visual-spatial learning and memory in chronic alcoholics. Journal of Clinical Psychology, 1981, 37(1), 192-197.

Lewinsohn, P. M., Glasgow, R. E., Barrera, M., Danaher, B. G., Alperson, J., McCarty, D. L., Sullivan, J. M., Zeiss, R. A., Nyland, J. & Rodrigues, M. R. P. Assessment and treatment of patients with memory deficits: Initial studies. JSAS Catalog of Selected Documents in Psychology, 1977, 7(3), 79 pgs.

Lhermitte, F. & Signoret, J.-L. The amnesic syndromes and the hippocampal-mammillary system. In M. R. Rosenzweig & E. L. Bennett (Eds.) Neural Mechanisms of Learning and Memory, MIT Press, 1976.

Long, J. A. & McLachlan, J. F. Abstract reasoning and perceptual motor efficiency in alcoholics. Quarterly Journal of Studies on Alcohol, 1974, 35, 1220-1229.

Luria, A. R. Restoration of Function after Brain Injury. New York: Macmillan, 1963.

Luria, A. R. Higher Cortical Functions in Man. New York: Basic Books, 1966.

Luria, A. R. The Neuropsychology of Memory. Washington, D.C.: V. H. Winston & Sons, 1976.

Mendelson, J. H. & LaDou, J. Experimentally induced chronic intoxication and withdrawal in alcoholics, Part 2: Psychophysiological findings. Quarterly Journal of Studies on Alcohol, 1964, Supplement No. 2, 14-39.

Nagaraja, J. Despondency,delinquency,drugs, and today's student, Child Psychiatry Quarterly, 1977, 10(1), 27-29.

Neisser, U. Visual imagery as process and as experience. In J. Atrobus (Ed.), Cognition and Affect. Boston: Little, Brown, 1970.

Oscar-Berman, M. Neuropsychological consequences of long-term chronic alcoholism. American Scientist, 1980, 68, 410-419.

Oscar-Berman, M. & Zola-Morgan, S. M. Comparative neuropsychology and Korsakoff's syndrome. I. Spatial and visual reversal learning. Neuropsychologia, 1978, 18, 499-512.

Paivio, A. Abstractness, imagery, and meaningfulness in paired-associate learning. Journal of Verbal Learning and Verbal Behavior, 1965, 4, 32-38.

Paivio, A. Mental imagery in associative learning and memory. Psychological Review, 1969, 76(3), 241-261.

Paivio, A. Imagery and Verbal Processes. New York: Holt, Rinehart & Winston, 1971.

Paivio, A., Yuille, J. C. & Madigan, S. A. Concreteness, imagery and meaningfulness values for 925 nouns. Journal of Experimental Psychology Monograph Supplement, 1968, 76(1)2.

Papineau, W. & Lohr, J. M. Effect of sensory modality for presentation and word imagery on paired-associate learning. Perceptual and Motor Skills, 1981, 52, 747-750.

Park, D. C. Item and attribute storage of pictures and words in memory. American Journal of Psychology, 1980, 93(4), 603-615.

Penfield, W. & Milner, B. Memory deficits produced by bilaterl lesions in the hippocampal zone. A.M.A. Archives Neurological Psychiatry, 1958, 79, 475-497.

Poon, L. W. & Walsh-Sweeney, L. Effects of bizarre and interacting imagery on learning and retrieval of the aged. Experimental Aging Research, 1981, 7(1), 65-70.

Portnoff, L. A. & Dougan, D. R. Disturbances of attention in alcohol withdrawal syndrome. International Journal of Neuroscience, 1982, 00, 1-7.

Randt, C. T., Brown, E. R., & Osborne, D. P. A memory test for longitudinal measurement of mild to moderate deficits. Clinical Neuropsychology, 1981, Vol. II, No. 4, 184-193.

Ray, O. Drugs, Society, and Human Behavior. St. Louis: C. V. Mosley, Co., 1978.

Ritchie, J. M. The aliphatic alcohols. In Goodman, L. S. & Gilmann, A. (Eds.), The Pharmacological Basis of Therapeutics. Edition 5, New York: Macmillan Publishing Co., 1975.

Ryan, C., Butters, N., Montgomaery, K., Adinolfi, A., & Didario, B. Memory deficits in chronic alcoholics: Continuities between the "intact" alcoholics and the alcoholic Korsakoff patient. In H. Begleiter & B. Kissin (Eds.), Biological Effects of Alcohol. New York: Plenum, 1980.

Ryback, R. S. Alcohol amnesia: Observations on seven inpatient alcoholics. Quarterly Journal of Studies on Alcohol, 1970, 31, 616-632.

Ryback, R. S. The continuum and specificity of the effects of alcohol on memory. Quarterly Journal of Studies on Alcohol, 1971, 32, 995-1016.

Scoville, W. B. & Milner, B. Loss of recent memory after bilateral hippocampal lesions. Journal of Neurology and Neurosurgical Psychiatry, 1957, 20, 11-21.

Shuttleworth, E. C. & Morris, C. E. The transient global amnesia syndrome: A defect in the second stage of memory in man. Archives of Neurology, 1966, 15, 515-520.

Smith, R. & Noble, C. E. Effects of a mnemonic technique applied to verbal learning and memory. Psychological Review, 1969, 76, 179-193.

Strosahl, K. D. & Ascough, J. C. Clinical uses of mental imagery: Experimental foundations, theoretical misconceptions, and research issues. Psychological Bulletin, 1981, 89(3), 422-438.

Sutherland, N. S. Outlines of a theory of visual pattern recognition in animals and man. Proceedings of the Royal Society, Series B, 1968, 171, 297-317.

Tarter, R. E. An analysis of cognitive deficits in chronic alcoholics. The Journal of Nervous and Mental Disease, 1973, 157(2), 138-147.

Treisman, A. Monitoring and storage of irrelevant messages in selective attention. Journal of Verbal Learning and Verbal Behavior, 1964, 3, 449-459.

Waid, W. M., Orne, E. C. & Orne, M. T. Selective memory for social information, alertness, and physiological arousal in the detection of deception. Journal of Applied Psychology, 1981, 66(2), 224-232.

Warrington, E. K. & Weiskrantz, L. A study of learning and retention in amnesic patients. Neuropsychologia, 1968, 6, 283-291.

Warrington, E. K. & Weiskrantz, L. Organizational aspects of memory in amnesic patients. Neuropsychologia, 1971, 9, 67-73.

Warrington, E. K. & Weiskrantz, L. Amnesia: A disconnection syndrome? Neuropsychologia, 1982, 20(3), 233-248.

Waugh, N. C. & Norman, D. A. Primary memory. Psychological Review, 1965, 72, 89-104.

Winocur, G. & Weiskrantz, L. An investigation of paired-associate learning in amnesic patients. Neuropsychologia, 1976, 14, 97-110.

APPENDICES

APPENDIX A: INFORMED CONSENT

EASTERN STATE HOSPITAL

Vinita, Oklahoma

EXPERIMENTAL SUBJECT'S BILL OF RIGHTS

Persons who participate in a medical experiment are entitled to certain rights. These rights include but are not limited to the subject's rights to: be informed of the nature and purpose of the experiment; be given an explanation of the procedures to be followed in the experiment, and any drug or device to be utilized; be informed of the extent and duration of his participation in the project; be given a description of any attendent discomforts or risks reasonably to be expected, if applicable; be given a disclosure of any benefits, therapeutic and/or monetary, if applicable; be given a disclosure of any risks attendent to the experiment, if any; be given a disclosure of any appropriate alternatives, drugs, or devices that might be advantageous to the subject, their relative risks and benefits; be informed of the avenues of medical and/or psychological treatment, if any, available to the subject after the experiment if complications should arise; be given an opportunity to ask any questions concerning the experiment or the procedure involved; be instructed regarding confidentiality of the subject's participation; be instructed that consent to participate in the experiment may be withdrawn at any time and the subject may discontinue participation without prejudice; be informed of any monetary and/or medical compensation available to the subject, should he receive an injury during the course of the study; be informed of his rights of litigation, should he receive an injury during the course of the study; be informed of avenues of official complaint, should the subject not be satisfied with the way in which the experiment is conducted; be given a copy of the signed and dated consent form; and be given the opportunity to decide to consent or not to consent to an experiment without the intervention of any element of force, fraud, deceit, duress, coercion, or undue influence on the subject's decision.

INFORMED CONSENT

1. You are invited to participate in a study of MEMORY RETRAINING IN ALCOHOLIC PATIENTS.

2. This study will be conducted by DEBORAH DOUGAN, Psychology Intern, principal investigator, under the supervision of LANCE A. PORTNOFF, Ph.D., Clinical Psychologist at Eastern State Hospital.

3. You were selected to participate in this study because you have been admitted to the Alcohol Treatment Program and have a history of memory difficulties. Some of you may be asked to serve as controls.

4. PROCEDURES:

   A. If you decide to participate, you will be tested before and after the alcohol program and you may be selected for the memory retraining session.

   B. The total time involved will be from either two 20-minute testing sessions to the testing sessions (two 20-minute sessions) plus an additional 2 or 3 days per week, 2 hours per day, if you are in the Memory Retraining Group.

4. PROCEDURES: (continued)

The tests consist of:

A. Trailmaking A and B from the Halstead-Reitan Neuropsychological Battery. This test can serve as a measure of concentration abilities and motor speed.

B. The DOOKS Memory test. This is a composite battery of memory subtests from the Wechsler Memory Scale, the New York Memory Test, and the Memory scale of the Luria Neuropsychological Battery. This test measures short-term retention and visual recognition skills, as well as concentration with a Digit Span subtest. It does not measure personality or intelligence.

C. The Vocabulary and Block Design subtests of the WAIS-R will be administered to give an idea of general intelligence; the vocabulary would suggest verbal abilities and the block design performance abilities. This test will not give an IQ per se but a point of comparison for memory improvement.

5. RISKS:

There are no possible physical risks, and the only psychological risk is possible frustration with the learning of the new techniques.

6. BENEFITS:

A. Medical.
(1) This study is designed as a treatment for your condition.

(2) Your standard medical/psychological treatment will not be withheld.

(3) The expected benefit is that you will improve your ability to memorize and to remember in your everyday life.

(4) However, we cannot and do not guarantee or promise that you will receive any benefits from this study.

B. Monetary.

(1) There is not monetary compensation for your participation in this study.

(2) There are not any additional costs to you for this study.

7. ALTERNATIVE PROCEDURES:

There are no alternative memory treatment programs available at this institution.

8. If medical/psychological complications should arise following the experiment, the principal investigator will be available to discuss any concerns and provide counseling, if needed, and consult with her supervisor if necessary.

9. Any data under the investigator's control will be disclosed in a manner that does not reveal your identity. This information may be used, anonymously, in research publications to help in planning better treatment for your condition.

Your physician and treatment team will be informed of your therapeutic progress

3--INFORMED CONSENT GUIDELINES

10. If you have any questions, we expect you to ask us. If you have any additional questions later, we will be happy to answer them. You may call DEBORAH DOUGAN, Psychology Intern at extension 335.

11. Your decision whether or not to participate will not prejudice you or your treatment at this hospital. If you decide to participate, you are free to withdraw your consent at any time without prejudice to your medical care or to you, and you may withdraw from the experiment.

12. In the unlikely event that you are injured as a result of participation in this study, monetary compensation and/or free medical care will not be provided by Eastern State Hospital. However, by signing this consent form, you have not waived any of your legal rights or released Eastern State Hospital and/or the principal investigator of this experiment from liability for negligence.

13. If you are not satisfied with the manner in which this study is being conducted, you may report (anonymously, if you so choose) any complaints to the Commissioner of Mental Health, Suite 100, East Terrace, 4545 North Lincoln Boulevard, Oklahoma City, Oklahoma 73105, (405) 521-2911; or to the Superintendent, Eastern State Hospital, (918) 256-7841, Ext. 211.

14. Your signature indicates that you have read and understand the above information, that you have discussed this study with the principal investigator or his or her staff, and that you have decided to participate based on the information provided.

15. _____ _____
Signature of Research Subject DATE

_____
Signature of Investigator or Witness

16. A copy of this form is available to you upon request.

APPENDIX B : NEW YORK MEMORY TEST

GENERAL INFORMATION

__ Name _____

__ Age _____

__ Home Address _____

__ Telephone No. _____

__ Place now _____

__ Day of week _____

__ Time of day _____

__ Day _____

__ Month _____

__ Year _____

__ Birthdate _____

__ US President _____

__ US Vice-president _____

__ 3 largest cities (NY, Chi, LA, Phila, Hstn, Det, Balt, Dal, SDieg, SFrn)

_____

☐ TOTAL

FIVE ITEMS

	acquisition	after digits	) 24 hrs
ice	. . .	. . .	. . .
tie	. . .	. . .	. . .
cloud	. . .	. . .	. . .
boat	. . .	. . .	. . .
fox	. . .	. . .	. . .
	32 44 76	49 82 95	35 58 86
TOTAL:	☐	☐	☐ ☐ ☐

REPEATING NUMBERS

Forward	Backward
542	85
521 3	16 2
9615	425
4629 4	826 3
13785	8399
98275 5	6497 4
597184	41739
865932 6	86295 5
5124763	428596
2958174 7	963718 6
28715396	1947628
92641573 8	9374625 7
379846215	16832475
935724186 9	19278365 8

MAXIMUM forward ☐ backward ☐

** *Return to Five Items* **

PAIRED WORDS

	acquis.	after story	) 24 hrs
key-			
hole	. . .	. . .	. . .
cake-			
tent	. . .	. . .	. . .
sheep-			
wool	. . .	. . .	. . .
job-			
song	. . .	. . .	. . .
bear-			
skin	. . .	. . .	. . .
head-			
hair	. . .	. . .	. . .
	42 57 71	68 85 98	92 51 64
TOTAL:	☐	☐ ☐	☐ ☐

SHORT STORY

	acquisition (v)	(g)	) pict (g)	) 24 hrs. (g)
Friday	. . .			
April	. . .			
fifth	. . .	. . .	. . .	. . .
Boston	. . .			
Massachusetts	. . .	. . .	. . .	. . .
(A) four-alarm	. . .			
fire	. . .	. . .	. . .	. . .
gutted	. . .			
(the) Belmont	. . .			
Hotel	. . .	. . .	. . .	. . .
(on) Winslow	. . .			
Street	. . .	. . .	. . .	. . .
killing	. . .	. . .	. . .	. . .
fourteen	. . .			
people	. . .	. . .	. . .	. . .
(and) injuring	. . .	. . .	. . .	. . .
four	. . .			
firemen	. . .	. . .	. . .	. . .
(plus) eighteen	. . .			
residents	. . .	. . .	. . .	. . .
TOTAL:	☐	☐	☐	☐

** *Return to Paired Words* **

PICTURE RECOGNITION

	acquis recog. + −	) inc. lrn recog rcl + −	) 24 hrs recog rcl + −
2 clock	. .	. .	. .
bridge	. .	. .	
box	. .	. .	
4 telephone	. .	. .	. .
ear	. .	. .	
bee	. .	. .	
6 horse	. .	. .	. .
pen	. .	. .	
1 table	. .	. .	. .
3 shoe	. .	. .	
window	. .	. .	
pipe	. .	. .	
5 glass	. .	. .	. .
sword	. .	. .	
7 corn	. .	. .	. .
TOTAL:	☐ ☐	☐ ☐	☐ ☐ ☐

** *Return to Short Story* **

INCIDENTAL LEARNING

General Information . . .

Five Items . . .

Repeating Numbers . . .

Short Story . . .

Paired Words . . .

Administration (1st, 2nd, etc) —(1)

SS # ___ ___ ___ / ___ ___ / ___ ___ ___ ___ (2-10)

Form: A (11)

Date ___ ___ / ___ ___ / ___ ___ (12-17)

General Information ___ ___ (18-19)

Five Items: acquisition ___ ___ (20-21)

after digits recall ___ (22)

reacquisition ___ ___ (23-24)

after 24 hours recall ___ (25)

reacquisition ___ ___ (26-27)

Repeat Numbers: forward ___ (28)

backward ___ (29)

Paired Words: Acquisit ___ ___ (30-31)

after story recall ___ (32)

reacquisition ___ ___ (33-34)

after 24 hours recall ___ (35)

reacquisition ___ ___ (36-37)

Short Story: acquisition verbatim ___ ___ (38-39)

gist ___ ___ (40-41)

after picture gist ___ ___ (42-43)

after 24 hours gist ___ ___ (44-45)

Picture Recognition: acquisition hits ___ (46)

false positives ___ (47)

after inc. learning hits ___ (48)

false positives ___ (49)

recall ___ (50)

after 24 hours hits ___ (51)

false positives ___ (52)

recall ___ (53)

Incidental learning ___ ___ (54-55)

Remarks

Original is a photocopy. Text is blurry and cut off at bottom of page.

INSTRUCTIONS FOR MEMORY TEST ADMINISTRATION

Following a brief introduction to the Memory Test, mention is made that an accurate estimate of memory is *dependent upon paying attention* and trying as hard as possible to remember. Instructions include notification that in four of the seven parts of the test (to be identified later), subjects *will be asked to recall previously presented* information for as long as 24 hours after it has been given.

Testing is begun immediately to avoid a decrement in attention or motivation. The test requires approximately 20 minutes to complete. Supplementary information is recorded afterwards. The test should be administered in a quiet room with the subject seated comfortably facing the examiner to facilitate eye contact. The titles of each of the parts of the test (Modules 1-6) are repeated three times to enhance an unannounced request for retrieval of these precise titles as a measure of incidental learning in the last part (Module 7) of the test battery.

Module 1
GENERAL INFORMATION

Instructions for Examiners

Answers to all items are recorded in spaces provided on the form. After recording the name, age, home address, and telephone number, as given by the subject, the location of the place where the test is being administered as well as questions documentating orientation as to time are asked. This is followed by retrieval of long-term, over-learned, information including the subject's birthdate, the current President and Vice-President of the United States, and names of three large cities in the U.S. Numbers indicating the order of recall of the cities should be placed above the names.

Guidelines for Presentation to Subjects

"This part of the test is called **General Information**. I will start by asking questions which come under the heading of General Information. This includes the place where you are now, the date, and some other facts *which have been* well-known to you in the past. This part of the test is known as General Information."

Scoring: One point is given for each correct answer (date and time ±2). The maximum score is 14 points.

Module 2
FIVE ITEMS

Instructions for Examiners

Subjects are told that recall of the five items which are to be presented in this part of the test will be requested later in the test and, again, the next day. They are instructed not to repeat aloud the five nouns which are spoken by the examiner at two second intervals. This presentation is followed immediately by a 10 second period during which the subject is asked to subtract serial 3's from the number which appears at the bottom of this list on the test form for each trial. The subject is then asked to recall all five words in any order. After a delay of 5 seconds without further recall of the items, only those words not retrieved in the just preceding trial (selective reminder) are repeated by the examiner and, again, followed by subtraction of serial 3's for 10 seconds. A third trial is given in a similar manner if all five words have not been recalled on any previous trial. Acquisition to criterion is determined by retrieval of all five words on any of the 3 trials after which the session is terminated without further repetition until after the next part of the test (Repeating Numbers) and, again, 24 hours later. In these later sessions, the subject is asked to recall all five items in any order prior to repetition by the examiner. This allows measurement of retrieval alone after two longer intervals of delay with distraction.

Guidelines for Presentation to Subjects

"This part of the test is called **Five Items**. I would like you to remember these words because I will ask you about them later in the test and, again, tomorrow. In a moment I will read a list of five unrelated words to you and ask you to recall these items, in any order, after a brief period during which I will ask you to subtract some numbers. When I have finished reading each item to you, please do not repeat it aloud. Here are the Five Items ...... Now please count backwards by 3's from this number .... That is far enough, please tell me the words. (three trials, if necessary, to reach the criterion of all five items on a single trial) This part of the test is called Five Items"

Scoring: One point for each correct answer. Order of recall is noted by a number on the form for each correct word in a trial. When all 5 items are recalled on a single trial, the session is terminated (criterion). If all five items are retrieved on the first of three possible trials in the initial acquisition session, the maximum score is 15. In the two subsequent sessions (after Repeating Numbers and 24 hours later), each having the possibility of 4 trials, the maximum score is 20 if all five items are given correctly on the first trial.

Module 3.
REPEATING NUMBERS

Instructions for Examiners

Digits forwards and backwards are administered separately. Digits are spoken at the rate of one per second, not grouped. The pitch of voice is dropped with the last digit of each series to denote the number of digits in an item. Digits Forwards: start with 3 digits for all subjects. In any series, if the subject repeats the digits correctly, proceed to the next higher series. The second trial of a series is given only if the first trial is failed. Discontinue after failing both trials of a given series. Digits Backwards: start with the 3 digit series after a test of understanding using 7, 1, 9 to be given backwards by the subject. If the subject does not reply correctly or fails to understand, give the right answer and another example using 3, 4, 8. If the subject succeeds this time, proceed with the test. However, if the second example is incorrect proceed *with the test by giving the 2 digit series.*

Guidelines for Presentation to Subjects

"This part of the test is called **Repeating Numbers**. I am going to say some numbers. Listen carefully, and when I am through say them right after me .... **Repeating Numbers** also includes saying them backwards. This time when I stop, I want you to say them backwards. For example, if I say "7, 1, 9", what would you say?" If incorrect, "Remember you are to say them backwards, now try 3, 4, 8 backwards. This part of the test is called **Repeating Numbers**."

Scoring: Record the largest number of digits recalled before two failures on any comparable span. The maximum scores are 9 digits forwards and 8 digits backwards.

• Return to **Five Items** and re-test as per previous instructions.

Module 4
PAIRED WORDS

Instructions for Examiners

After the instruction that pairs of words will be given from which subjects will be asked to recall the second word when the first word is presented by the examiner, mention is made that after the initial session they will be asked to remember the pairs later in the test and, again, after 24 hours. Six pairs of words are spoken with one second intervals between words and two second intervals between pairs. The subject is asked not to repeat the words aloud. This is immediately followed by subtraction of serial 3's for 10

ond word has been retrieved by the subject on any previous trial in this session (restricted reminder). Should all six second words be recalled on a single trial, the criterion has been met and no subsequent trials are given in that session. The second session using the same list of paired words is delayed until after completion of the next part of test (Module 5, Short Story), and, on a third session *24 hours later. In the* first trial of the last two sessions, the examiner initially presents only the first words in order to test retrieval alone. This is followed by three subsequent trials to re-acquisition as in the initial presentation.

Guidelines for Presentation to Subjects

"This part of the test is called **Paired Words**. I will ask you to recall them later in the test and, again, tomorrow. I will read a list of the **Paired Words** to you. Please do not repeat them aloud. Some of these words are more closely related than others. Then, after counting backwards by 3's, I will give you the first word and you are to give me the second word. This part of the test is called **Paired Words**. Here are the pairs of words ......

Scoring: One point is given for each correct answer. Should all second words be retrieved on the first trial, that session is *terminated*. The *maximum* score for the first session is 18 and for the two later sessions, 24 points each.

Module 5
SHORT STORY

Instructions for Examiners

After the instruction that the subjects will be asked to recall a short story immediately after it has been read to them, a second time later in the test, and again, after 24 hours, the story is read at a rate of 1 to 2 words per second. Each of the 20 primary words are recorded by a number indicating the order of recall. After this, the gist of the story is requested with credit given for any block in which the precise word had been retrieved previously. Without re-reading the story, the gist is requested after the next part, (Module 6, Picture Recognition) and, again, 24 hours later.

Guidelines for Presentation to Subjects

"This part of the test is called a **Short Story**. I will ask you to recall as much of the Short Story as you can, immediately after reading it to you, as well as later in the test and, again, tomorrow. Here is the Short Story".

Scoring: One point for each word recalled immediately after presentation. The maximum score is 20. In the gist score, credit is given for any block in which a precise word has been retrieved after the first presentation. In the two subsequent requests for recall, only the gist is scored. The maximum gist scores are 10 each.

• Return to **Paired Words** and re-test as per previous instructions.

Module 6.
PICTURE RECOGNITION

Instructions for Examiners

The subjects are told that they will be asked to recognize objects in a first set of pictures to be shown just prior to presentation of a second set. The latter set is comprised of a larger number of objects from which they are to identify those seen in the first set. They will be asked to recognize pictures from the first set later in the test and, again after 24 hours. The first set of 7 pictures is displayed for 2 seconds each during which time subjects are asked not to comment aloud. The start of the second series of 15, which includes replicas of the first 7 objects as well as others, is begun immediately. The subject indicates recognition or no recognition within a period of 3 seconds. The second, larger series of 15 pictures, is presented again after the next part of the test (Module 7, Incidental Learning) and again 24 hours later. On each of the last two occasions, an unannounced request for recall of the names of the objects is *made after the recognition* is completed. This period for recall is terminated within 15 seconds.

Guidelines for Presentation to Subjects

"This part of the test is called **Picture Recognition**. I will show two sets of pictures to you to see how well you do with **Picture Recognition**. During the presentation of the first set, please do not say the name of the objects but to try to remember them. I will indicate to you the start of the second set of a large number of pictures only some of which you have seen. Please nod your head, yes, if you have seen the same picture in the first set. Your ability to recognize pictures from the first set will be asked for after the next part of the test and, again, tomorrow. Here is the **Picture Recognition** part of the test."

Scoring: One point for each correct identification of previously seen objects (maximum score is 7). False identification of *pictures not previously* seen (false positives) are scored separately when they occur (maximum score 8). Delayed verbal recall (after Module 6, Incidental Learning and after *24 hours)* of pictures previously seen is scored one point for each correct answer (maximum score 7).

• Return to **Short Story** and re-test as per previous instructions.

Module 7
INCIDENTAL LEARNING

Instructions for Examiners

Although the subjects have not been asked to remember the titles of the six previous sections (Modules 1-6), these headings have been presented to the subjects three times (refer to the Guidelines for Presentation to Subjects) for: **General Information**; **Five Items**; **Repeating Numbers**; **Paired Words**; **Short Story**; and, *Picture Recognition)*. Without prior warning, a request for recall of the precise two words is made. A period of 15 seconds is allowed for retrieval.

Guidelines for Presentation to Subjects

"Please tell me the titles of the parts of the test which you have just taken. I understand that you were not asked to remember them. It will be helpful for you to think back about what you were asked to do in each part as a clue to the names"

Scoring: One point is given for each precise title word recalled. The maximum score is 12 points.

• Return to **Picture Recognition** and re-test as per previous instructions.

Tests After 24 Hours

The four parts of the test to be repeated 24 hours later includes: (in person or by telephone)

1. **Five Items** - 4 trials or less, the initial trial for measurement of retrieval from prior acquisition and subsequent three trials for re-acquisition and retrieval
2. **Paired Words** - 4 trials or less, the initial trial for measurement of retrieval from prior acquisition and the subsequent three trials for re-acquisition and retrieval
3. **Short Story** - No repetition after initial presentation, retrieval for gist only

PILOT STUDY DATA: from NEW YORK MEMORY TEST

(Scores reported as percentage of subtest total.)

						SHORT STORY						PICTURE RECOGNITION					
						Acq		Later		Aftr 24 hr		Acq		Later		Aftr 24 hr	
#	sex	age	ed	age onset	yrs	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	M	42	12	16	14	30	60	20	80	60	50	100	100	100	100	57	0
2	M	30	12	15	2	55	45	40	40	70	50	100	100	100	100	57	0
3	F	24	13	22	2		65		80		80		100		100		43
4	F	21	13	16	5	20	70	60	90	80	100	100	100	100	100	43	86
5	M	34	12	16	18	35	50	30	40	50	50	100	100	86	86	29	43
6	M	25	12	14	11	45	45	70	50	70	50	100	100	100	100	100	57
7	M	39	BA	30	9	70	60	70	100	80	60	100	100	100	100	86	43
8	M	35	12	22	13	70	80	60	70	70	80	100	100	100	100	57	86
9	F	27	14	21	7	60	40	60	80	80	80	100	100	100	100	86	43

	REPEATING NUMBERS				FIVE ITEMS						PAIRED WORDS					
	Forward		Backward		Acq		Later		Aftr 24 hr		Acq		Later		Aftr 24 hr	
#	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
1	89	44	37	37	93	87	100	100	80	20	72	44	100	83	50	67
2	89	78	78	62	73	87	100	80	100	0	67	83	83	100	67	17
3		67		50		100		100		60		100		100		67
4	78	67	50	50	87	100	100	100	100	100	100	100	100	100	83	50
5	78	67	62	50	93	87	100	80	60	100	100	72	100	67	50	17
6	89	100	100	100	100	100	100	80	100	80	100	94	100	100	100	83
7	56	67	62	62	100	100	100	100	100	100	100	83	100	100	33	33
8	78	67	50	62	100	100	100	100	100	100	100	100	100	100	83	67
9	78	67	50	50	100	93	100	40	100	80	94	83	100	100	83	83

DOOKS MEMORY TEST

SUBTESTS	JULY (N=17)		AUGUST (N=13)		OCTOBER (N=15)		NOVEMBER (N=14)		NORMALS (N=10)	
	$\bar{X}$	s.d.	$\bar{X}$	s.d.	$\bar{X}$	s.d.	$\bar{X}$	s.d.	$\bar{X}$	s.d.
SIMPLE RECALL 1st Trial (10)	5.7647	±1.6405	5.9231	±0.9541	5.2000	±1.8974	6.0000	±2.2532	6.7000	±1.567
SIMPLE RECALL Total (40)	28.5882	±5.4205	31.9231	±2.7526	30.2000	±4.5701	30.2143	±6.6353	32.2000	±4.5412
DIGIT SPAN Forward (9)	6.5882	±1.0641	5.7692	±0.8321	6.4667	±1.7265	6.7143	±1.3260	7.4000	±1.4298
DIGIT SPAN Backward (8)	4.3529	±0.8618	4.5385	±0.8771	5.1333	±1.5055	4.2857	±1.3828	5.0000	±1.0541
PAIRED ASSOCIATES: Pic/Word (13)	8.8235	±2.2146	8.3077	±2.4285	9.0667	±3.0347	9.0714	±2.4950	11.2000	±1.4757
SIMPLE RECALL w/ Interference 1st Trial (10)	3.3529	±1.7299	3.3846	±1.8502	3.8667	±2.1336	3.2857	±1.3260	5.3000	±1.1595
Total (40)	21.4118	±9.1519	24.9231	±7.0529	22.4000	±7.3950	18.1429	±6.0365	28.0000	±4.3970
VISUAL MEMORY (30)	29.5882	±0.6183	29.4615	±0.6602	28.3333	±2.0237	29.3571	±2.1342	29.4000	±0.8433
PAIRED ASSOCIATES: Word/Word (16)	9.4118	±2.4764	10.4615	±2.5695	9.1313	±3.1818	8.9286	±2.6447	10.9000	±2.6013
SHORT STORY (20)	10.1176	±2.7130	11.1538	±3.1317	10.0000	±3.9641	9.7857	±3.5772	11.7000	±3.1990

N = 59

$\bar{X}$ AGE = 34.1724

$\bar{X}$ EDUCATION = 11.8103

N = 10

$\bar{X}$ AGE = 31.8

$\bar{X}$ EDUCATION = 14.8

APPENDIX D: TESTING INSTRUMENTS

INSTRUCTIONS

Simple Recall - This is a four trial test or until a person recalls all ten words on a given trial. The words are given at the rate of one word per second. Check correct responses.

Digit Span - Same as WAIS. Numbers are given at a rate of one per second. Stop when subject fails both trials at the same level.

PAIRED ASSOCIATES - PICTURE/WORD - (12 pairs) Remember first pair is an example where the task is explained. Each picture is shown for five seconds after the test word is first given to the subject. After showing all twelve pairs, the person is shown the pictures again and asked the word paired with each picture.

Simple Recall w/Interference - Same as simple recall only before subject is asked to recall the list on each trial, they are required to count backwards from 100, 80, 60, or 40 on subsequent trials.

PAIRED ASSOCIATES - WORDS - (16 pairs) The pairs are given at the rate of one second between words in a pair and two seconds between pairs. Then subject is given the first word in each pair and asked to give the paired-word. Draw line through incorrect responses.

Visual Memory - Subject is shown first fifteen cards at rate of two seconds per picture, but first informed that they will see these again. Then subject is shown second set of thirty pictures and asked if they have seen each picture before. Draw line through incorrect responses.

SHORT STORY - First story is read slowly to subjects. Then asked to recall the story. Draw line through each bit of detail recalled.

DOOKS MEMORY TEST

Name_____
Age _____
M/F _____
Education_____
Occupation_____
Since last drink_____
Age of onset_____
Duration_____
Avg wkly in last 6 mos_____
Head injury?_____

* * *

SIMPLE RECALL

fence	____	____	____	____
carpet	____	____	____	____
knife	____	____	____	____
broom	____	____	____	____
storm	____	____	____	____
hat	____	____	____	____
moon	____	____	____	____
plane	____	____	____	____
duck	____	____	____	____
tomato	____	____	____	____

* * *

DIGIT SPAN

Forward	Backward
286	64
582. 3	73. 2
3698	976
4957 4	572 3
82761. .	7284
25437. . . .5	7543. 4
41357	86497
852974 . . .6	96574 5
3815946	632971
1924853. . .7	318492. . . . 6
59824371	1657482
14398752 . .8	2739614 . . . 7
916832475	62193547
192873546. .9	96253481. . . 8

Forward ____ Backward _____

* * *

PAIRED ASSOCIATES-PICTURE/WORD

EX: M7 (horse)
M11(employment)
M13(happy)
M15(project)
N2 (fever)
J29(stretch)
H18(gospel)
H28(interrupt)
D2 (mimic)
D4 (thankful)
D6 (spinach)
D8 (persistent)
D10(remember)

SIMPLE RECALL w/ INTERFERENCE

Count back from 100 by 3's for 30"

cat	____	____	____	____
pliers	____	____	____	____
hose	____	____	____	____
fork	____	____	____	____
shadow	____	____	____	____
book	____	____	____	____
boat	____	____	____	____
carrot	____	____	____	____
bat	____	____	____	____
pencil	____	____	____	____

* * *

PAIRED ASSOCIATES-WORDS

metal	- iron	north	____
card	- board	fruit	____
baby	- cries	ear	____
corn	- map	obey	____
crush	- dark	card	____
north	- south	rose	____
school	- grocery	baby	____
house	- home	cloud	____
rose	- flower	up	____
cloud	- wall	lamp	____
up	- down	cabbage	____
obey	- inch	house	____
ear	- ring	metal	____
fruit	- apple	corn	____
lamp	- light	school	____
cabbage	- pen	crush	____

* * *

VISUAL MEMORY

2	clock	____
	bridge	____
	box	____
4	telephone	____
	ear	____
	bee	____
6	horse	____
	pen	____
1	table	____
3	shoe	____
	window	____
	pipe	____
5	glass	____
	sword	____
7	corn	____
	mountain	____
9	brush	____
11	key	____
	fish	____
13	dog	____
8	chair	____
	foot	____
10	hat	

SHORT STORY

Monday	____
Marcn	____
fourth	____
Denver	____
Colorado	____
(A) raging	____
blizzard	____
buried	____
(the) Hackett	____
Airport	____
(on) Billings	____
Road	____
stranding	____
sixty	____
travelers	____
(and) trapping	____
eight	____
children	____
(plus) twenty	____
policemen	____

FORM A

DOOKS MEMORY TEST

Name _____
Age _____
M/F _____
Education _____
Occupation _____
Since last drink _____
Age of onset _____
Duration _____
Avg wkly in last 6 mos _____
Head injury? _____

* * *

SIMPLE RECALL

tree	____	____	____	____
spoon	____	____	____	____
candle	____	____	____	____
towel	____	____	____	____
church	____	____	____	____
bus	____	____	____	____
rose	____	____	____	____
chicken	____	____	____	____
bucket	____	____	____	____
hammer	____	____	____	____

* * *

DIGIT SPAN

Forward	Backward
542	85
521. 3	16. 2
9615	425
4629 4	826 3
13785	8399
98275. 5	6497. 4
597184	41739
865932 6	86295 5
5124763	428596
2958174. . . .7	963718. 6
28715396	1947628
92641573 . . .8	9374625 7
379846215	16832475
935724186. . .9	19278365. . . .8

Forward ____ Backward ____

* * *

PAIRED ASSOCIATES-PICTURE/WORD

EX: M10(energy)
M12(party)
M14(family)
M16(pollution)
H24(strawberry)
H19(example)
H20(marathon)
D1 (determination)
D3 (correspondence)
D5 (confession)
D7 (travel)
D9 (foolish)
D11(hypnotize)

SIMPLE RECALL w/ INTERFERENCE

Count back from 100 by 3's for 30 secs

napkin	____	____	____	____
ice	____	____	____	____
tie	____	____	____	____
cloud	____	____	____	____
boat	____	____	____	____
fox	____	____	____	____
mop	____	____	____	____
car	____	____	____	____
snake	____	____	____	____
tire	____	____	____	____

* * *

PAIRED ASSOCIATES-WORDS

come	- go	knife	____
lead	- pencil	lead	____
in	- although	sheep	____
key	- hole	in	____
country	- France	country	____
cake	- tent	bear	____
sheep	- wool	dig	____
dig	- guilty	lock	____
lock	- door	key	____
job	- song	cake	____
bear	- skin	murder	____
jury	- eagle	head	____
murder	- crime	necktie	____
knife	- sharp	come	____
head	- hair	job	____
necktie	- cracker	jury	____

* * *

VISUAL MEMORY

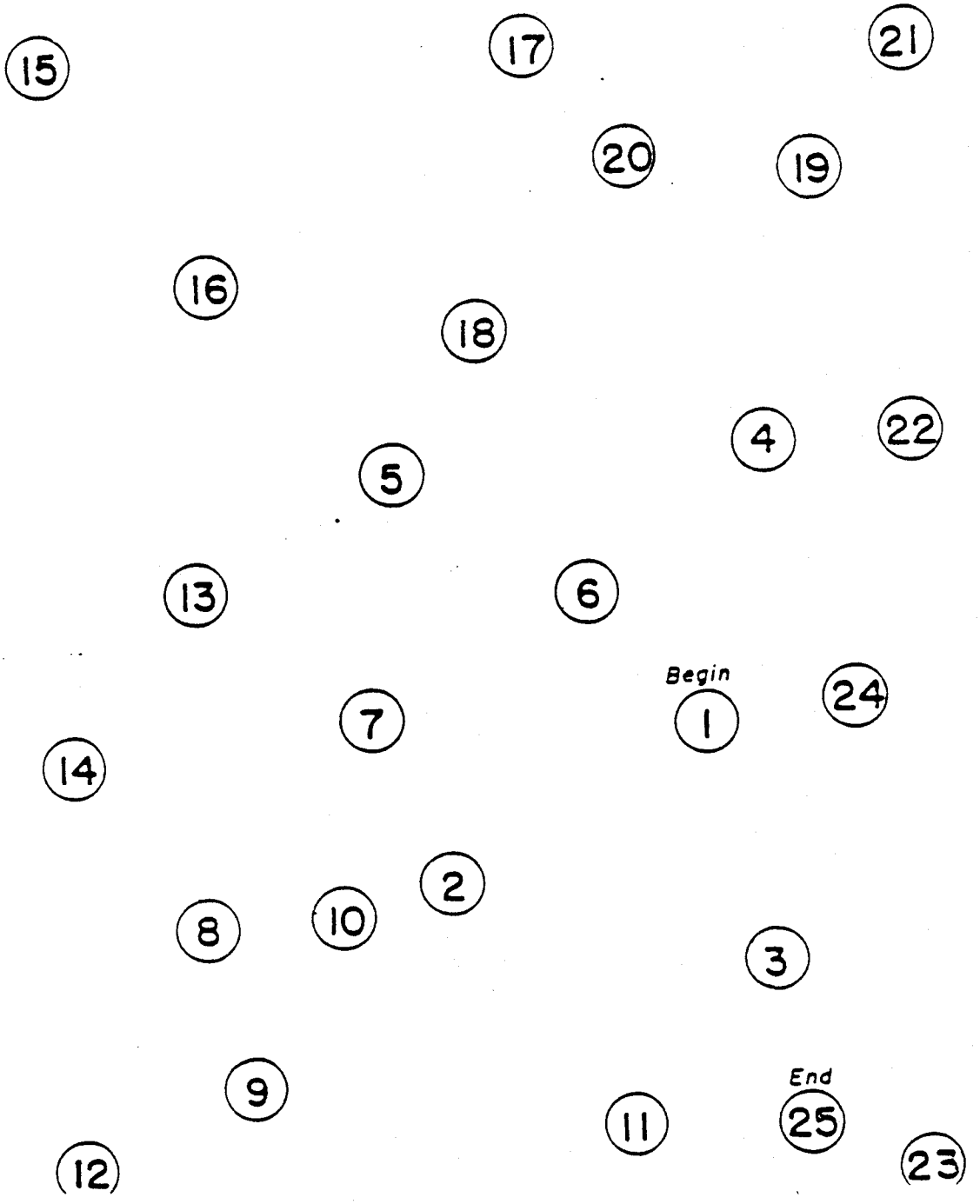
4	mountain	____
	brush	____
	key	____
2	fish	____
	dog	____
	chair	____
6	foot	____
	hat	____
3	lion	____
8	bell	____
	cup	____
1	match	____
7	house	____
	apple	____
5	knife	____
	clock	____
10	bridge	____
14	box	____
	telephone	____
13	ear	____
	bee	____
	horse	____
9	pen	____
	table	____
	shoe	____
12	window	

SHORT STORY

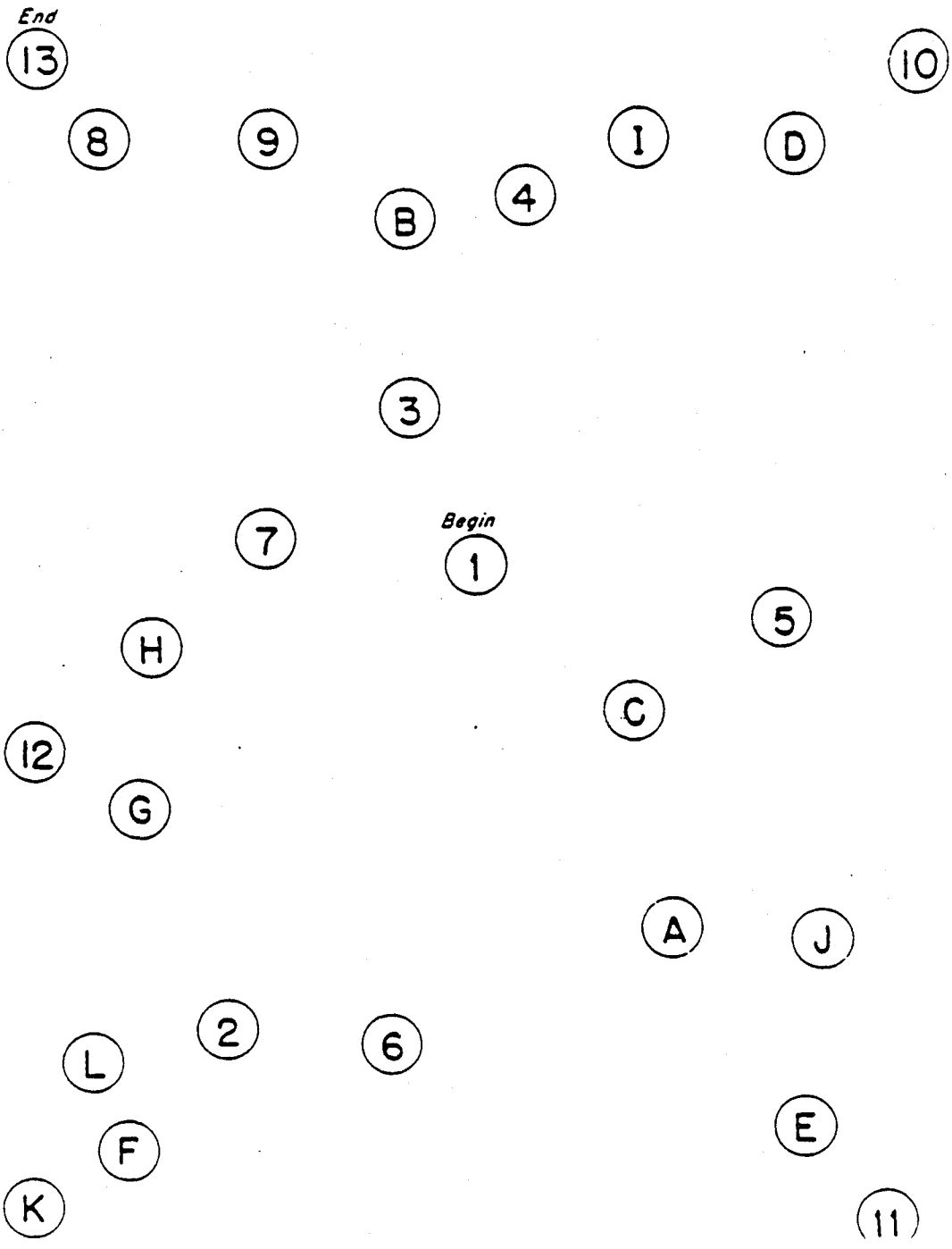
Friday	____
April	____
fifth	____
Boston	____
Massachusetts	____
(A) four-alarm	____
fire	____
gutted	____
(the) Belmont	____
Hotel	____
(on) Winslow	____
Street	____
killing	____
fourteen	____
people	____
(and) injuring	____
four	____
firemen	____
(plus) eighteen	____
residents	____

FORM B

TRAILMAKING A



TRAILMAKING B



ZUNG S.D.S.

MARK ONE COLUMN FOR EACH ITEM

	A LITTLE OF THE TIME	SOME OF THE TIME	GOOD PART OF THE TIME	MOST OF THE TIME
1. I feel down-hearted and blue.				
2. Morning is when I feel the best.				
3. I have crying spells or feel like it.				
4. I have trouble sleeping at night.				
5. I eat as much as I used to.				
6. I still enjoy sex.				
7. I notice that I am losing weight.				
8. I have trouble with constipation.				
9. My heart beats faster than usual.				
10. I get tired for no reason.				
11. My mind is as clear as it used to be.				
12. I find it easy to do the things I used to.				
13. I am restless and can't keep still.				
14. I feel hopeful about the future.				
15. I am more irritable than usual.				
16. I find it easy to make decisions.				
17. I feel that I am useful and needed.				
18. My life is pretty full.				
19. I feel that others would be better off if I were dead.				
20. I still enjoy the things I used to do.				

MEMORY PROBLEM LIST

NAME: _____

RATE THE PROBLEMS THAT YOU MAY HAVE WITH REMEMBERING IN EVERYDAY LIFE.

1 = no problem 2 = slight problem 3 = moderate problem 4 = severe problem

Give examples, explain, guess at the frequency.

___ Remember what you have done; like
locked the door
turned off the lights
take care of errands
call people

____ Remember where you put things; like
glasses
keys
bills
letters

____ Remember what you're supposed to do;
keep appointments

____ Remember what you have heard; like
instructions
directions
lectures
names
telephone numbers
addresses
stories, jokes

____ Remember what you have seen; like
street signs
landmarks
maps
letters

____ Remember job-related information

____ Remember news and current events

____ Remember conversations

____ Remember movies and T.V. programs

____ Remember books, magazine articles

Do you have trouble remembering it in the first place? _____

Or do you have trouble with recall or short-term memory? _____

BLOCK DESIGN

1. 60"	1		2					
	2		0	1				
2. 60"	1		2					
	2		0	1				
3. 60"			0	16-60 4	11-15 5	1-10 6		
4. 60"			0	16-60 4	11-15 5	1-10 6		
5. 60"			0	21-60 4	16-20 5	11-15 6	1-10 7	
6. 120"			0	36-120 4	26-35 5	21-25 6	1-20 7	
7. 120"			0	61-120 4	46-60 5	31-45 6	1-30 7	
8. 120"			0	76-120 4	56-75 5	41-55 6	1-40 7	
9. 120"			0	76-120 4	56-75 5	41-55 6	1-40 7	

VOCABULARY

1. Bed
2. Ship
3. Penny
4. Winter
5. Breakfast
6. Repair
7. Fabric
8. Assemble
9. Enormous
10. Conceal
11. Sentence
12. Consume
13. Regulate
14. Terminate
15. Commence
16. Domestic
17. Tranquil
18. Ponder
19. Designate
20. Reluctant
21. Obstruct
22. Sanctuary
23. Compassion
24. Evasive
25. Remorse
26. Perimeter
27. Generate
28. Matchless
29. Fortitude
30. Tangible
31. Plagiarize

APPENDIX E: MEMORY RETRAINING COURSE

TRANSCRIPTS FROM MEMORY RETRAINING CLASS

NOTE: Reflected in the transcripts is the interactive nature of this program and the extent to which participation is encouraged.

FIRST MEETING

(Prior to entering the classroom the instructor has already memorized first and last name of each participant and will be able to identify each name with the appropriate face.)

Does anybody have any comments about the memory test you just took? Did anybody have trouble with the Picture Recognition subtest? Why do you think that is? Just remember the old saying, "One picture's worth a thousand words."

Describe the format of the class. 1) There will be exercises in class, homework assignments which you aill be asked to recall at the beginning of every class, and a final project of remembering the "12 Steps of Alcoholics Anonymous." 2) Overview: We'll talk about strategies using imagery and association; about absent-mindedness; about techniques to remember people's names and associate them with the face.

You'll hear me say this time and again but remember that repetition will be insurance that you remember that: If you want to remember anything, you must first pay attention; observe and pay attention and concentrate on it. Now, who did not see _____ (a highly visible person) today? Everyone?! O.K. so-and-so, what was she wearing? Does everybody agree? How can we all have seen the same person and not agree on what she was wearing? (Someone will say, "I only remember things that interest me.")

The point is that we're walking around in a fog. I want you all to become alert, start paying attention, and take an interest. Observe what's going on around you.

Everyone put your arms behind your back. If you are NOT wearing a watch, you may take your arms from behind your back. Now, so-and-so how long have you had your watch? And you, _____? Can you tell me, does your watch have numbers, Roman numerals, or just slashes or is it digital? (One at a time, have them look and replace their arm.) Now so-and-so; can you tell me what time your watch says? --you just looked at your watch!

So-and-so, which color is the light on the top of a traffic signal? Does everyone agree? What famous person is on the face of a penny? Is he or she wearing a tie? What kind of tie? Besides "In God We Trust", what four words appear most on a U.S. coin? What letters, if any, are missing on a telephone dial? So what does all this teach us? The first step to remembering anything is to pay attention.

(A videotape on the "Neurology of Alcohol" was scheduled to precede the first meeting of the memory class.) By way of background on the idea of memory retraining. . .as you saw in the videotape, alcohol gravitates to the area of the brain where memory seems to be located. Just to reinforce the idea, remember that alcohol destroys brain cells and neurons in the brain do not reproduce themselves. The idea for the memory retraining came from the work we've been doing here at the Hospital in the Neuropsych Lab. We have a battery of neuropsychological tests which we have been given to persons just like yourselves--and regardless of who it is

and to what degree the person has brain damage, there's always some degree of memory problem. Knowing this as we do, we designed a memory retraining system to be part of this program so you-all can get additional benefit. So get what you can from the memory retraining but above all, remember that alcohol kills the brain cells that help you remember.

Virtually all learning is based on memory. So if you have a good memory, you are likely to be intelligent because you will remember what you need to know. Intelligence is the ability to learn; memory is the ability to retain,which is not related to intelligence. Apes can remember 30 actions to obtain food pellets. So improving your memory will help you retain more.

Many people expect their memory to get worse as they get older. It's true that memory deteriorates and it is also trtue that alcohol has the same effect on the brain as aging does. But the mind deteriorates much slower than the body and we can arrest this action by keeping mentally active and alert.

Improving memory takes knowledge, then Imagination, and most of all practice. Just like playing piano or basketball, or riding a bicycle, any skill improves with use and practice. You can't just listen; you must apply the techniques and participate and practice. There are no miracles, no easy secrets. Concentration improves when you get in the habit of focusing your attention. In this class we're going to use observation of what you want to remember, paying attention and concentration, and then association and imagery strategies to organize and remember. We'll go over all this time and agains so there's no need to write or take notes. Just REMEMBER.

Now that I've done all this talking, let's begin by playing a little game. "Going to Dallas." (Page 113). (Instructor should remember the exercise so techniques can be pointed out.) After the game point out different strategies people used. Usually each one looks at the person who is talking and makes an association of some kind. Emphasize the unconscious use of strategy. Ask how individual ones remembered. Discuss.

SECOND MEETING

Ask if anyone remembers the list from the "Dallas" game from the last meeting. Ask how they remembered; emphasize that it was discussed and brought to everyone's attention. (If people don't remember, they'll usually admit they weren't paying attention in the first place.) Today we're goin to talk about a way to remember things and we're gonna practice in class. First let me say that these exercises are just practice and may not seem relevant to your treatment here. But what we're doing is making you think, sharpening your mind, and getting you alert. So just do the best you can but really try.

So-and-so tell me the first step to remembering anything. O.K., good. Now take out scrap paper and pencil but put your pencils down. I want you to listen carefully and try to remember while I read you 5 words. After I read them I'm going to ask you to write them down in any order. (READ page111; WRITE). Now, how many got all 5? So-and-so read your 5 and everybody listen and see if you agree. O.K., how'd you do, so-and-so? And you, _____? What strategy did you use? And you, _____? Now we're going to try the same 5 words; I'll read them again. This time I want you to try to get a clear picture of each one and to put them together in a story as we go.

Remember, try to get a vivid picture and put them together in a story. And I'll ask you to remember them in order this time. (READ: PAUSE) Now before you write, let me pass around this sheet: "Progressive Relaxation." We'll talk about this a little later. Now WRITE. How many got them all in order? So-and-so read yours and everybody listen and see if you agree. Did the pictures help? (Ask individuals how they did, what strategies they used. Ask one or two to tell the story they made up.)

O.K., good! Let's try another exercise of 5 words. This time try the first time to get a clear picture and put them together in a story. (READ page111; PAUSE) Did everyone get a "Progressive Relaxation" handout? O.K., wrtie the 5 words in order. How many got 5? So-and-so read your words and everyone listen to see if you agree. Did the pictures help? Was it easier this time? (Ask individuals what was difficult about it for them.) Remember that this gets easier as we practice so don't get discouraged. If you get one more each time, you're doin great. Just do the best you can.

The basic rule is: You can remember anything if you associate it to something you already know. And we're gonna add, "in some ridiculous way." So we're going to exercise our imaginations and try to get some wild pictures and stories. And all of us in this room have had to come up with some pretty good stories at one time or another in our lives. . . You should realize that we've used association all our lives, but usually subconsciously. For example, could anybody come to the chalkboard right now and draw the shape of the country Greece? How about Russia? How about Italy? And why is that so easy? So if association has been going on subconsciously

then it's been hit and miss, with no control. Anything clearly associated is surely easily remembered.

Let's try one last exercise. I'm having a party tonight and I'm going to give you all directions right now. No pencils; I want you to remember these directions. (READ page 113). Now, raise your hand if you remember directions by landmarks; if you remember by left and rights. O.K., write the directions down. So-and-so, would you like to read the directions? Everybody listen and see if you agree. Who tried to visualize the directions? Isn't it usually easier to get somewhere a second time once you've driven there the first time? Usually if you're driving you have to pay attention more than if you're a passenger. (Ask individuals how they did and if they remembered the directions.)

Now it's time to test the teacher. (Pass around page 119). Everyone think of a word and please go easy on me and let it be an easy one, preferably a concrete noun. ("Concrete" means something you can see or touch, as opposed to abstract words like LOVE or LOYALTY.) I want you to write the numbers 1 through 20 on a piece of paper. Then I want you to skip around the room having persons say a number and their word. The numbers do not have to be in order. Everyone keep track of the numbers and the words because I won't be writing them, I'll be remembering them. The reason I want you to skip around the room is so I won't be accused of rememberng them in sequence or by looking at faces. Be sure you write them down so you will be impressed with my performance!

Now look at the B. S. Memory Course sheet that was passed to each of you. The numbers 1 through 20 have a word beside them

that rhymes with the number: 1-run, 2-zoo, 3-tree, etc. Right now, everybody memorize 1 through 10--just the word that rhymes with the number. (PAUSE) So-and-so give it a try. O.K., after each word is a phrase. That phrase has something to do with the rhyming word that you memorized. Take number 1, run. Picture a racehorse running down a track toward the finish line. Whatever the word is for #1, picture on the horse's head holding it back from the finish line. Two-zoo: Whatever the word is for #2 is what the monkeys in the zoo are throwing back and forth. Three-tree: Whatever the word is for #3 is holding the top of a Christmas tree bent over. Four-door: Whatever the word is for #4 is stuck in a revolving door. Five-hive: The word for #5 is stuck in the top of a bee-hive. Six-sick: The word for #6 is getting stuck with a needle by a mean nurse. Seven-heaven: The word for #7 is on the stairway to heaven. Eight-gate: the word for #8 is holding down a railroad crossing gate. Nine-wine: The word for #9 is flowing out of a bottle of wine. Ten-den: The word for #10 is blocking the entrance to a bear's den. Eleven is usually a football quarterback's number so eleven is quarterback. The word for #11 is in the quarterback's hands, just about to be thrown like a pass. 12-shelve: The word for #12 comes tumbling from the shelves of children's closets. 13-hurting: The word for #13 has just struck a man in the side and is hurting him. 14-courting: The word for #14 suddenly appears between a boy and girl who are courting and just about to kiss. 15-lifting: The word for #15 is being lifted by a power weight lifter. 16-licking: The word for #16 is being licked up by a cat. 17-leavening: The word for #17 suddenly appears from bread that is being leavened by a maid. 18-waiting: As you wait for the bus, one arrives and the word for 18 flies out the

bus doors at you. 19-pining: From the eyes of the crying Statue of Liberty comes the word for #19. 20-horn of plenty: The word for #20 is coming from a horn of plenty. That's the 20 and although everyone is anxious to try it themselves, we'll try it again a little later on.

For our next meeting I want you to be able to write the numbers 1 through 10, the word that rhymes, and a phrase that shows you remember the picture. You already know the numbers and the rhyming words. Also, look at the "Progressive Relaxation" (Page118). There are 13 steps. Each step pays attention to a part of the body. For our next meeting, pick out the part of the body in each step and memorize them in order. If you can, try the B. S. Memory Course or tell a story. Try to use some strategy. Two assignments for the next meeting: (1) #1 through #10, the rhyming word, and the picture; and (2) the 13 steps of progressive relaxation.

THIRD MEETING

Take out scratch paper and pencil and write the numbers 1 through 10, the words that rhyme, and jot down a phrase that describes the picture. Then write the part of the body that matches with each of the 13 steps of progressive relaxation. (PAUSE) Who thinks they have all 10? O.K. so-and-so, turn your clipboard over and tell us; everybody listen and see if you agree. Who got all 10? (Ask individually if they made an attempt to memorize, if they even looked at them, or if they forgot; make suggestions to help them remember.

Who thinks they have the 13 steps? O.K. so-and-so, leave your clipboard and go to the front of the class and lead us in progressive relaxation. Everybody listen and see if you agree. GREAT! (Instructor must remember who has participated so each person gets

a chance to participate.) How many remembered all 13? And what strategy did you use? Who used imagery? Told a story? Let's hear the story. Is it getting easier? Does the imagery help?

Just for fun: would anyone like to try to recall the words from the "Dallas" game? How about the 5 words we did as an exercise? Can you remember the story you used?

Last meeting we tried series of 5. This time let's start out with 6. I want you to listen carefully while I read the 6 words. Try to get a picture of them--I'll read them slowly and you try to put them together in a story. Try to remember them in order. (Page112). Before I ask you to write, let me pass out this exercise. (Page111). O.K., now please write the 6 words. (PAUSE) How many got all 6 in order? Ask individually, what strategies did you use? Have one tell their story if they used the story-type association.

Now I'll read 10 words. I want you to listen carefully and try to remember them in order. (Page111). Before I ask you to write them, let me say that I always try to talk in between reading to you and having you write them because that's generally how it happens in the real world. It's called "interference" but you-all are getting much better at concentrating, even with the interference. O.K., write 10. How many got 10 in order? So-and-so read your 10 and everybody listen to see if you agree. (Ask individually how each did, what strategy they used, is imagery helping, is it getting easier? Give a demonstration of a wild story using the last 10 words to show how to use imagery and how to make it bizarre so it'll stick in their memories. Make a mental note of individuals for whom this was most difficult to ask to tell the story you just told at the next meeting.

For the next exercise I'll read pairs of words and I want you to remember what two words go together in the pair. After I finish reading all the pairs, I'll read the first word and ask you what goes with it. There are 6 pairs. (READ page 112). Before I have you write, raise your hand if you're ready to memorize 10 words using the B. S. Memory System. O.K., write the word that goes with_____. How many got all 6? So-and-so see if you can say the pairs without reading them and tell us your image with each one. Good! How'd you do so-and-so?

Now I'm going to send you all to the grocery store without a list written down--it's all in your memory. Listen carefully to the 10 items and try to remember them in order because I have them written according to aisles so you'll only have to make one trip through. (READ page 112). Has anyone in here ever tried before to remember as many as 10 items to pick up from the grocery store? O.K., write, in order please. How many think they got all 10 in order? So-and-so read yours and everybody listen and see if you agree. Did anybody find themselves group some items together like the detergent and the paper towels? (Ask individually how each did; what strategy? if they used a story, have them tell the story; is it getting easier to use imagery?)

One last shopping errand--to the hardware store for 7 items. Listen carefully, try to remember them in order, and try to put them in a story. The 7 items are (READ page 112). Who thinks they got all 7 in order? So-and-so read your 7 items and everybody listen and see if you agree. Getting easier, isn't it?

FOURTH MEETING

Everybody take out scratch paper and something with which to write. I want you to write the 13 parts of the body that correspond to the 13 steps of progressive relaxation. Then I want you to write the numbers 1 through 10, the rhyming word, and a phrase to explain the picture that goes with it. (PAUSE) So-and-so, why don't you turn your clipboard over and lead us all in progressive relaxation. Everybody listen, relax, and see if you agree that they're in the correct order. Now, so-and-so, turn your clipboard over and tell us the 10 rhyming words and the images that go with them.

While you're all still relaxed, we'll begin with an exercise to get your imaginations working. I'm going to read concrete words that are high imagery. I want everyone to get a clear picture of the word I read because I'll ask several people at random to describe in detail the image they saw. So just relax, close your eyes if that will help shut out some distraction, and see what you imagine when I say. . ."_____." (Ask individuals to describe; try to encourage detail.) Great!--you're doing great!

Let's go on to the next exercise. I'll read pairs of words and I want you to try to get good clear pictures of the pairs together. After I read the 10 pairs, I'll give you one word and you write the word that goes with it. Listen carefully and try to get a good clear picture of each as I read the 10 pairs. (READ page 112). Now before I ask you the words, I want everybody to think of a person's name to use as an alias. Please make it very simple. O.K., what word goes with _____; through 10. Who thinks they got all 10? O.K. so-and-so, turn your clipboard over and everybody listen and see if you agree.

What were some of your pictures? Is it easier when you get images? For those who are having trouble, what seems to be the problem? When other peple describe the images they use, does that help you? Can you see how we are using this system?

Let's talk now a little about how to apply imagery to abstract nouns. This is tricky and will come with practice and experience. Let me demonstrate by teaching you-all a little Spanish. Does anybody here speak Spanish? Now what we want to do is to first use a substitute word for the abstract word.--use a rhyming word or make an association in some way. Then make an image connecting the two words. Let me show you. (WRITE page 114). (After going through the list, turn the chalkboard or erase it.) Before we test your memory on those words, was everyone able to think of another person's name? Remember, make it easy, O.K., what is the Spanish word for the English _____? (ETC.) Who thinks they got them all right? So-and-so turn your paper over and tell us.

Now we'll use the same system and talk about people's names. What image could you make if you were introduced to a man named Robert? "Robber" sounds like Robert so you might picture Robert wearing a mask like a robber. (Page 114). Do you all remember the name you are going to use as your alias? O.K., I'd like you all to stand and walk around the room, introducing yourself to each other using your alias. After everyone's met everyone, we'll return to our seats and write everyone's alias. Remember, the first step is to listen carefully, pay attention, repeat the name, spell it if you need to. Then make an association with the name and attach it to the face. Remember, this is our first attempt so it won't be easy but

I promise it'll get easier with practice. (Instructor participates.) Now that we've all met, let me pass these around. (Page 120). Now everyone write the names. (PAUSE). Who thinks they got them all? So-and-so see if you can identify everybody here. GREAT!

I passed around a copy of the 12 Steps of A. A. I want everyone to pick one word in each step that is the key word to them. Try to pick a word that is concrete or that can easily be made from a substitute word. That is your assignment for our next meeting. You will also be quizzed on the 13 Steps of Progresive Relaxation and the B. S. Memory Course.

FIFTH MEETING

Begin the session by quizzing on the 13 Steps of Progressive Relaxation and the B. S. Memory Course, same as previous meetings.

The first exercise we're going to do is to get our imaginations working. I am going to put 2 letters of the alphabet in various places around the room. After I have done this, I'm going to go around the room and point to the various areas and ask you what 2 letters are there. HINT: make an image of a concrete word that has both letters in it and imagine it in that spot in the room. (READ page 112 and point to objects.) O.K., which letters are _____? (ETC.) Who thinks they got them all? So-and-so, which letters are _____? (ETC.)

Now I'd like to read 12 words, I want you to listen carefully because I'll have you write them, in order, after I read them. If you can, use the B. S. Memory System or use some type of association--tell a story perhaps. These words are all concrete so you won't need to make substitute words. Here are the 12 words. (READ page 112).

Now before you write these words, raise your hand if you did not do the assignment with the 12 steps of A. A. Why not so-and-so? Well, we'll talk about it a bit later. Right now I'd like you-all to write the 12 words in order please. (PAUSE) Who thinks they got all 12 in order? O.K. so-and-so, turn your clipboard over and everybody listen and see if you agree. GREAT! Now can you explain the strategy you used? Good. How many got all 12? What strategy did you use? So-and-so, you didn't get all 12; how many did you get? But you're doin lots better, aren't you? Little by little you'll keep seeing improvement.

Just for fun, let's see how much Spanish you remember from the last meeting. Take out scratch paper and write the Spanish word for the English _____ (ETC.) Who thinks they got them all? Everyone else listen and see if you agree. Do you remember the picture with each one that we talked about? GREAT! Are you beginning to see how images help memory?

Let's try to apply our systems to a practical exercise. I'm going to read a list of things you need to do today. I want you to remember them in order because they are in order to save time running around. You'll make 11 stops, and on one stop remember 5 items. That's 16 items total. Listen carefully and remember these items in order. (Read page 113). Now I'm passing around "How to Remember Names." Who thinks they got all 17 items in order? So-and-so, why don't you turn your clipboard over and see if you can tell us where to stop; everybody else listen and see if you agree. How many got them right? GREAT! (Ask around how individuals did and compare progress of the individuals.)

Let's play the name game now. Everybody pick a name--make it kinda easy because we're all beginners. First look at the sheet that was passed around. Let's review: to remember a name and face, (1) be sure to pay attention and concentrate on the name; be sure you hear the person's name in the first place; (2) spell it or have them spell it; (3) if there's an odd fact about the name or if it's similar to a name you know, mention it; (4) repeat the name as often as you can in the conversation; and (5) use the name when you say good-bye. Now that you're experts at association, you can also associate the name in some ridiculous way. Then remember the face; concentrate on it and pick an outstanding feature. Lastly, link the name and face together. Use a ridiculous association. Everybody stand and mingle and introduce yourself to each other. (Instructor participates) Now I'd like you to write the names. Who thinks they got them all? So-and-so, see if you can name everybody. Who got them all? Which ones were easiest? What images did you use?

Everyone take out your copy of the 12 Steps. So-and-so, which word did you choose for #1? What image did you use? Anybody else get something different? Remember, the words and images have to work for you so we can't decide for you. Each individual must use what works for them. (Continue with 12 steps.) For our next meeting I want you to remember each 12 images, in order. Also, I'll ask you to write the 13 parts of the body of the steps of progressive relaxation, as well as the numbers 1 through 10, the words that rhyme, and a word to show me that you know the images that goes with that word and number.

SIXTH MEETING

Begin the session by quizzing on the 13 steps of progressive relaxation and the B. S. Memory System, same as previous meetings. Then write the key word that each chose for each of the 12 Steps of A. A. If anyone can do 1 through 20 on the B. S. System, let them try a demonstration. Who can tell the main idea of each of the 12 Steps of A. A.? What strategy did you use to remember these? How did everyone else do? What strategies did everyone else use? Would someone like to tell the story they used? Does that help everyone else? Just for fun, let's see how many Spanish words you can remember. (Read English words and ask someone to read their answers.) This is just for fun, too: see if you can write the 10 words that began with "airplane." If you can't remember the words, see if you can write the story we made up. (PAUSE) Did anybody remember it? GOOD!

Today we're going to start with a list of things you want to remember. I'll read you the list and I want you to remember them in order. Listen carefully--(Read page). Now before I ask you to write them, we're going to practice names again today so everybody think of a name. Now, who thinks they got the list in order? So-and-so please tell us and everybody listen and see if you agree. This time you can make it relatively tricky BUT I want <u>you</u> to think of an association with <u>your</u> name and mention it to the person when you introduce yourself. For example, I would introduce myself as "Ruby Slippers" and mention that my skirt is ruby red but I'm wearing boots as slippers. (Milling around; write names; quiz to see how everyone did.)

We're going to talk some about absentmindedness. When most folks complain of a poor memory they may just be talking about

absentmindedness. A person is absentminded when their mind is absent, when they perform actions unconsciously without thinking. How much time, energy, and aggravation have you spent remembering if you locked the door? if you turned off the oven? if you unplugged the iron? if you left something somewhere? The solution is simple: BE SURE TO THINK OF WHAT YOU'RE DOING DURING THE MOMENT IN WHICH YOU'RE DOING IT. Since you know that making an association forces observation and concentration, an attempt to make an association will force you to be aware of what you are doing. You can read an example (Page 116): If the phone rings, you put your pencil behind your ear as you reach for the phone. In that moment, make a fast mental picture between your ear and the pencil. For example, actually see the pencil going into your ear. Let's try this exercise and see if you can use your imaginations to think of ways to use association. (Read page 117).

Let's talk now about the 12 Steps of A.A. Let's go through each step and talk about what substitute word you use and how you linked those words together. (Go through steps.) The key, of course, to remembering these words is that each word will cue you to remember the rest of the sentence. Would anybody take the challenge to say all 12 Steps?

If you would, please take this time now to give me some feedback about this class. Start with the good news and tell me what you liked abot it. ( ). Now I'd like to know what you think could have been improved or what additions I could make to make this more effective. Now the bad news--what did not work for you?

Thanks, good luck, and I'll see you at the Commencement Dinner.

BASIC MEMORY RULE: IN ORDER TO REMEMBER ANY NEW PIECE OF INFORMATION, IT MUST BE ASSOCIATED TO SOMETHING YOU ALREADY KNOW OR REMEMBER IN SOME RIDICULOUS WAY.

Memorize in sequence: AIRPLANE, TREE, ENVELOPE, EARRING, BUCKET, SING, BASKETBALL, SALAMI, STAR, NOSE.

Memorize AIRPLANE.

TREE: Picture a ricidulous (impossible, crazy, illogical, absurd)

i.e., A gigantic tree flying instead of an airplane or airplane growing instead of tree, or airplanes growing on trees or millions of trees boarding airplanes.

ENVELOPE: Millions of envelopes growing on a tree, or a tree sealing a gigantic envelope or trying to seal a tree in an envelope

EARRING: see self wearing envelopes instead of earrings, or you open an envelope and millions of earrings fly out & hit you in the face.

BUCKET: see self wearing buckets instead of earrings; or a gigantic bucket wearing gigantic earrings.

SING: see a gigantic bucket singing; or see self singing w/ a bucket over your head.

BASKETBALL: picture a basketball singing; or someone singing & millions of basketballs fly out of their mouth

SALAMI: picture a gigantic salami playing basketball; or a basketball player dribbling a salami instead of a ball

STAR: picture a gigantic salami twinklin in sky; or slicing a star instead of a salami

NOSE: picture someone with a twinkling star on face instead of a nose; or a star has a large nose.

EXERCISE: Memorize in sequence: CARPET, PAPER, BOTTLE, BED, FISH, CHAIR, WINDOW, TELEPHONE, CIGARETTE, NAIL, TYPEWRITER, SHOE, MICROPHONE, PEN, TELEVISION SET, PLATE, DOUGHNUT, CAR, COFFEE POT, AND BRICK.

CLASS EXERCISES

A

baseball
star
statue
beverage
settler
murderer

B

money-table
beggar-coffee
railroad-reptile
anger-phantom
volume-moisture
fire-passageway

C

ice cream freezer
light bulbs
keys made
plant food
dead bolt
car wax
jumper cables

D

arm
rat
ear
dog
rain
bear
wood
bird
saw
cat
bank
lion

E

hammer-alligator
orchestra-water
tree-candy
nail-girl
doctor-lake
policeman-house
fisherman-magazine
lemon-fox
microscope-harp
horse-missile

F

go to kitchen
get a glass of water
sit down in the living room
start reading a book
get up to answer the doorbell
take the mail from the mailman
go for a walk
talk to a neighbor
pet a dog
go home again

G

BN	(bone)	T.V.
PT	(pot)	chalkboard
SK	(sucker)	window
FX	(fox)	table
TR	(tree)	door
MS	(mess)	chair
KAJ	(cage)	T.V.
ROX	(rocks)	planter
ZYL	(seal)	chair
XAC	(sack)	chair

EXERCISE: LINK SYSTEM

You have to have your car washed;
make a deposit at the bank;
mail a letter;
see your dentist;
pick up the umbrella you forgot at a friend's house;
buy some perfume for your sister;
call or see the T.V. repairman;
stop at the hardware store for bulbs, a hammer, a picture frame, an extension cord, and an ironing board cover;
go to the bookstore to buy a copy of the Memory Book.
have your watch repaired;
bring home one dozen eggs.

EXERCISE: VISUALIZATION

Go straight until you come to a fork in the road. Then turn right and travel to the second four-way stop. Then turn left and keep going until you come to a tunnel. Make your first left after you get out of the tunnel. Then go past two traffic lights and you should see a monument on the right-hand side. You want the building that is before the monument.

EXERCISE: GAMES FOR LINK

(1) Each player adds an item to the list. The first one might say, "I'm going to Dallas and I'm going to take a bottle." The next one says, "I'm going to Dallas and I'm going to take a bottle and a broom." The first player who misses an item is "out."

(2) Place items on a tray and cover them with a cloth. Remove the cloth for a short time (a minute or so), then replace it and have everyone try to list all the items.

SUBSTITUTE WORD EXERCISE

Robert	robber
Jerry	cherry
Florence	floor ants
Mary	bride (marry)
Sheila	shield
Harry	hairy
Jim	gym
Gordon	garden
Smith	blacksmith's hammer
Cohen	ice cream cone
Oliver	olive

SUBSTITUTE WORDS FOR FOREIGN LANGUAGE

(Spanish)		
ventana	window	Anna throwing a vent through a closed window
hermano	brother	your brother as an airman
cuarto	room	room piled high with quarters
vasa	glass	see yourself drinking from a vase
pluma	pen	see yourself writing with a gigantic plume
pajara	bird	parked car crammed with birds
(French)		
pont	bridge	see yourself punting a football over a bridge
père	father	see your father like a pear
libre	book	slice of liver in a book as a marker

REMEMBERING NAMES AND FACES

1) Be sure you hear the person's name in the 1st place.
2) Spell it or have them spell it.
3) If there's an odd fact about the name, or if it is similar to a name you know, mention it.
4) Repeat the name as often as you can throughout the conversation.
5) Use the name when you say "good bye"

REMEMBERING THE NAME FORCES YOU TO LISTEN, PAY ATTENTION, CONCENTRATE
IT GETS EASIER AS YOU PRACTICE.

THREE STEPS:

1) Remember name: associate in some ridiculous way
2) Remember face: concentrate, pick outstanding feature.
3) LINK together. ASSOCIATE. SUBSTITUTE WORD with outstanding feature. Use a RIDICULOUS ASSOCIATION.

Remember face: outstanding characteristic:

1) pay attention
2) interested in
3) concentrate

NAMES

MEAN SOMETHING	NO MEANING
Cook	Kraukauer
Brown	Conti
Coyne	Sullivan
Carpenter	Mooney
Berlin	Carson
Storm	Morgan
Shivers	Resnick
King	
Gold	

Suggest a Picture
John L. Sullivan
Abraham Lincoln
River Jordan

If you've been applying the systems, you've not only improved your MEMORY but you've also improved

1) your IMAGINATION
2) your CONCENTRATION, and
3) your OBSERVATION

These ideas have been intended to FORCE YOU TO PAY ATTENTION

You cannot sharpen your observation without applying some EFFORT.

ABSENTMINDEDNESS

You are ABSENTMINDED when your mind is ABSENT,
when you perform actions unconsciously without thinking,
USE CONSCIOUS ASSOCIATIONS.
How much time, energy, aggravation have you spent remembering
?? have I turned off the oven??
?? have I locked the door??
?? have I unplugged the iron??
?? have I left something on the bus??

SOLUTION: BE SURE TO THINK OF WHAT YOU'RE DOING DURING THE MOMENT IN WHICH YOU'RE DOING IT.

HOW: Use ASSOCIATION; ASSOCIATION forces ORIGINAL AWARENESS
for example: If the phone rings, and as you reach for it, you put your pencil behind your ear--make a fast mental picture between ear & pencil. Actually SEE the pencil going INTO your ear.

If you place your eyeglasses on your television set as you leave the room, "see" the antenna of the television set going right through the glasses lens, shattering it.

ABSENT-MINDED EXERCISE

Ask Group members to give examples of how they would ASSOCIATE & VISUALIZE.

1. Don't want to forget umbrella at friend's house. (Imagine you're wearing an umbrella instead of your coat.)
2. Don't want to forget your umbrella at the office. (Imagine umbrella in time slot.)
3. You wrote an important letter and don't want to forget to mail it.
4. Remember not to burn the roast. (Put a frying pan on top of T.V.)
5. Remember whether you turned off the oven. (Imagine your head in the oven.)
6. Remember whether you locked the door. (Imagine that you locked the door with your head.)
7. Remember if you've unplugged the iron.
8. You went to the refrigerator, opened the door, looked in, and forgot what you wanted.
9. Remember whether you set the alarm clock or not. (Visualize the knob going through your nail.)
10. Remember to pick up a dozen eggs on the way home from work.
11. Remember to call Julie later.
12. Remember to turn off a certain EXIT on the expressway.

APPENDIX G: HOMEWORK ASSIGNMENTS

PROGRESSIVE RELAXATION

1. Clench both fists, feel the tension. Relax slowly. . .feel the tension ease. Feel the difference now that the muscles are relaxed.

2. Make a muscle with both arms. Contract the biceps. . .now relax the arms slowly.

3. Curl the toes downward until the muscles are tight up through the thighs. . .now relax slowly. . .feel the tension ease.

4. Curl the toes upward until the muscles in the back of the legs are tight. Now relax slowly. Feel the tension ease.

5. Push the stomach muscles out as though you were going to be hit in the stomach and you are protecting yourself. Now slowly. . .relax. Your arms are relaxed. . .your legs are relaxed and your breathing is easy.

6. Pull your stomach in until your diaphram feels the pressure. Now . . .slowly relax. . .slowly. Feel the tension ease.

7. Pull your shoulders up to your ears. Feel the tension in your back and chest. Now. . .slowly relax. Let your arms relax. You are feeling good. Your breathing is easy.

8. Tilt your head backward as far as you can. Stretch the muscles. Feel the tenseness. Now, slowly, relax. Let your head come to a comfortable position.

9. Put your chin down on your chest. Hold it. Feel the tension. Now, relax. Feel the tension go.

10. Wrinkle your forehead. Hold it. Now relax. Feel the tension go.

11. Squint your eyes as tight as you can. Hold it. Now. . .relax.

12. Make a face using all your face muscles. Hold it. Now relax. . slowly. Your arms are relaxed. . your breathing is easy and you feel good all over.

13. In a state of perfect relaxation you should feel unwilling to move a single muscle in your body. Now continue relaxing, and when you wish to get up, count backward from four to one. You should then feel fine and refreshed, wide awake and calm.

B.S. MEMORY COURSE
(BROWN'S SHORT)

1.	RUN	HORSE RUNNING DOWN A TRACK
2.	ZOO	MONKEYS IN THE ZOO
3.	TREE	BENT CHRISTMAS TREE
4.	DOOR	REVOLVING DOOR
5.	HIVE	BEE-HIVE
6.	SICK	MEAN NURSE WITH NEEDLE
7.	HEAVEN	STAIRWAYS FROM HEAVEN
8.	GATE	RAILROAD CROSSING GATE
9.	WINE	BOTTLE OF WINE
10.	DEN	ENTRANCE OF A DEN
11.	QUARTERBACK	PRO QUARTERBACK
12.	SHELVE	CHILDRENS CLOSET
13.	HURTING	A MAN WITH A PAIN IN HIS SIDE
14.	COURTING	BOY AND GIRL KISSING
15.	LIFTING	POWER LIFTER
16.	LICKING	CAT LICKING SOMETHING
17.	LEAVENING	MAID LEAVENING BREAD
18.	WAITING	WAITING AT THE BUS
19.	PINING	STATUTE OF LIBERTY CRYING
20.	HORN OF PLENTY	HORN OF PLENTY

THE 12 STEPS OF ALCOHOLICS ANONYMOUS

1. We admitted we were powerless over alcohol--that our lives had become unmanageable.

2. Came to believe that a Power greater than ourselves could restore us to sanity.

3. Made a decision to turn our will and our lives over to the care of God as we understood Him.

4. Made a searching and fearless moral inventory of ourselves.

5. Admitted to God, to ourselves, and to another human being the exact nature of our wrongs.

6. Were entirely ready to have God remove all these defects of character.

7. Humbly asked Him to remove our shortcomings.

8. Made a list of all persons we had harmed, and became willing to make amends to them all.

9. Made direct amends to such people wherever possible, except when to do so would injure them or others.

10. Continued to take personal inventory and when we were wrong, promptly admitted it.

11. Sought through prayer and meditation to improve our conscious contact with God as we understood Him, praying only for knowledge of His will for us and the power to carry that out.

12. Having had a spiritual awakening as the result of these steps, we tried to carry this message to alcoholics, and to practice these principles in all our affairs.