AN ABSTRACT OF THE THESIS OF

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

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 Docks 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 drink, 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

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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 systematically 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.
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, systematic 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

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 (C₂H₅OH) 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

Midsagittal 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 cingulate 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, quarrelosomeness, 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 system-
matically 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 systematic 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 associa-
tion 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, 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 re-
ceived 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

**ALCOHOLISM FOLLOWUP REPORT**

**May 23, 1980**

<table>
<thead>
<tr>
<th></th>
<th>TOTAL</th>
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<th>FEMALE</th>
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<td>8</td>
<td>5</td>
</tr>
<tr>
<td>Jun</td>
<td>9</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>Jul</td>
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<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Oct</td>
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<td>5</td>
<td>0</td>
</tr>
<tr>
<td>Nov</td>
<td>12</td>
<td>9</td>
<td>3</td>
</tr>
<tr>
<td>Dec</td>
<td>9</td>
<td>9</td>
<td>0</td>
</tr>
<tr>
<td>Jan 80</td>
<td>9</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Feb</td>
<td>4</td>
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</tr>
<tr>
<td>Mar</td>
<td>8</td>
<td>6</td>
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<tr>
<td>Apr</td>
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<td>3</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td>102</td>
<td>84</td>
<td>18</td>
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</table>

82% males, 18 females

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

White 69%, Native American 24%, Black 7%

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

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**ADMISSIONS TO ALCOHOL UNIT--1981--**

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<tr>
<td>Jan</td>
<td>30</td>
<td>1/5-1/30</td>
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<td>Feb</td>
<td>32</td>
<td>2/30-3/13</td>
</tr>
<tr>
<td>Mar</td>
<td>39</td>
<td>3/30-4/24</td>
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<tr>
<td>Apr</td>
<td>31</td>
<td>5/11-6/5</td>
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<td>6/22-7/17</td>
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<td>Jun</td>
<td>49</td>
<td>8/3-8/28</td>
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<td>Jul</td>
<td>34</td>
<td>9/14-10/9</td>
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<td>39</td>
<td>10/26-11/20</td>
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<tr>
<td>Sep</td>
<td>48</td>
<td>11/30-12/23</td>
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<tr>
<td>Oct</td>
<td>46</td>
<td>81</td>
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<tr>
<td>Nov</td>
<td>30</td>
<td>57 (1 out of 8)</td>
</tr>
<tr>
<td>Dec</td>
<td>25</td>
<td></td>
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452 Females: 57 (1 out of 8)
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<tr>
<th>SEX</th>
<th>TOTAL %</th>
<th>EXP</th>
<th>%E</th>
<th>CONTROL %</th>
<th>%C</th>
<th>TOTAL</th>
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<tr>
<td>MALE</td>
<td>89.75</td>
<td>26</td>
<td>93.3</td>
<td>25</td>
<td>86.2</td>
<td>53</td>
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<tr>
<td>FEMALE</td>
<td>10.25</td>
<td>2</td>
<td>6.7</td>
<td>4</td>
<td>13.8</td>
<td>6</td>
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**AGE - Range: 18 to 61 yrs**

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<tr>
<td>MALE</td>
<td>35.73</td>
<td>9.91</td>
<td>21 to 59 yrs</td>
<td>37.03</td>
<td>11.24</td>
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<td>FEMALE</td>
<td>6.7</td>
<td>2.53</td>
<td>18 to 61 yrs</td>
<td>10.62</td>
<td>2.53</td>
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**EDUCATION - Mode: 12 yrs**

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<tr>
<td>MALE</td>
<td>11.87</td>
<td>1.90</td>
<td>6th-College Grad</td>
<td>10.62</td>
<td>2.53</td>
</tr>
<tr>
<td>FEMALE</td>
<td>6th-College Grad</td>
<td>6th-College Grad</td>
<td>11.25</td>
<td>2.53</td>
<td></td>
</tr>
</tbody>
</table>

**LENGTH OF ABSTINENCE**

**DAYS SINCE LAST DRINK**

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</thead>
<tbody>
<tr>
<td>MALE</td>
<td>22.13</td>
<td>21.56</td>
<td>4 to 99 days</td>
<td>21.59</td>
<td>21.93</td>
</tr>
<tr>
<td>FEMALE</td>
<td>7 days</td>
<td>14 days</td>
<td>5 to 99 days</td>
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**AGE OF ONSET**

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</thead>
<tbody>
<tr>
<td>MALE</td>
<td>20.57</td>
<td>8.42</td>
<td>7 to 47 yrs</td>
<td>23.97</td>
<td>9.60</td>
</tr>
<tr>
<td>FEMALE</td>
<td>16 yrs</td>
<td>16 yrs</td>
<td>10 to 49 yrs</td>
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</table>

**DURATION**

<table>
<thead>
<tr>
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<th>s.d.</th>
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<tbody>
<tr>
<td>MALE</td>
<td>14.40</td>
<td>8.44</td>
<td>3 to 31 yrs</td>
<td>12.48</td>
<td>10.57</td>
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<tr>
<td>FEMALE</td>
<td>7 yrs</td>
<td>7 yrs</td>
<td>1 to 51 yrs</td>
<td></td>
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</tbody>
</table>
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 material. 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 acquisition 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.

<table>
<thead>
<tr>
<th></th>
<th>EXPERIMENTAL</th>
<th>CONTROL</th>
</tr>
</thead>
<tbody>
<tr>
<td>PRETEST</td>
<td>n=30</td>
<td>n=29</td>
</tr>
<tr>
<td>TREATMENT</td>
<td>/ / / / / / /</td>
<td></td>
</tr>
<tr>
<td>POSTTEST</td>
<td>n=30</td>
<td>n=29</td>
</tr>
</tbody>
</table>
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.

<table>
<thead>
<tr>
<th>Source of Variation</th>
<th>Degrees of Freedom</th>
<th>Sum of Squares</th>
<th>Mean of Squares</th>
<th>Adjusted</th>
<th>( MS_{grps} / MS_{error} )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between groups</td>
<td>1</td>
<td>A</td>
<td>A/1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Within (error)</td>
<td>57</td>
<td>B</td>
<td>B/57</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>58</td>
<td>C</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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:

\[ H_0: \bar{X}_{\text{Experimental}} = \bar{X}_{\text{Control}} \]

\[ H_a: \bar{X}_{\text{Experimental}} > \bar{X}_{\text{Control}} \]

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?

\[ H_0: \bar{X}_{\text{Experimental}} = \bar{X}_{\text{Control}} \]

\[ H_a: \bar{X}_{\text{Experimental}} > \bar{X}_{\text{Control}} \]
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?

\[ H_0: \text{There is no relationship between Trails and memory.} \]

\[ H_1: \text{As Trails scores improve, memory scores improve.} \]

\[ H_2: \text{As Trails scores worsen, memory scores worsen.} \]

\[ H_3: \text{As Trails scores improve, memory scores worsen.} \]

\[ H_4: \text{As Trails scores worsen, memory scores improve.} \]

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.
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

<table>
<thead>
<tr>
<th>Source</th>
<th>d.f.</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>SIG of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Composite Pretest</td>
<td>1</td>
<td>1157.725</td>
<td>1157.725</td>
<td>5.292</td>
<td>.025*</td>
</tr>
<tr>
<td>Group</td>
<td>1</td>
<td>4660.407</td>
<td>4660.407</td>
<td>21.303</td>
<td>.001**</td>
</tr>
<tr>
<td>Residual</td>
<td>56</td>
<td>12250.942</td>
<td>218.767</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>56</td>
<td>17838.949</td>
<td>307.566</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*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**

<table>
<thead>
<tr>
<th>Source</th>
<th>d.f.</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>SIG of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Trial Simple Recall Pretest</td>
<td>1</td>
<td>94.334</td>
<td>94.334</td>
<td>32.673</td>
<td>.001**</td>
</tr>
<tr>
<td>Group</td>
<td>1</td>
<td>9.016</td>
<td>9.016</td>
<td>3.123</td>
<td>.083</td>
</tr>
<tr>
<td>Residual</td>
<td>56</td>
<td>161.684</td>
<td>2.887</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>58</td>
<td>260.034</td>
<td>4.483</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**TOTAL TRIALS**

<table>
<thead>
<tr>
<th>Source</th>
<th>d.f.</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>SIG of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL Simple Recall Pretest</td>
<td>1</td>
<td>716.856</td>
<td>716.856</td>
<td>24.026</td>
<td>.001**</td>
</tr>
<tr>
<td>Group</td>
<td>1</td>
<td>437.818</td>
<td>437.818</td>
<td>14.674</td>
<td>.001**</td>
</tr>
<tr>
<td>Residual</td>
<td>56</td>
<td>1670.872</td>
<td>29.837</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>58</td>
<td>2894.847</td>
<td>49.911</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* 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

<table>
<thead>
<tr>
<th>Source</th>
<th>d.f.</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>SIG of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Word-word Pretest</td>
<td>1</td>
<td>18.481</td>
<td>18.481</td>
<td>2.630</td>
<td>.110</td>
</tr>
<tr>
<td>Group</td>
<td>1</td>
<td>72.548</td>
<td>72.548</td>
<td>10.324</td>
<td>.002*</td>
</tr>
<tr>
<td>Residual</td>
<td>56</td>
<td>393.523</td>
<td>7.027</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>58</td>
<td>476.678</td>
<td>8.219</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*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

<table>
<thead>
<tr>
<th>Source</th>
<th>d.f.</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>SIG of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Trial Simple Recall Pretest</td>
<td>1</td>
<td>90.823</td>
<td>90.823</td>
<td>20.187</td>
<td>.001**</td>
</tr>
<tr>
<td>Group</td>
<td>1</td>
<td>41.436</td>
<td>41.436</td>
<td>9.210</td>
<td>.004*</td>
</tr>
<tr>
<td>Residual</td>
<td>56</td>
<td>251.954</td>
<td>4.499</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>58</td>
<td>367.390</td>
<td>6.334</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Source</th>
<th>d.f.</th>
<th>SS</th>
<th>MS</th>
<th>F</th>
<th>SIG of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>TOTAL Simple Recall Pretest</td>
<td>1</td>
<td>963.235</td>
<td>963.235</td>
<td>16.831</td>
<td>.001**</td>
</tr>
<tr>
<td>Group</td>
<td>1</td>
<td>1020.726</td>
<td>1020.726</td>
<td>17.835</td>
<td>.001**</td>
</tr>
<tr>
<td>Residual</td>
<td>56</td>
<td>3204.959</td>
<td>57.231</td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL</td>
<td>58</td>
<td>5146.678</td>
<td>88.736</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* $p < .05$
** $p < .001$
<table>
<thead>
<tr>
<th>SUBTEST</th>
<th>EXP Means &amp; s.d.</th>
<th>CONTROL Means &amp; s.d.</th>
<th>ENTIRE Means &amp; s.d.</th>
<th>d.f.</th>
<th>Covariates MS</th>
<th>F</th>
<th>SIGNIFICANCE of F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple Recall 1st Trial</td>
<td>.87 .35</td>
<td>.61</td>
<td>1</td>
<td>94.33</td>
<td>32.67</td>
<td>.001**</td>
<td>2.40 1.78 2.12</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TOTAL trials</td>
<td>6.93 1.07</td>
<td>4.05</td>
<td>1</td>
<td>716.856</td>
<td>24.03</td>
<td>.001**</td>
<td>7.32 5.46 7.06</td>
</tr>
<tr>
<td>Digits Forward</td>
<td>.47 .38</td>
<td>.42</td>
<td>1</td>
<td>20.15</td>
<td>17.59</td>
<td>.001**</td>
<td>1.11 1.32 1.21</td>
</tr>
<tr>
<td>Digits Backward</td>
<td>.60 .31</td>
<td>.46</td>
<td>1</td>
<td>9.42</td>
<td>9.09</td>
<td>.004*</td>
<td>1.04 1.14 1.09</td>
</tr>
<tr>
<td>Recall with Interference</td>
<td>2.53 1.24</td>
<td>1.90</td>
<td>1</td>
<td>90.82</td>
<td>20.19</td>
<td>.001**</td>
<td>2.66 2.21 2.52</td>
</tr>
<tr>
<td>1st Trial</td>
<td>11.77 3.62</td>
<td>7.76</td>
<td>1</td>
<td>963.24</td>
<td>16.831</td>
<td>.001**</td>
<td>9.39 7.58 9.42</td>
</tr>
<tr>
<td>Paired Associates</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Word-Word</td>
<td>2.27 .17</td>
<td>1.24</td>
<td>1</td>
<td>16.48</td>
<td>2.63</td>
<td>.110</td>
<td>2.63 2.54 2.87</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Short Story</td>
<td>.83 .14</td>
<td>.49</td>
<td>1</td>
<td>85.23</td>
<td>10.74</td>
<td>.002*</td>
<td>3.24 2.84 3.04</td>
</tr>
<tr>
<td>Trails A</td>
<td>-5.17 -5.10</td>
<td>-5.14</td>
<td>1</td>
<td>2570.46</td>
<td>24.61</td>
<td>.001**</td>
<td>13.58 10.47 12.05</td>
</tr>
<tr>
<td>Trails B</td>
<td>-2.70 -19.79</td>
<td>-11.10</td>
<td>1</td>
<td>20692.68</td>
<td>26.64</td>
<td>.001**</td>
<td>24.98 39.47 33.74</td>
</tr>
</tbody>
</table>

*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 ($r = .2930$, $p < .05$) 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

<table>
<thead>
<tr>
<th>SOURCE</th>
<th>SIGNIF OF COMPOSITE PRETEST COVARIATE</th>
<th>d.f.</th>
<th>MS</th>
<th>F</th>
<th>SIGNIF OF F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>.013*</td>
<td>2</td>
<td>809.375</td>
<td>3.960</td>
<td>.025*</td>
</tr>
<tr>
<td>Age X Treatment</td>
<td></td>
<td>2</td>
<td>.197</td>
<td>.001</td>
<td>.999</td>
</tr>
<tr>
<td>Education</td>
<td>.013*</td>
<td>2</td>
<td>124.028</td>
<td>.554</td>
<td>.578</td>
</tr>
<tr>
<td>Ed X Treatment</td>
<td></td>
<td>2</td>
<td>206.983</td>
<td>.925</td>
<td>.403</td>
</tr>
<tr>
<td>Days since last drink</td>
<td>.042*</td>
<td>2</td>
<td>307.937</td>
<td>1.392</td>
<td>.258</td>
</tr>
<tr>
<td>Days X Treatment</td>
<td></td>
<td>2</td>
<td>56.472</td>
<td>.255</td>
<td>.776</td>
</tr>
<tr>
<td>Duration</td>
<td>.019*</td>
<td>2</td>
<td>266.592</td>
<td>1.191</td>
<td>.312</td>
</tr>
<tr>
<td>Duration X Treatment</td>
<td></td>
<td>2</td>
<td>79.303</td>
<td>.354</td>
<td>.703</td>
</tr>
<tr>
<td>Depression</td>
<td>.104</td>
<td>3</td>
<td>194.184</td>
<td>.857</td>
<td>.470</td>
</tr>
<tr>
<td>Depression X Treatment</td>
<td></td>
<td>3</td>
<td>122.133</td>
<td>.539</td>
<td>.658</td>
</tr>
<tr>
<td>WAIS-R IQ</td>
<td>.001**</td>
<td>3</td>
<td>389.216</td>
<td>5.874</td>
<td>.002*</td>
</tr>
<tr>
<td>IQ X Treatment</td>
<td></td>
<td>3</td>
<td>224.616</td>
<td>1.334</td>
<td>.274</td>
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</tbody>
</table>

* p < .05
** p < .001
### TABLE IX

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

<table>
<thead>
<tr>
<th>AGE</th>
<th>EXPERIMENTAL</th>
<th>CONTROL</th>
<th>ENTIRE POPULATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 30</td>
<td>29.20</td>
<td>12.50</td>
<td>21.78</td>
</tr>
<tr>
<td></td>
<td>17.88</td>
<td>16.70</td>
<td>18.89</td>
</tr>
<tr>
<td></td>
<td>n=10</td>
<td>n=8</td>
<td>n=18</td>
</tr>
<tr>
<td>30-40</td>
<td>19.09</td>
<td>3.92</td>
<td>11.17</td>
</tr>
<tr>
<td></td>
<td>11.73</td>
<td>14.36</td>
<td>15.02</td>
</tr>
<tr>
<td></td>
<td>n=11</td>
<td>n=12</td>
<td>n=23</td>
</tr>
<tr>
<td>&gt; 40</td>
<td>18.67</td>
<td>9.12</td>
<td>17.36</td>
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<td>n= 9</td>
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<td>n=18</td>
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</table>

### TABLE X

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

<table>
<thead>
<tr>
<th>EDUCATION (years)</th>
<th>EXPERIMENTAL</th>
<th>CONTROL</th>
<th>ENTIRE POPULATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;12</td>
<td>26.50</td>
<td>3.17</td>
<td>10.94</td>
</tr>
<tr>
<td></td>
<td>14.36</td>
<td>8.86</td>
<td>15.48</td>
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<td></td>
<td>n= 6</td>
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<tr>
<td>12</td>
<td>21.83</td>
<td>7.45</td>
<td>15.81</td>
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<td></td>
<td>16.14</td>
<td>17.92</td>
<td>18.11</td>
</tr>
<tr>
<td></td>
<td>n=18</td>
<td>n=13</td>
<td>n=31</td>
</tr>
<tr>
<td>&gt;12</td>
<td>19.67</td>
<td>2.50</td>
<td>12.80</td>
</tr>
<tr>
<td></td>
<td>20.99</td>
<td>15.61</td>
<td>20.12</td>
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<td>n= 6</td>
<td>n= 4</td>
<td>n=10</td>
</tr>
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**TABLE XI**

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

<table>
<thead>
<tr>
<th>DAYS SINCE LAST DRINK</th>
<th>EXPERIMENTAL</th>
<th>CONTROL</th>
<th>ENTIRE POPULATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;14</td>
<td>20.91</td>
<td>-.75</td>
<td>9.61</td>
</tr>
<tr>
<td></td>
<td>14.31</td>
<td>8.46</td>
<td>19.85</td>
</tr>
<tr>
<td></td>
<td>n=11</td>
<td>n=12</td>
<td>n=23</td>
</tr>
<tr>
<td>14-30</td>
<td>21.07</td>
<td>8.92</td>
<td>15.22</td>
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<td></td>
<td>16.31</td>
<td>17.81</td>
<td>17.82</td>
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<td></td>
<td>n=14</td>
<td>n=13</td>
<td>n=27</td>
</tr>
<tr>
<td>&gt;30</td>
<td>29.00</td>
<td>9.50</td>
<td>20.33</td>
</tr>
<tr>
<td></td>
<td>22.59</td>
<td>10.34</td>
<td>20.02</td>
</tr>
<tr>
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<td>n= 5</td>
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<td>n= 9</td>
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**TABLE XII**

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

<table>
<thead>
<tr>
<th>DURATION (years)</th>
<th>EXPERIMENTAL</th>
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<th>ENTIRE POPULATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;10</td>
<td>23.90</td>
<td>6.50</td>
<td>13.19</td>
</tr>
<tr>
<td></td>
<td>21.68</td>
<td>13.68</td>
<td>16.87</td>
</tr>
<tr>
<td></td>
<td>n=10</td>
<td>n=16</td>
<td>n=26</td>
</tr>
<tr>
<td>10-20</td>
<td>22.23</td>
<td>7.12</td>
<td>16.48</td>
</tr>
<tr>
<td></td>
<td>13.80</td>
<td>17.97</td>
<td>16.85</td>
</tr>
<tr>
<td></td>
<td>n=13</td>
<td>n= 8</td>
<td>n=21</td>
</tr>
<tr>
<td>&gt;20</td>
<td>20.28</td>
<td>-3.20</td>
<td>10.50</td>
</tr>
<tr>
<td></td>
<td>14.39</td>
<td>5.41</td>
<td>16.43</td>
</tr>
<tr>
<td></td>
<td>n= 7</td>
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### TABLE XIII

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

<table>
<thead>
<tr>
<th>DEPRESSION SCORES</th>
<th>EXPERIMENTAL</th>
<th>CONTROL</th>
<th>ENTIRE POPULATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 50 normal</td>
<td>16.00</td>
<td>4.00</td>
<td>9.71</td>
</tr>
<tr>
<td></td>
<td>16.88</td>
<td>17.49</td>
<td>17.86</td>
</tr>
<tr>
<td></td>
<td>n=10</td>
<td>n=11</td>
<td>n=21</td>
</tr>
<tr>
<td>50-59 mild</td>
<td>25.78</td>
<td>.75</td>
<td>14.00</td>
</tr>
<tr>
<td></td>
<td>14.89</td>
<td>9.14</td>
<td>17.70</td>
</tr>
<tr>
<td></td>
<td>n=9</td>
<td>n=8</td>
<td>n=17</td>
</tr>
<tr>
<td>60-69 moderate</td>
<td>29.37</td>
<td>9.83</td>
<td>21.00</td>
</tr>
<tr>
<td></td>
<td>17.38</td>
<td>8.59</td>
<td>17.08</td>
</tr>
<tr>
<td></td>
<td>n=8</td>
<td>n=6</td>
<td>n=14</td>
</tr>
<tr>
<td>&gt; 69 severe</td>
<td>14.33</td>
<td>9.00</td>
<td>11.28</td>
</tr>
<tr>
<td></td>
<td>11.50</td>
<td>20.17</td>
<td>15.99</td>
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<tr>
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<td>n=3</td>
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<td>n=7</td>
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TABLE XIV

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

<table>
<thead>
<tr>
<th>WAIS-R VOCABULARY IQ</th>
<th>EXPERIMENTAL</th>
<th>CONTROL</th>
<th>ENTIRE POPULATION</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 70 Borderline</td>
<td>19.33</td>
<td>2.83</td>
<td>11.08</td>
</tr>
<tr>
<td></td>
<td>14.21</td>
<td>6.79</td>
<td>13.67</td>
</tr>
<tr>
<td></td>
<td>n= 6</td>
<td>n= 6</td>
<td>n=12</td>
</tr>
<tr>
<td>70-89 Dull Normal</td>
<td>17.20</td>
<td>- .55</td>
<td>5.00</td>
</tr>
<tr>
<td></td>
<td>17.06</td>
<td>11.80</td>
<td>15.58</td>
</tr>
<tr>
<td></td>
<td>n= 5</td>
<td>n=11</td>
<td>n=16</td>
</tr>
<tr>
<td>90-110 Average</td>
<td>21.55</td>
<td>15.12</td>
<td>16.84</td>
</tr>
<tr>
<td></td>
<td>20.44</td>
<td>18.64</td>
<td>19.44</td>
</tr>
<tr>
<td></td>
<td>n=11</td>
<td>n= 8</td>
<td>n=19</td>
</tr>
<tr>
<td>&gt; 110 Bright</td>
<td>28.87</td>
<td>3.25</td>
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</tr>
<tr>
<td></td>
<td>11.51</td>
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</tr>
<tr>
<td></td>
<td>n= 8</td>
<td>n= 4</td>
<td>n=12</td>
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### TABLE XV

**PEARSON CORRELATION COEFFICIENTS**

<table>
<thead>
<tr>
<th>TRAILS A</th>
<th>TRAILS B</th>
<th>DIFF</th>
<th>IQ</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRAILS A</td>
<td>1.000</td>
<td>.3049 *</td>
<td>-.1609</td>
</tr>
<tr>
<td></td>
<td>p=.009</td>
<td>p=.085</td>
<td>p=.226</td>
</tr>
<tr>
<td>TRAILS B</td>
<td>.3049 *</td>
<td>1.000</td>
<td>.0873</td>
</tr>
<tr>
<td></td>
<td>p=.009</td>
<td>p=.255</td>
<td>p=.262</td>
</tr>
<tr>
<td>COMPOSITE</td>
<td>-.1809</td>
<td>.0873</td>
<td>1.000</td>
</tr>
<tr>
<td>DIFF</td>
<td>p=.085</td>
<td>p=.255</td>
<td>p=.012</td>
</tr>
<tr>
<td>IQ</td>
<td>.0996 *</td>
<td>.0846</td>
<td>.2930 *</td>
</tr>
<tr>
<td></td>
<td>p=.226</td>
<td>p=.262</td>
<td>p=.012</td>
</tr>
</tbody>
</table>

* *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 is 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 individualization 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


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 attendant 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 attendant 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 no monetary compensation for your participation in this study.
   (2) There are no 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.
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.
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### SHORT STORY

**Acquisition**

- Friday
- April
- Massachussets
- 4 hour alarm
- five
girls
- (the) Belmont
- House
- (on) Winslow
- Street
- taking
- fourteen
- people
- (and) arriving
- hour
- (under the) residents

**Recall**

- Monday
- April
- Massachussets
- 4 hour alarm
- five
girls
- (the) Belmont
- House
- (on) Winslow
- Street
- taking
- fourteen
- people
- (and) arriving
- hour
- (under the) residents

### PAIRED WORDS

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### INCIDENTAL LEARNING

- **General Information**
  - Free
  - Items
  - Numbers
  - Short
  - Pairs

- **Administration**
  - Total: 2 (1st rec)
  - Total: 2 (2nd rec)
  - Total: 2 (3rd rec)
  - Total: 2 (4th rec)
  - Total: 2 (5th rec)
  - Total: 2 (6th rec)
  - Total: 2 (7th rec)
  - Total: 2 (8th rec)

### REMARKS

- **Test score: 111**
- **Date: 3/17/71**
- **General Information**
  - Total: 2 (1st rec)
  - Total: 2 (2nd rec)
  - Total: 2 (3rd rec)
  - Total: 2 (4th rec)
  - Total: 2 (5th rec)
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**Return to Paired Words**

**Return to Short Story**

**Return to Five Items**

**Return to Paired Words**

**Return to Short Story**

**Return to Five Items**

**Return to Paired Words**

**Return to Short Story**

**Return to Five Items**
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 application that in both paired words and the two later sessions, the examiner says the words in the order of recall. (Module 7) The test battery is open.

Module 1: GENERAL INFORMATION

INSTRUCTIONS FOR EXAMINERS

An introduction is given to the Memory Test, the test is divided into three parts: the Memory Test, the Paired Words Test, and the Paired Words Test (Module 7).

Module 2: FIVE ITEMS

INSTRUCTIONS FOR EXAMINERS

The instructions for examiners are divided into three parts: the Memory Test, the Paired Words Test, and the Paired Words Test (Module 7).

Module 3: PAIRED WORDS

INSTRUCTIONS FOR EXAMINERS

The instructions for examiners are divided into three parts: the Memory Test, the Paired Words Test, and the Paired Words Test (Module 7).

Module 4: SHORT STORY

INSTRUCTIONS FOR EXAMINERS

The instructions for examiners are divided into three parts: the Memory Test, the Paired Words Test, and the Paired Words Test (Module 7).

Module 5: PICTURE RECOGNITION

INSTRUCTIONS FOR EXAMINERS

The instructions for examiners are divided into three parts: the Memory Test, the Paired Words Test, and the Paired Words Test (Module 7).

Module 6: INCIDENTAL LEARNING

INSTRUCTIONS FOR EXAMINERS

The instructions for examiners are divided into three parts: the Memory Test, the Paired Words Test, and the Paired Words Test (Module 7).

Module 7: FURTHER INSTRUCTIONS

INSTRUCTIONS FOR EXAMINERS

The instructions for examiners are divided into three parts: the Memory Test, the Paired Words Test, and the Paired Words Test (Module 7).

Module 8: ADDED INFORMATION

INSTRUCTIONS FOR EXAMINERS

The instructions for examiners are divided into three parts: the Memory Test, the Paired Words Test, and the Paired Words Test (Module 7).
PILOT STUDY DATA: from NEW YORK MEMORY TEST

(Scores reported as percentage of subtest total.)

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# DOOKS MEMORY TEST

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<th>SUBTESTS</th>
<th>JULY (N=17)</th>
<th>AUGUST (N=13)</th>
<th>OCTOBER (N=15)</th>
<th>NOVEMBER (N=14)</th>
<th>NORMALS (N=10)</th>
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<td>5.9231</td>
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<td>6.4667</td>
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<tr>
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<td>4.5385</td>
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<tr>
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<td>+3.1317</td>
<td>10.0000</td>
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| N = 59                                |            |               |                |                 |                |
| X AGE = 34.1724                       |            |               |                |                 |                |
| X EDUCATION = 11.8103                 |            |               |                |                 |                |

| N = 10                                |            |               |                |                 |                |
| X AGE = 31.8                          |            |               |                |                 |                |
| 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

SIMPLE RECALL w/ INTERFERENCE
Count back from 100 by 3's for 30'
cat  pliers  hose  fork  shadow  book  boat  carrot  bat  pencil

SIMPLE RECALL
fence  carpet  knife  broom  storm  hat  moon  plane  duck  tomato

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  north - south rose  school - grocery baby

PAIRED ASSOCIATES-PICTURE/WORD

FORWARD  BACKWARD
286   64
582 . . . . 3 73 . . . . 2
3698  976
4957 . . . 4 572 . . . . 3
82761. . 7294
25437. . . 5 7543. . . . 4
<1357  86497
852974 . . 6 96574 . . . 5
3815946 . 632971
1924853. . . 7 318492. . . 6
39824371  1657482
14398752. . 8 2739614 . . . 7
916832475 . 62193547
192873546 . . 9 96235481. . 8

FORWARD  BACKWARD
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  18 chair  foot  10 hat

SHORT STORY
Monday  Marcn  fourth  Denver  Colorado  blizzard  buried  (the) Rackett Airport  (on) Billings Road  ** standing  sixty  travelers  (and) trapping  eight  children  (plus) twenty  policemen

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  18 chair  foot  10 hat

DOOKS MEMORY TEST
DOOKS MEMORY TEST

### SIMPLE RECALL w/ INTERFERENCE

**SHORT STORY**

Count back from 100 by 3's for 30 secs

- napkin
- tie
- cloud
- boat
- fox
- car
- snake
- tire

**PAIRED ASSOCIATES-WORDS**

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

**DIGIT SPAN**

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<tr>
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<th>Backward</th>
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<tr>
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<td>521</td>
<td>16</td>
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<td>9615</td>
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</tbody>
</table>

**VISUAL MEMORY**

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

**FORM B**
TRAILMAKING A

Begin 1  24

End 25

15  17  21

16  18  19

5  6

13

14

7  10  2

8

12  11

9

3

23

22
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>1.</td>
<td>I feel down-hearted and blue.</td>
<td></td>
<td></td>
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<tr>
<td>2.</td>
<td>Morning is when I feel the best.</td>
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<tr>
<td>3.</td>
<td>I have crying spells or feel like it.</td>
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<tr>
<td>4.</td>
<td>I have trouble sleeping at night.</td>
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<tr>
<td>5.</td>
<td>I eat as much as I used to.</td>
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<tr>
<td>6.</td>
<td>I still enjoy sex.</td>
<td></td>
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<tr>
<td>7.</td>
<td>I notice that I am losing weight.</td>
<td></td>
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<tr>
<td>8.</td>
<td>I have trouble with constipation.</td>
<td></td>
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<tr>
<td>9.</td>
<td>My heart beats faster than usual.</td>
<td></td>
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<tr>
<td>10.</td>
<td>I get tired for no reason.</td>
<td></td>
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<tr>
<td>11.</td>
<td>My mind is as clear as it used to be.</td>
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<tr>
<td>12.</td>
<td>I find it easy to do the things I used to.</td>
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<td></td>
<td></td>
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<tr>
<td>13.</td>
<td>I am restless and can't keep still.</td>
<td></td>
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<tr>
<td>15.</td>
<td>I am more irritable than usual.</td>
<td></td>
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<tr>
<td>16.</td>
<td>I find it easy to make decisions.</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>17.</td>
<td>I feel that I am useful and needed.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18.</td>
<td>My life is pretty full.</td>
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<tr>
<td>19.</td>
<td>I feel that others would be better off if I were dead.</td>
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<td></td>
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<tr>
<td>20.</td>
<td>I still enjoy the things I used to do.</td>
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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? ________
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 sub-test? 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 will 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 true 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 again 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 going 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 page 111; 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., write 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 page113). 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 page119). 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 remembering 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 E. 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" (Page 118). 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 page112]. 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 page112]. 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 page112]. 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 people 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 Progressive 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 you to think of an association with your 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 about 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.
APPENDIX F: PRACTICE EXERCISES

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 ridiculous (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

<table>
<thead>
<tr>
<th>A</th>
<th>B</th>
<th>C</th>
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<tbody>
<tr>
<td>baseball</td>
<td>money-table</td>
<td>ice cream freezer</td>
</tr>
<tr>
<td>star</td>
<td>beggar-coffee</td>
<td>light bulbs</td>
</tr>
<tr>
<td>statue</td>
<td>railroad-reptile</td>
<td>keys made</td>
</tr>
<tr>
<td>beverage</td>
<td>anger-phantom</td>
<td>plant food</td>
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<tr>
<td>settler</td>
<td>volume-moisture</td>
<td>dead bolt</td>
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<tr>
<td>murderer</td>
<td>fire-passageway</td>
<td>car wax</td>
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<tr>
<th>D</th>
<th>E</th>
<th>F</th>
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<tbody>
<tr>
<td>arm</td>
<td>hammer-alligator</td>
<td>go to kitchen</td>
</tr>
<tr>
<td>rat</td>
<td>orchestra-water</td>
<td>get a glass of water</td>
</tr>
<tr>
<td>ear</td>
<td>tree-candy</td>
<td>sit down in the living room</td>
</tr>
<tr>
<td>dog</td>
<td>nail-girl</td>
<td>start reading a book</td>
</tr>
<tr>
<td>rain</td>
<td>doctor-lake</td>
<td>get up to answer the doorbell</td>
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<tr>
<td>bear</td>
<td>policeman-house</td>
<td>take the mail from the mailman</td>
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<tr>
<td>wood</td>
<td>fisherman-magazine</td>
<td>go for a walk</td>
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<tr>
<td>bird</td>
<td>lemon-fox</td>
<td>talk to a neighbor</td>
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<tr>
<td>saw</td>
<td>microscope-harp</td>
<td>pet a dog</td>
</tr>
<tr>
<td>cat</td>
<td>horse-missile</td>
<td>go home again</td>
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<tr>
<th>G</th>
<th></th>
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<tbody>
<tr>
<td>BN (bone)</td>
<td>T.V.</td>
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<tr>
<td>PT (pot)</td>
<td>chalkboard</td>
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<td>SK (sucker)</td>
<td>window</td>
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<td>FX (fox)</td>
<td>table</td>
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<tr>
<td>TR (tree)</td>
<td>door</td>
</tr>
<tr>
<td>MS (mess)</td>
<td>chair</td>
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<tr>
<td>KAJ (cage)</td>
<td>T.V.</td>
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<tr>
<td>ROX (rocks)</td>
<td>planter</td>
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<tr>
<td>ZYL (seal)</td>
<td>chair</td>
</tr>
<tr>
<td>XAC (sack)</td>
<td>chair</td>
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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.
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

(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

<table>
<thead>
<tr>
<th>NAMES</th>
<th>NO MEANING</th>
</tr>
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<tbody>
<tr>
<td>MEAN SOMETHING</td>
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</tr>
<tr>
<td>Cook</td>
<td>Kraukauer</td>
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<td>Brown</td>
<td>Conti</td>
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<td>Coyne</td>
<td>Sullivan</td>
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<td>Carson</td>
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<td>Storm</td>
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<td>Shivers</td>
<td>Resnick</td>
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<td>King</td>
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<tr>
<td>Gold</td>
<td></td>
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<tr>
<td>Suggest a Picture</td>
<td></td>
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<tr>
<td>John L. Sullivan</td>
<td></td>
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<tr>
<td>Abraham Lincoln</td>
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<tr>
<td>River Jordan</td>
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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.

ABSENTMINDENESS
You are ABSENTMINDENED 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 diaphragm 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.


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 HORSERUNNING 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. SHELVES CHILDREN'S 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 STATUE 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.

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