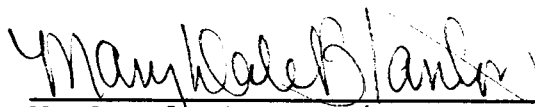


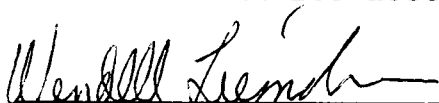
To the Graduate Council:

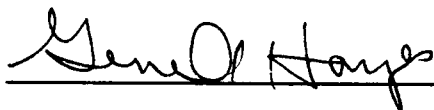
I am submitting herewith a thesis written by Martha Louise Donahue entitled "The Effectiveness of Selected Recreation Activities in the Rehabilitation of Visual Retention." I have examined the final copy of this thesis for form and content and recommend that it be accepted in partial fulfillment of the requirements for the degree of Master of Science, with a major in Recreation.



M. D. Blanton, Major Professor

We have read this thesis
and recommend its acceptance:







Accepted for the Council:



Vice Provost
and Dean of The Graduate School

STATEMENT OF PERMISSION TO USE

In presenting this thesis in partial fulfillment of the requirements for a Masters degree at the University of Tennessee, Knoxville, I agree that the Library shall make it available to borrowers under the rules of the Library. Brief quotations from this thesis are allowable without special permission, provided that accurate acknowledgement of the source is made.

Permission for extensive quotation from or reproduction of this thesis may be granted by my major professor, or in her absence, by the Head of Interlibrary Services when, in the opinion of either, the proposed use of the materials is for scholarly purposes. Any copying or use of material in this thesis for financial gain shall not be allowed without my written permission.

Signature M. Louise Donahue

Date May 14, 1988

THE EFFECTIVENESS OF SELECTED RECREATION
ACTIVITIES IN THE REHABILITATION OF VISUAL RETENTION

A Thesis
Presented for the
Master of Science
Degree
The University of Tennessee, Knoxville

Martha Louise Donahue

June 1988

DEDICATED TO MOMMA

THANK YOU FOR YOUR LOVE AND SUPPORT

ACKNOWLEDGMENTS

Special thanks goes to Dr. Mary Dale Blanton for her continuous enthusiasm and support throughout the entirety of this study. Appreciation is extended to Dr. Gene Hayes, Dr. Wendell Liemohn, and Alfred Kaye for their guidance and assistance in completion of this project. I would also like to thank the patients and staff of The Patricia Neal Rehabilitation Center for their cooperation, especially to the Recreation Therapy Department and the Psychology Department for their supportive and laborious efforts. Sincere thanks go to my family and friends for their constant support, encouragement, and patience throughout the trials, tribulations, and triumphs of the study.

ABSTRACT

Many persons in our society suffer from cerebrovascular accident and traumatic brain injury each year. Brain damage can result in severe functional deficits including a visual memory impairment. Games have been used as a learning medium for years and are used in the rehabilitation of persons suffering from traumatic brain injury.

It was the purpose of this study to determine the effectiveness of selected recreation activities in the treatment of visual retention of clients functioning at a level five or above on The Rancho Los Amigos Cognitive Functioning Scale. Sub-problems included

1. Determining the criteria for selection of recreational activities based on approval from the jury.
2. Selection of the battery of manufactured table games.

For the study, participants consisted of right cerebrovascular accident and traumatic brain injury patients at The Patricia Neal Rehabilitation Center who were functioning at a level five or above on The Rancho Los Amigos Cognitive Functioning Scale. Fourteen patients participated and were randomly assigned to either a control group or an experimental group.

The Revised Visual Retention Test was given as a pre-test and post-test with ten therapy sessions administered between testings. Treatment consisted of a battery of three manufactured table games which were selected according to components of activity analysis deemed pertinent to the study by a jury of therapeutic recreation professionals. The games chosen were Simon, Math Lotto, and Colorado.

Results of this study did not support the use of manufactured table games in the rehabilitation of visual retention. Statistical analysis revealed no significant differences between the post-test scores of the control group and treatment group.

Recommendations for further research include replication of this study with a larger number of subjects, a longer treatment time, a different measure of performance, and a more extensive activity analysis to ensure that the most effective games are selected. It is also recommended that research be done in the area of therapeutic recreation to determine the most effective treatment modalities in the rehabilitation of common disabling conditions and their consequences.

TABLE OF CONTENTS

CHAPTER	PAGE
I. INTRODUCTION.	1
Rationale for the Study.	3
Problem Statement.	4
Hypothesis	4
Delimitations of the Study	5
Limitations of the Study	5
Assumptions of the Study	6
Definition of Terms.	6
II. REVIEW OF RELATED LITERATURE.	9
Introduction	9
Facility	9
Population	10
Memory	13
Games.	18
<u>Revised Visual Retention Test.</u>	25
<u>The Rancho Los Amigos Cognitive</u>	
<u>Functioning Scale.</u>	29
III. METHODOLOGY	31
Population	31
Sample	32
Instrumentation.	34
Criteria for Determining	
Selected Recreational Activities	35
Selection of Jury.	35
Selection of Manufactured	
Table Games.	35
Administration of the Instrument	36
Analysis of Data	38
IV. RESULTS	39
Introduction	39
t-Test	40
Discussion	43
V. CONCLUSIONS AND RECOMMENDATIONS	46
Introduction	46
Conclusions.	46
Recommendations.	48

CHAPTER	PAGE
REFERENCES	50
APPENDICES	57
APPENDIX A.	58
APPENDIX B.	65
APPENDIX C.	68
APPENDIX D.	72
APPENDIX E.	75
APPENDIX F.	77
APPENDIX G.	84
VITA	88

CHAPTER I

INTRODUCTION

Many persons are affected by brain damage as the result of stroke and traumatic brain injury each year. "Nearly two million persons in the United States have been afflicted by stroke" (Sister Kenny, 1978). There are

. . . nearly 8 million recorded head injuries annually in the United States, the vast majority are mild to moderate in severity, with many more mild injuries going unreported (Conboy, 1986).

Brain damage, whether the consequence of trauma or cerebrovascular accident, can produce severe deficits. Disabling conditions vary according to the hemisphere which is injured. Damage to the right hemisphere can result in a number of disabling conditions including a visual memory disturbance which can impair the person's ability to function independently in society. Damage to the right hemisphere may significantly affect the visual and spatial realms of the individual. Functions of the right hemisphere generally include reading comprehension, prosodic expression and comprehension, visual memory, and facial recognition among others (Burns, 1985 and Wittrock, 1977). Hence this study recognized that visual memory tasks are usually a function of the right hemisphere and used persons who have experienced damage to the right hemisphere as the result of cerebrovascular accident or

traumatic brain injury to test the effectiveness of selected recreation activities in the rehabilitation of visual retention.

"The idea of the playing of games as a desirable learning medium has been traced to the ancient Egyptians" (Humphrey, 1970). Therapeutic recreation specialists recognize the potential value of using recreation activities in the rehabilitation process. Therapeutic recreation specialists use leisure activities as a treatment modality or intervention strategy to reach a final goal or objective. Each activity is prescribed on an individual basis and is adapted to the abilities of the individual.

This therapeutic use of recreational activities is a well-planned process that includes assessing the client's functional problem, stating a treatment goal, selecting appropriate activities, and selecting an interaction or intervention style (Gunn, 1978).

However,

. . . the therapeutic process is not a scientifically administered regimen where in cause and effect relationships are absolutely defined. Sometherapeutic procedures are practiced although the reasons for their effectiveness are not understood. Likewise there is a great deal known about how recreational activities are performed, administered, and organized, but not why they appear to have beneficial effects upon those who are exposed to them (Shivers, 1975).

This was a study of the effectiveness of selected recreation activities in the rehabilitation of visual

retention and was concerned with the short-term visual memory processes of persons who have been affected by traumatic brain injury and cerebrovascular accidents of the right hemisphere.

Rationale for the Study

Many persons who suffer from head trauma and right cerebrovascular accident report disturbance in memory (Levin, 1982; Wilson, 1987; Burns, 1985; Brooks, 1984; Conboy, 1986; Sister Kenny, 1978; and Stroke: Why Do They Behave That Way, 1974). Impaired memory can greatly inhibit an individual's ability to function in society. Therefore rehabilitation of memory is an important aspect of recovery from brain damage.

Games are commonly used in the rehabilitation of persons with brain damage (Kaye, 1988). However, very little information is presently available on the effects of recreation activities on persons suffering from disabilities as the result of damage to the brain. There appears, therefore, to be a need to determine if a significant relationship exists between the use of recreation activities as a treatment modality and the rehabilitation of persons who have experienced damage to the brain. In short, research is needed to determine if

recreation activities have an affect on the recovery process.

This study attempted to determine if recreation activities have an effect in the rehabilitation process. Specifically, this study focused on the effectiveness of selected manufactured table games in the rehabilitation of visual retention.

Problem Statement

It was the purpose of this study to determine the effectiveness of selected recreation activities in the treatment of visual retention of clients functioning at a level five or above on The Rancho Los Amigos Cognitive Functioning Scale (See Appendix A for description).

Sub-problems included:

1. Determining the criteria for selection of recreational activities based on approval from the jury.
2. Selection of the battery of manufactured table games.

Hypothesis

There will be no significant difference between the experimental group and control group in the number correct and the number of errors post-test visual retention scores

as measured by the Revised Visual Retention Test at the $\alpha = 0.10$ level.

Delimitations

The delimitations of the study were:

1. The use of three selected manufactured table games as defined in this study.
2. The criteria used to determine game selection.
3. Subjects who were patients at the Patricia Neal Rehabilitation Center.
4. Subjects at Patricia Neal Rehabilitation Center who were appropriate for and willing to participate in the study.
5. Adult clients age sixteen and over who were functioning at a level five or above on The Rancho Los Amigos Cognitive Functioning Scale (Appendix A).

Limitations

The study was limited by:

1. Variable deficits of the patients other than cognitive functioning due to the cerebrovascular accident or head trauma.
2. Census of the hospital during the time frame the study was performed.

3. Therapy scheduling conflicts which influenced the continuity of the study.

Assumptions of the Study

The assumptions of the study were:

1. The Revised Visual Retention Test is a valid instrument.
2. The subjects understood the directions given.
3. Participation will have an effect on visual retention.

Definition of Terms

For the purpose of this study the following definitions were used:

Recreation Therapy

Those directed experiences immediately concerned with enabling the fullest possible recovery of a person within a treatment milieu or as those activities designed to sustain health through satisfying achievement and adapted to the restrictions of a mental or physical affliction (Shivers, 1975).

Recreation therapy is one facet of the therapeutic recreation profession, therefore inclusion of recreation therapy is implied in any reference made to therapeutic recreation or therapeutic recreation services throughout this study.

Brain Trauma

Injury to the head, especially to the scalp and cranium. The injury may be limited to soft tissue damage or may include the cranial bones and the brain (Thomas, 1985).

Cerebrovascular Accident

A condition in which the brain does not receive a sufficient supply of oxygen and nutrients as the result of a cerebral hemorrhage, cerebral embolism, or cerebral thrombosis (Learning About Stroke, 1982).

Rehabilitation

A personalized process which attempts to minimize or obliterate the effects of any disability and its residual potential handicap while simultaneously making possible the optimal restoration of the disabled person (Shivers, 1975).

Visual Retention

The ability to reproduce or recall what has been visually processed as measured by the Revised Visual Retention Test (Benton, 1974).

Selected Manufactured Table Games

Commercially manufactured table top games which are selected based on the suggestion of the jury to be used for individual (1:1) treatment.

Activity Analysis

Focuses on determining the inherent characteristics of activities. It enables greater comprehension of participation requirements and gives insight into the dynamics of activity involvement (Peterson, 1984).

Level Five

(Confused, Inappropriate) - The patient at this or a greater level can follow a simple command, one or two

steps, with relative ease. Requires a great deal of external support and structure to complete more complex tasks. Distractibility is quite high and focusing on complex cognitive tasks is difficult. Memory is generally impaired and initiation of activity is quite low. Interactions with others are at an automatic level and generally appropriate. Confusion with novel tasks may be quite high, though these may be completed with high levels of structure. Responses are generalized best to body, self, comfort and family members. To complete ADLS (activities of daily living), the patient requires a great deal of supervision. As the ranchos level increases, cognitive and behavioral function increases proportionally. This suggests decreasing cognitive impairment and increasing social and behavioral independence, with independent self care and decreased supervision required. At approximately level VII (automatic-appropriate) and VIII (purposeful and appropriate) independent living with some external structure becomes feasible. Even at these levels, impairment of judgment and insight are evident. Socialization may be mildly impaired, but behavior is generally well controlled and appropriate (Pendergrass, 1987).

For additional medical terminology see Appendix B.

CHAPTER II

REVIEW OF RELATED LITERATURE

Introduction

This study was concerned with the effectiveness of selected recreation activities on the visual retention (memory) of persons suffering from brain injury and right cerebrovascular accident. Several factors have been discussed in relation to this study. This chapter was a review of literature related to (a) the facility, (b) population involved, (c) the memory process, (d) rehabilitative potential of table games, (e) the Revised Visual Retention Test, and (f) The Rancho Los Amigos Cognitive Functioning Scale.

Facility

The Patricia Neal Rehabilitation Center at Fort Sanders Regional Medical Center located in Knoxville, Tennessee, is a sixty bed attached physical medicine rehabilitation unit. It is part of Fort Sanders Regional Medical Center, a private nonprofit hospital. The center provides twenty-four hour nursing services, physical therapy, occupational therapy, recreation therapy, psychological services, social services, vocational evaluation, speech, dietary, and on-call physicians. The

services operate in an inter-disciplinary program designed to meet the individual treatment goals of the patient. Patricia Neal Rehabilitation Center serves primarily the East Tennessee region and surrounding states. The facility serves individuals who have suffered a physical trauma or neurological disorders as associated under physical medicine. The population primarily consists of persons affected by traumatic brain injury, spinal cord injury, and cerebrovascular accident.

The Recreation Therapy Department at The Patricia Neal Rehabilitation Center program focus includes treatment of disability for functional improvement, leisure education, community reintegration, diversionary activities, and fun. Primarily the Recreation Therapy Department is treatment oriented.

The Philosophy of the Recreation Therapy Department is to provide meaningful avocational/leisure experiences for each patient with purposeful intervention to produce desired changes and outcomes through the concomitant effect of a prescribed recreation activity. The Recreation Therapy Department concurs with the Philosophical Statement of the National Therapeutic Recreation Society (Patricia Neal Rehabilitation Center, 1987 Manual).

Population

The two most frequent disorders seen in rehabilitation settings are "cerebrovascular accident (CVA) and closed head injury (CHI) patients" (Thomas,

1982). There are many causes of head injuries; examples of which are falls, moving vehicles, blows, and penetrating wounds. Anytime the head is jarred, significant damage can occur to the brain, brain stem, skull, meninges, vascular system, and ventricular system. The severity of the trauma is related to the type of injury and to the position of the injury in relation to the cranium.

There are two general categories of brain damage. The first is primary brain damage which "occurs at the time of injury, is the result of distinctive mechanical factors, and is seldom affected by treatment" (Brooks, 1984). Secondary brain damage is "a consequence of a complication and is potentially preventable or reversible with treatment" (Brooks, 1984) and may delay improvement.

Common complaints following head injury include headache, dizziness, impaired memory, absentmindedness, mental and physical fatigue, inability to concentrate, difficulty in problem solving, irritability, insomnia, short attention span, slowness of movement, visual spatial disturbance, impulsiveness, and irritability (Levin, 1982; Conboy, 1986). Levin states "loss of memory for events after trauma or disease onset, is probably the most consistent clinical feature of closed head injury" (Levin, 1982). Individuals suffering from head trauma may not remember events immediately prior to and events

immediately following the trauma. The patient will "usually have a much harder time remembering and learning new things" (Marshall, 1981). Grasping new ideas may be very difficult for the individual. Memory disturbance tends to remain after the initial phase of injury and may result in a permanent disabling condition (Brooks, 1983 and Wilson, 1987).

A stroke results when the brain does not receive a sufficient supply of oxygen and nutrients. Consequently, those brain cells which do not receive oxygen die or are damaged. The cerebrovascular accident may be the result of a cerebral hemorrhage, cerebral embolism, or cerebral thrombosis. If permanent damage has occurred, this can not be altered. However, surrounding areas may recover. When the right hemisphere is affected, visual perceptual memory is often impaired. As with the individuals who suffer from traumatic brain injury, right cerebrovascular accident victims also tend to have more disturbance in recent memory than in prior memory. Cerebrovascular accidents may result in difficulty in problem solving, learning new things, and thinking in abstract terms. "Patients with memory problems also often have a decrease in the ability to generalize" from one situation to another (Stroke: Why Do They Behave That Way, 1974).

Memory

Brain damage, whether as the result of trauma or of cerebrovascular disease, can result in many physical, neurological, cognitive, and mental manifestations of disability. Anytime the brain is damaged, memory deficits are a possibility. "Almost any injury to the brain, however minimal, produces memory problems" (Stroke: Why Do They Behave That Way?, 1974). "Cerebral injury or disease is the most frequent determinant of defective performance in visual-memory" (Benton, 1974). Memory disturbance can greatly impair a person and limit his/her ability to function independently in society. According to Miller,

Disturbances of memory are probably the most commonly encountered form of neuropsychological impairment and they can be extremely handicapping to the individuals who suffer them (Miller, 1984).

Memory is a complicated phenomena involving several processes and is not fully understood. Mossman states:

Memory is a cerebral recording of previous experiences which allows our present to take advantage of our past with a system whose complexity still defies explanation

 "Reception, registration, retention and recall" are involved (Mossman, 1976).

If any of these four processes do not function properly, independently or cooperatively, memory will be impaired (Mossman, 1976).

Memory can be extremely susceptible to impairment when damage occurs to the right hemisphere of the brain (Levin, 1982; Burns, 1985). Two of the most frequent causes of memory disturbance are head injury and cerebral vascular disorder (Wilson, 1987). As previously stated, memory impairment affects the ability to learn and to generalize. Memory impairment affects other aspects of the person's ability to function as well. It limits the level of independence which the person may achieve as a direct result of the effect vocationally and socially. Memory impairments last longer and recover slower than other cognitive functions (Brooks, 1983). "Recent memory is far more sensitive to loss than remote memory" (Mossman, 1976). The present study focuses on the rehabilitation of recent memory otherwise known as short-term memory retention.

Memory function does not have a specific location in the brain (Hart, 1975). There are several theories and models regarding memory functions and processes such as long term versus short term memory, storage versus retrieval, encoding, memory sensitivity, dichotomous organization, schemata, single replica model, conscious versus self-conscious, recognition versus recall, and the role of the hippocampi (Brooks, 1983; Popper, 1977; Baine, 1986; Salmon, 1987). The present study did not expound on the theoretical aspects of memory operation processes.

Instead, it was recognized that memory disturbance often results from damage to the right hemisphere of the brain either by trauma or cerebrovascular accident. Further an attempt was made to give support for the use of selected recreation activities in the rehabilitation of the memory impairment. Maximizing the potential of an individual is always the goal of the rehabilitation team.

Rehabilitation of memory functioning presents an interesting challenge. Recovery of memory processing has definite implications for vocational adjustment as well as the ability to achieve independence. Memory skills are necessary for activities of daily living and socialization. Memory disturbance can significantly impair an individual educationally, socially, vocationally, and in activities of daily living (Levin, 1982). Memory disturbance also makes the acquisition of new skills difficult. "Lack of memory is a key issue because teaching / learning interactions cannot occur in the absence of short-term memory skills" (Baggerly, 1986). Therefore it is important that the individual achieve his/her maximum potential in the rehabilitation process.

For rehabilitation to be most effective, three points must be kept in mind:

1. Rehabilitation must begin as soon . . . as possible;
2. The family can be the patient's most important means of support during the rehabilitative process;

3. Rehabilitation is a team effort with the physician, nurse, and other specialists working with the patient and his family (Strokes A Guide for the Family, 1981).

The rehabilitation process varies with the individual. Since each patient is different and has specific needs, the objectives and techniques of rehabilitation are individualized.

Each case is different and must be approached with the patient's premorbid personality and intellectual resources, present needs, motivation, and other factors in mind (Conboy, 1986).

The prognosis and the severity of the trauma is related to the type of injury, and to the location of the injury.

"Older, less educated individuals appear to be at higher risk for slow recovery and possible permanent disability" (Conboy, 1986). The age of the person at the time of injury will influence the degree of recovery. Impairing conditions persist more frequently as the age of the individual increases (Conboy, 1986).

Rehabilitation efforts are most effective within the first six months after the cerebrovascular accident or traumatic brain injury has occurred. "Short periods of treatment, 10 to 15 minutes, are most effective" in the rehabilitation process (Wahlstrom, 1983). The environment should be quiet in order to reduce any distractions. Also the brain injured patient tires easily both mentally and physically.

Attempts to train the patient in areas in which learning ability is significantly impaired, or to bombard the patient with more material than can be effectively processed, will necessarily be doomed to failure" (Lezak, 1987).

Recovery varies with each individual. The patient may show "a rapid return to full functioning, others a slower progression toward the same result, and some patients never reaching their premorbid level" (Brooks, 1984). "Memory recovers slowly compared with other cognitive functions, and even at the end of a 2-year period, many patients are still complaining of memory difficulties" (Brooks, 1984). The goal of the rehabilitation process is to aid the patient in achieving the fullest possible recovery.

Recreation Therapy generally assumes three roles in the rehabilitation program. First recreation activities can be a treatment modality and used to facilitate the accomplishment of preset goals and objectives. Secondly, Recreation Therapy encourages successful community reintegration by training the patient for community accessibility and also by introducing the patient to resources and facilities which are available in the individual's home community. The third role of the therapeutic recreation specialist in the rehabilitation process is to promote a nonthreatening conducive environment for the total rehabilitation experience through

the use of diversionary activities in a fun atmosphere for the clients.

"Assisting the client in a more rapid rehabilitation or recuperation is the process's single most important goal" (Shivers, 1975). The Recreation Therapy program should be designed to facilitate physical, behavioral, emotional, and cognitive functioning. "On the basis of the physician's diagnosis and recommendation, the recreationist develops a program of activity which should have a therapeutic value for the patient" (Shivers, 1975). The therapeutic recreation specialist decides which activities are most appropriate and beneficial to the patient.

Games

Throughout history, human beings have demonstrated their awareness of the physical and mental good deriving from wholesome physical and mental activity. Ancient chronicles of Egypt, Greece, and Rome are replete with salutes to the value of dance, drumming, extension, gymnastics, weight training, running, swimming, and combat sports. Similarly, the cultures of Central and South America, the Aztecs, Mayans, and Toltecs of Mexico, and the Zulus, Basutos, and Swazis of Africa all recorded the therapeutic effects of music, aromas, the touch of sympathetic hands, the reading of ancestral testaments and the setting down of life's beauties and mysteries in picture and in word Therapeutic recreation is the modern formalization and focus of this ancient awareness (Curtis, 1979).

Recreation activities such as games and toys are commonly used in the education setting and also in the

areas of rehabilitation such as physical therapy, occupational therapy, and recreation therapy (Peterson, 1984). Games have many intrinsic as well as extrinsic values. When used correctly, games can improve social behavior, muscle development, coordination, sensory perception, and self control among other influences (Farina, 1959). Games are interesting and have been used for motivation and to teach skills. Games are useful for focusing attention and maintaining interest (Thorun, 1976; Avedon, 1971). In education settings, games are used as a learning tool or instructional aid. The majority of literature discusses toys and games used with young children in play therapy or with children in education settings. The use of early childhood and educational games is also used in the rehabilitation of patients with traumatic brain injury and cerebrovascular accident (Kaye, 1988). Several activity manuals and activity guides designed for use with special populations are available. However most of these resources do not have evidence to validate that the suggested activities do have a positive effect. There were no research studies prior to the writing of the manuals or guides to define the relationships.

Activity analysis is an important aspect of recreation therapy. Activity analysis is the process of

breaking down an activity into its various components

(Russell, 1982).

Breaking down activities into their component parts allows the therapeutic recreation specialist to become aware of what participatory skills and abilities are needed by the client in order to engage in the activity

.
If the program is rehabilitation- or treatment-oriented, analysis of a selected activity, compared with the stated treatment goal, would allow the specialist to ascertain whether that activity would contribute to the desired behavioral or functional improvement objective (Peterson, 1984).

Each activity can be analyzed according to the physical, cognitive, and affective aspects. Each activity varies according to the participation and socialization required. Based on activity analysis, the therapeutic recreation specialist can decide which activity is most appropriate in order to meet the rehabilitation goals.

Peterson states:

Activity analysis provides

1. a better comprehension of the expected outcomes of participation;
2. a greater understanding of the complexity of activity components, which can then be compared to the functional level of an individual or group to determine the appropriateness of the activity
3. information about whether the activity will contribute to the desired behavioral outcome when specific behavioral goals or objectives are being used;
4. direction for the modification or adaptation of activity for individuals with limitation;
5. useful information for selecting an intervention, instructional, or leadership technique; and
6. a rationale or explanation for the therapeutic benefits of activity involvement (Peterson, 1984).

Activity analysis is a professional expertise of the therapeutic recreation specialist. It is a foundation of the profession.

Practically applied, activity analysis makes it possible to select appropriate activities for therapeutic outcomes and facilitates sequencing and modification of instructional and recreation programs. Activity analysis gives more accuracy and accountability to program design efforts (Peterson, 1984).

Activity analysis is concerned with the characteristics of the participant and of the activity. Characteristics of the participant which should be considered include:

Physical:

- Parts of the body required
- Types of movement required
- Coordination
- Endurance
- Energy level
- Flexibility
- Dexterity
- Fine motor skills
- Gross motor skills
- Body position

Social:

- Verbalization
- Appropriate social interaction

Cognitive:

- Complexity of rules
- Short-term memory
- Strategy / planning
- Problem solving
- Attention to task
- Decision making
- Sequencing
- Over stimulation
- Retention
- Repetition

Affective:

- Anger
- Anxiety

Frustration
Depression
Accomplishment
Self confidence.

Characteristics of the activity which should be considered
include:

Sensory stimulation:
Color
Sound
Visual
Texture
Purchase information:
Cost
Available
Multiple uses
Adaptable
Planning and implementation:
Equipment
Time required
Structure
Controlled environment
Supervision
Materials:
Size
Storage
Portable
Age appropriate
Safety:
Swallowing foreign objects
Toxic
Infection control
Flammable Materials
Eye strain

(Blanton, 1986; Chase, 1973; Farrell, 1983;
Kirchner, 1979; Thorum, 1976; Wehman, 1979).

The selection of games to be utilized in this study
were determined by activity analysis. The criteria for
selection was based on research, the investigator's field
experience, recommendations by therapeutic recreation

professionals, and was submitted for approval to a jury of professionals who have an expertise in Recreation Therapy.

Memory rehabilitation is a relatively new area in research which has significant potential. "Although there is a high level of interest, surprisingly the field of memory rehabilitation has developed slowly" (O'Connor, 1987). Several areas have been explored, but "this work has been fragmented with little in the way of systematic research programmes" (Miller, 1984).

The majority of literature on the topic of memory rehabilitation has focused on the use of mnemonics and imagery. Other techniques used in memory rehabilitation include cognitive programs, rehearsal, computer use, psychological methods, and behavioral methods. Psychological methods "emphasize effective ways to minimize cognitive deficits" and "attempt to provide the brain-injured persons with new cognitive strategies to circumvent those no longer available" (O'Connor, 1987).

Currently, research in memory rehabilitation has failed to reveal any significant or applicable effectiveness. The only reference made to games in relation to memory rehabilitation, has involved the use of computer games. Because memory rehabilitation represents a new area of investigation, future research findings should produce interesting and challenging information. "At

present, rehabilitative techniques have not successfully met the needs of memory - impaired individual" (O'Connor, 1987).

Computer retraining is a rapidly growing area of cognitive rehabilitation. With the widespread use of computers, it is not surprising that their application in rehabilitation is being explored. "Computer technology has recently been used to meet the needs of brain-injury victims. Both the efficacy of this approach and its practical utility make it a promising resource for rehabilitative interventions" (O'Connor, 1987). There are several advantages of computer use in rehabilitation. Computer and electronic games are inexpensive, readily available, enjoyable, portable, educational, compact, therapeutic and provide immediate feedback (O'Connor, 1987 and Lynch, 1982).

"Although there have been occasional references to the use of video games in research, there have been no published reports of their use as rehabilitation techniques in a substantial series of patients" (Lynch, 1982). There are few computer programs which may facilitate memory rehabilitation. "The Memory Skills package of computer programs is designed to aid in the remediation of memory problems that are associated with brain injury" (Bracy, 1983). These computer games are adaptations of

manufactured table games which may be used in the rehabilitation of memory.

Other games have also been useful in improving memory function. "Indigenous games are said to play an important part in training memory strategies in children" (Davidson, 1984). Not only are games useful with children, but also memory games have been reported as "useful in cognitive rehabilitation" (Lynch, 1982).

Revised Visual Retention Test

In the present study the Revised Visual Retention Test by Benton (Benton, 1974) was used to test the effectiveness of selected recreation activities. The fourth edition of the Revised Visual Retention Test is an updated version of the 1963 edition. The test "is a clinical and research instrument designed to assess visual perception, visual memory, and visual constructive abilities" (Benton, 1974). The original copyright of the Revised Visual Retention Test was in 1955. The Revised Visual Retention Test is composed of a series of ten cards showing one or more geometric designs. There are three forms and several different ways which the test may be administered with varied degrees of difficulties.

Performance is scored in terms of number of cards correctly reproduced and total number of errors. Interscorer reliability of the order of .95 is reported for these scores (Anastasi, 1976).

There are several reasons this test was selected for use. The test was currently being administered to patients at The Patricia Neal Rehabilitation Center. "It seems clear that memory and learning tasks are more sensitive measures of cognitive change, at least after closed head injuries than conventional intelligence tests" (Bond, 1983). Several problems exist with intelligence quotient tests. General IQ test are affected by age, educational level, time frame, attention span, mental fatigue, and perceptual deficits (Bond, 1983). "Visual memory is typically evaluated by a memory for geometric designs" (Lynch, 1982). The Revised Visual Retention Test is sensitive to disturbances and is used in several neuropsychological test batteries (Hamsher, 1984; Lezak, 1976; Anastasi, 1976). "It is probably as good as any of the three or four tests of this type which are currently being used" (Hanawalt, 1959).

The reliability and validity of the Revised Visual Retention Test has been documented by several investigators (Benton, 1974). Reliability is reported in the .80's (Anastasi, 1976; Zwann 1967). Its norms include both age and estimated original intellectual capacity (Lezak, 1976).

In a study by Poitrenaud and Clement (1965), 504 subjects between the ages of forty-five and eighty-four

were used to compare the results with the published norms and to develop standards for older subjects. The results demonstrated that with increasing age there is a decreased performance. Results also demonstrated that the published norms for superior intelligence are somewhat higher than actual performance of the younger subjects (Poitrenaud, 1965).

Dee and Fontenot (1969) studied the degree of influence of drawing by the non-dominant hand. The study involved sixty control subjects who were right-handed and drew with their left hands. Results revealed no significant differences between the right-hand and left-hand scores (Dee, 1969).

Beames and Russell (1970), Brasfield (1971), and Matos Sanchez (1967) studied the normative data for children. Matos Sanchez (1967) studied 188 Peruvian children between the ages of eight and fourteen. Results consistently indicated higher scores for children with superior intelligence than for children with average intelligence (Matos Sanchez, 1967).

Brasfield tested two groups of youths in order to provide information on the performance of youths. One group had a mean age of five years and seven months. The second group had a mean age of five years and eleven months. Test results of young children correlated with the

published norms for older children (Brasfield, 1971). Beames and Russell's study (1970) involved 545 youth divided into two groups. One group was between the ages of five years six months and five years eleven months; the second group was between the ages of six years zero months and six years six months. This study along with the study by Brasfield provide norms for younger children (Beames and Russell, 1970).

Hence, the Revised Visual Retention Test was deemed as an appropriate measure of the effectiveness of recreational activities as a treatment modality for visual memory.

The present study was concerned with the value of recreational activities in the rehabilitation of visual retention in right cerebrovascular accident and traumatic brain injury patients. A common problem of persons who have damage to the right side of the brain is a disturbance in visual memory which can severely impair the person's ability to function independently. Therefore, it is important to achieve the maximum functional ability. This is the primary goal of the rehabilitation process. Selected recreational activities are used in many rehabilitation centers in the treatment of traumatic brain injury and stroke patients. This is a specific task of most recreation therapy departments. However, research

documenting the effectiveness of recreational activities in the rehabilitation of brain-injured patients is sparse. There was a need to determine if there is a significant relationship between the use of selected recreational activities as a treatment modality and improvements in visual retention. The present study attempted to test the effectiveness of selected recreational activities to determine if significant changes occurred in the visual retention of traumatic brain injury and stroke patients.

The Rancho Los Amigos Cognitive Functioning Scale

This study used The Rancho Los Amigos Cognitive Functioning Scale as a screening device to ensure internal consistency (Appendix A).

The Ranchos Scale is a behaviorally defined scale which lists characteristics of cognitive and language disruption in a hierarchal manner (Pendergrass, 1986).

Baggerly states

A contextual basis for effective head injury rehabilitation is offered by The Los Rancho Scale of Cognitive Levels

.
The delineation of eight cognitive levels after head injury, developed originally by Hagen, Malkmus, and Durham, facilitates planned care, rather than isolated responses to cognitive and behavioral manifestations as they occur (Baggerly, 1986).

At the time the study was undertaken, very little information was available on The Rancho Los Amigos Cognitive Functioning Scale.

CHAPTER III

METHODOLOGY

This chapter identifies the procedures used in this study. It was the purpose of this study to determine the effectiveness of selected recreation activities in the treatment of visual retention of clients functioning at a level five or above on The Rancho Los Amigos Cognitive Functioning Scale. Sub-problems included

1. Determining the criteria for selection of recreational activities based on approval from the jury.
2. Selection of the battery of manufactured table games.

Population

The population of the present study consisted of right cerebrovascular accident and traumatic brain injury patients at The Patricia Neal Rehabilitation Center who were functioning at a level five or above on The Rancho Los Amigos Cognitive Functioning Scale [See Appendix A, (Hagen, 1979)] as identified by a clinical neuropsychologist. Subjects were diagnosed by physicians as either traumatic brain injury patients or right cerebrovascular accident patients. "While the causation of the injury is different,

cognitive and behavioral outcomes can be strikingly similar" (Pendergrass, 1986).

Sample

The subjects for this study were identified from a random matched pool by a clinical neuropsychologist. Subjects were patients at The Patricia Neal Rehabilitation Center at the time of the study who were provided services of the Recreation Therapy Department. At the time the study was undertaken, the population at level five and above was used. The subjects were matched according to level of cognitive functioning and then randomly assigned into a control group and experimental group. Each group consisted of traumatic brain injury patients and cerebrovascular accident patients.

A total of fourteen subjects participated in the study. Twelve traumatic brain injury patients (85.7%) and two right cerebrovascular accident patients (14.3%) participated. Five females (35.7%) and nine males (64.3%) participated in the study. Based on The Rancho Los Amigos Cognitive Functioning Scale, one subject (7.1%) was functioning at a level five, seven (50%) were functioning at a level seven, and six (42.9%) were functioning at a level eight.

There were seven subjects in the control group and seven subjects in the experimental group. The control group consisted of two female subjects (28.6%) and five male subjects (71.4%); of the seven subjects, there was one right cerebrovascular accident (14.3%) and six traumatic brain injuries (85.7%). Four subjects (57.1%) were functioning at a level seven on The Rancho Los Amigos Cognitive Functioning Scale, and three subjects (42.9%) in the control group were functioning at a level eight.

The experimental group was comprised of three females (42.9%) and four males (57.1%). One subject (14.3%) was a right cerebrovascular accident, six subjects (85.7%) were traumatic brain injuries. One subject (14.3%) was functioning at a level five, three subjects (42.9%) were functioning at a level seven, and three subjects (42.9%) were functioning at a level eight on The Rancho Los Amigos Cognitive Functioning Scale.

Each group was as homogenous as possible in terms of the level of cognitive functioning, the number of male and female subjects, and the percentage of right cerebrovascular accident and traumatic brain injury patients. Each subject was ensured confidentiality, right to privacy, and right to professional responsibility as indicated in the consent forms. Each subject was asked to sign a consent form before participation in the study [See

Appendix C]. All treatments were administered by the principal investigator to ensure continuity and to prevent bias.

Instrumentation

The instrument used in this study was form C, administration A of the Revised Visual Retention Test (Benton, 1974). The test was administered within one week prior to the treatment phase and within one week following the treatment phase. The test was administered and scored by an unbiased examiner who was a trained psychology technician at The Patricia Neal Rehabilitation Center. A consistent protocol was used in explaining the directions to each subject in both the pre- and post-test [See Appendix D for the protocol used (Pendergrass, 1987)].

Determination of the instrument was based on availability, affordability and appropriateness. The Revised Visual Retention Test was presently being administered to patients at The Patricia Neal Rehabilitation Center through the psychology department. This test was also chosen because it had been standardized with accepted validity and reliability testing. The test is easy to administer and score.

Criteria for Determining Selected Recreational Activities

A list of criteria for selection of recreation activities based on research, the investigator's field experience, and recommendations of professionals in therapeutic recreation was generated by the principal investigator and approved by a jury of professionals in Recreation Therapy. The selection of manufactured table games was based on the criteria approved.

Selection of Jury

The jury was composed of four professionals who have an expertise in Recreation Therapy. Persons who were asked to serve as jury members were therapeutic recreation professionals who have knowledge of and experience with the population utilized in the study. (See Appendix E for jury identification.)

Selection of Manufactured Table Games

The criteria for selection of the manufactured table games was based on the components of activity analysis deemed most pertinent to the study. The criteria for selection was submitted to the jury for approval. The games to be utilized in the study were then selected based on the criteria approved as pertinent to the study.

Criteria selected as pertinent to the study were broken down into characteristics of the game itself and characteristics of the patient's ability in order to participate in the activity. Game characteristics identified by the jury as pertinent included visual stimulation, adaptable equipment, time required to complete the activity, the size of the materials and/or equipment, age appropriateness, and safety measures.

Characteristics related to the patient which were chosen as a necessary consideration in the game selection process included fine motor skills, gross motor skills, ability to comprehend and follow simple or complex rules, attention to task, decision making skills, ability to sequence, avoidance of over stimulation, avoidance of frustration, retention, repetition, and opportunity for accomplishment. (See Appendix F for the complete list of criteria generated and for letter of jury approval.) Approximately seventy-five games were reviewed and narrowed down to twelve, from which three were selected. The games selected were Simon, Math Lotto, and Colorado (See Appendix G for game description).

Administration of the Instrument

The Revised Visual Retention Test (Benton, 1974) was given as the measure of visual retention and was

administered once before the treatment interval and once after the treatment interval. Ten therapy sessions were conducted during the treatment phase. The therapy sessions involved the use of a battery of three manufactured table games as selected based on the criteria suggested as applicable to the study by a jury of therapeutic recreation professionals. The patients in the experimental group participated in the three selected recreation activities in addition to regular therapies while the control group received no additional treatment. The subjects in the experimental group participated in a series of three manufactured table games in an effort to improve visual retention. Research has shown no evidence to suggest a minimal number of treatments in order for the Revised Visual Retention Test to detect a positive effect. According to Pendergrass and based on his experience with the test as a clinical neuropsychologist, the Revised Visual Retention Test will detect a change after approximately seven treatment trials (Pendergrass, 1987). In the present study, ten treatments were administered in a three week period. Each treatment was approximately forty-five minutes with thirty minutes actual therapy time. All treatments were administered by the principal investigator.

Analysis of Data

This study used an independent t -test to analyze the data in order to test the null hypothesis which stated that there would be no significant difference between the post-test scores of the experimental group and control group at the $\alpha = 0.10$ level. The independent t -test was determined as an appropriate statistical test since the study was interested in assessing differences between two groups which were randomly assigned and where the total N was less than thirty. The "SPSS.LIS" computer statistical package was used to analyze the data collected in this study.

CHAPTER IV

RESULTS

Introduction

This study utilized a pre-test/post-test design. The participants in this study were patients at The Patricia Neal Rehabilitation Center who had suffered traumatic brain injury or right cerebrovascular accident and were functioning at a level five or above on The Rancho Los Amigos Cognitive Functioning Scale. There were fourteen subjects who participated in this study. The subjects were matched according to level of cognitive functioning and randomly assigned to either a control group or an experimental group. The age of the participants ranged from seventeen to seventy. Due to the population available, the majority of the participants were traumatic brain injury patients (85.7%). Two subjects (14.3%) were right cerebrovascular accident patients. Nine males (64.3%) and five females (35.7%) participated in the study. "Males consistently predominate in hospital admissions and deaths due to head injury" (Levin, 1982). One participant (7.1%) was functioning at a level five, seven participants (50%) were functioning at a level seven, and six participants (42.9%) were functioning at a level eight on The Rancho Los Amigos Cognitive Functioning Scale.

The Revised Visual Retention Test was administered by an unbiased trained psychology technician at The Patricia Neal Rehabilitation Center within approximately one week prior to the treatment sessions. Ten treatments were administered by the principal investigator to each subject in the experimental group. All treatments were administered in a three week period. Each treatment session was approximately forty-five minutes with thirty minutes actual treatment time. After all ten treatment sessions had been completed, the Revised Visual Retention Test was given to each participant as a post-test within one week after the last treatment was completed. All testing was administered to both the control group and the experimental group during the same time period.

t-Test

Data were analyzed by the use of a t-test with an alpha level of $p < 0.10$ required to infer statistical significance with regard to the hypothesis of the study. Data were analyzed with a "SPSS.LIS" statistical package.

There was no significant difference between the control and treatment groups in the number of pre-test errors ($t = .30$, $df = 10.64$, $p = .769$) or in the number of pre-test correct ($t = .84$, $df = 11.95$, $p = .419$). Therefore the control group and treatment group were equal initially.

With regard to the hypothesis of this study, no significant differences were noted between the control and treatment groups throughout the analyses. Analysis of post-test scores produced no significant difference in post-test errors ($t=0.00$, $df=11.64$, $p=1.0$) or in post-test correct ($t=.14$, $df=11.18$, $p=.8940$). Treatment had little or no effect with $N=14$.

There was however a significant difference between the post-test scores and the pre-test scores. Post-test errors were reduced from a mean of 12 to a mean of 8.14 ($t=3.35$, $df=13$, $p=.005$). Post-test correct were increased from a mean of 3.5 to a mean of 4.79 ($t=2.59$, $df=13$, $p=.022$). Thus there was significant effect across time.

It was hypothesized that participation in selected recreation activities would not have a beneficial effect in the rehabilitation of visual retention. Table 1 contains the pre- and post-test results for the treatment and control groups on the Revised Visual Retention Test.

No significant interaction was noted between the use of manufactured table games and visual retention. The hypothesis was statistically supported. Overall, the mean number of errors on the pre-test (12.0) was lower on the post-test (8.14) which was significant ($t=3.35$, $df=13$, $p=.005$), but the crucial treatment outcome effect was

nonsignificant ($t=0.00$, $df=11.64$, $p=1$). The treatment did not significantly reduce the number of errors made.

Table 1
Pre- and Post-test
Means and Standard Deviations

	Mean	SD
Treatment		
Pre-test Errors	12.43	4.28
Pre-test Correct	3.00	2.16
Post-test Errors	8.14	3.85
Post-test Correct	4.86	1.68
Control		
Pre-test Errors	11.57	6.21
Pre-test Correct	4.00	2.31
Post-test Errors	8.14	4.60
Post-test Correct	4.71	2.21

Results for the number of correct responses repeated those for errors. Subjects performed better on the post-test ($t=2.59$, $df=13$, $p=.02$), but there was no significant effect of treatment ($t=.14$, $df=11.18$, $p=.894$). The mean number correct on the pre-test (3.50) was increased on the

post-test (4.79) which was significant. The hypothesis was supported by the research findings.

Discussion

The results of this study did not support the effectiveness of manufactured table games as a treatment modality in the rehabilitation of visual retention of those persons who have suffered from traumatic brain injury or right cerebrovascular accident. No significant differences were produced between the post-test scores of the control and treatment groups. The study produced no correlation between the use of manufactured table games as a treatment modality and rehabilitation of visual retention. Although a positive change did occur, there was no significant difference in the degree of change between the treatment group and the control group.

Both the control and treatment group showed a significant positive change across time from the pre-test to the post-test. Both groups were involved in intensive rehabilitation and participated in the other therapies regularly. Therefore it was not unexpected for both the control group and the experimental group to show some degree of improvement. The treatment group did not have a significant improvement over the control group.

Participation in the selected recreation activities had little or no effect on rehabilitation of visual retention.

The literature suggests that selected recreation activities have potential value as a treatment modality or intervention strategy in the rehabilitation process. Therapeutic recreation specialists commonly use games in the rehabilitation of various disabling condition, and games appear to be an effective treatment strategy. However, the results of this study did not support the use of Simon, Math Lotto, and Colorado in the rehabilitation of visual retention.

Several factors may have influenced the outcome of this study. The small number of participants in this study may have been one influencing factor. With such a small number of subjects, group differences would have to be large to produce significant results.

Second, the duration of treatments was shorter than might be necessary to produce significant change. Memory impairments last longer and recover slower than other cognitive functions (Brooks, 1983). Therefore ten treatments in a three week period may not have been enough to secure a positive effect.

A third factor was that the study involved subjects at various cognitive levels. Ideally, treatments should be designed to the specific level and needs of the patient. A

generalized battery of games may have resulted in a minimal effect on the involved subjects. These factors, alone or combined, may have been detrimental to the outcome of this study.

CHAPTER V

CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter will give a brief summary of the results of the study, conclusions reached by the investigator, and recommendations for further research.

Conclusions

It was the purpose of this study to determine the effectiveness of selected recreation activities in the treatment of visual retention of clients functioning at a level five or above on The Rancho Los Amigos Cognitive Functioning Scale. Sub-problems included

1. Determining the criteria for selection of recreational activities based on approval from the jury of therapeutic recreation professionals.

2. Selection of the battery of manufactured table games.

A review of literature found a void in information pertaining to the effects of recreation activities as specific treatment modalities or intervention strategies. Therefore there is a need to determine if recreation activities have an effect in the rehabilitation process. This study focused on the effectiveness of selected

manufactured table games in the rehabilitation of visual retention.

For the purpose of this study, a pre-test/post-test control group design was used. Subjects were matched according to level of cognitive functioning and then randomly assigned to either a control group or a treatment group. Fourteen subjects participated in the study. The Revised Visual Retention Test was given as the pre- and post-test to measure visual retention. Ten therapy sessions were administered to the treatment group between testings over a three week treatment schedule. The control group received no additional treatment. All treatments were administered by the principal investigator. All testing was administered and scored by an unbiased trained psychology technician at The Patricia Neal Rehabilitation Center.

The battery of selected manufactured table games was selected based on components of activity analysis as deemed pertinent to the study by a jury of therapeutic recreation professionals. The games chosen were Simon, Math Lotto, and Colorado.

An independent t-test was used with alpha being equal to 0.10 to analyze the data collected in the study. Statistical analysis revealed no significant differences between the post-test scores of the control and treatment

group. The results of this study did not support the use of manufactured table games as a specific treatment modality in the rehabilitation of visual retention.

The values of games is well documented in therapeutic recreation and special education literature. The implications and potential for the use of selected games as specific treatment interventions seems clear, however there is little supportive research for specific methodology. Of the specific interventions discussed in the literature, few studies identify the effectiveness of the treatment modalities. Research is needed in order to develop and identify effective treatment modalities.

Recommendations

The following recommendations for further research are made based on the results of this study.

1. A larger number of subjects should be used so that any correlations may be statistically defined.

2. Further research should include a more extensive activity analysis with respect to the population involved to ensure that the most appropriate and beneficial games are selected to use in the study.

3. The number of treatments should be increased in order to allow for maximum or optimal potential. The

literature suggests that memory recovers slower than other cognitive functions.

4. While the Revised Visual Retention Test was adequate for this study, other instruments may be a more sensitive or specific measure of performance.

5. There is a need for research to determine the most effective treatment modalities. Further research should include the use of other intervention strategies in the rehabilitation of common disabling conditions and their consequences. There is a need for research on the effectiveness of specific treatment modalities used in the therapeutic recreation setting.

6. Finally, research should be conducted to compare the performance of individuals who have received rehabilitation and those individuals who received no rehabilitation.

REFERENCES

REFERENCES

- Anastasi, A. (1976). Psychological Testing. New York: MacMillan Publishing Co., Inc.
- Avedon, E. M., and Sutton - Smith, B. (1971). The study of games. New York: John Wiley and Sons, Inc.
- Baggerly, J. (1986). Rehabilitation of the adult with head trauma. Nursing Clinics of North America, 21, 577-587.
- Baine, D. (1986). Memory instruction. Englewood Cliffs: N J Educational Technology Publications.
- Beames, T. B. and Russell, R. L. (1970). Normative data by age and sex for five pre-school tests. Report neuropsychology laboratory, University of Victoria. Cited in Benton, A. L. (1974). Revised visual retention test clinical and experimental applications. New York: The Psychological Corporation.
- Benton, A. L. (1974). Revised visual retention test clinical and experimental applications. New York: The Psychological Corporation.
- Blanton, M. D. (1986). Recreation 3200 Program Planning. The University Of Tennessee, Knoxville.
- Bond, M. R. (1983). Standardized methods of assessing and predicting outcome. In Rosenthal, M., Griffith, E. R., Bond, M. R., and Miller, I. D. (Eds.) Rehabilitation of the head injured adult. Philadelphia: F. A. Davis Company, 97-113.
- Bracy, O.L. (1983). Cognitive rehabilitation of the brain injured and stroke patient. Models and Techniques of Cognitive Rehabilitation - III. Indianapolis: Third International Symposium.
- Brasfield, C. M. (1971). An investigation of the use of the Benton Visual Retention Test with pre-school children. M. A. Thesis, University of Victoria. Cited in Benton, A. L. (1974). Revised visual retention test clinical and experimental applications. New York: The Psychological Corporation.

- Brooks, N. (Ed.). (1984). Closed head injury psychological, social, and family consequences. New York: Oxford University Press.
- Brooks, N. (1983). Disorders of memory. In Rosenthal, M., Griffith, E. R., Bond, M. R., and Miller, J. D. (Eds.) Rehabilitation of the head injured adult. Philadelphia: F. A. Davis Company, 185-196.
- Burns, M. S., Halper, A. S., Shelley, I. M. (1985). Clinical management of right hemisphere. Rockville: Aspen Systems Corporation.
- Chase, R. A. et. al. (1973). Design of play materials for infants. DMG-DRS Journal, 7. In Thorum, A. R., Stearns, E. C., Harms, K. L., VanVliet, D., and Martomez, G. (1976). Instructional Materials for the handicapped. Salt Lake City: Olympus Publishing Company.
- Conboy, T. J., Barth, J., Boll, T. J. (1986). Treatment and rehabilitation of mild and moderate head injury. Rehabilitation Psychology, 31, 203-215.
- Curtis, J. E. (1979). Recreation theory and practice. St. Louis: The C. V. Mosby Company.
- Davidson, G. R., Kishor, N. (1984). Indigenous games and the development of memory strategies in children. Cited in Kirby, J.R. (Ed.) Cognitive strategies and educational performance. Orlando: Academic Press, Inc. 203-213.
- Dee, H. L. and Fantenot, D. J. (1969). Use of the non-preferred hand on graphomotor performance: a methodological study. Conf. Neurol., 31: 273-280. Cited in Benton, A. L. (1974). Revised visual retention test clinical and experimental applications. New York: The Psychological Corporation.
- Farina, A. M., Furth, S. H., and Smith, J. M. (1959). Growth through play. Englewood Cliffs: Prentice-Hall, Inc.
- Farrell, P. and Lundegren, H. M. (1983). The process of recreation programming Theory and technique. New York: John Wiley and Sons.

- Gunn, S. L. and Peterson, C. A. (1978). Therapeutic recreation program design principles and procedures. Englewood Cliffs: Prentice Hall, Inc.
- Hagen, C., Malkmus, D., Durham, P. (1979). Levels of cognitive functioning. In Rehabilitation of the head injured adult: Comprehensive physical management. Downey: Professional Staff Association of Rancho Los Amigos Hospital, Inc.
- Hamsher, Kerry des. (1984). Specialized neuropsychological assessment methods. In Goldstein, G., Hersen, M. (Eds.) Handbook of psychological assessment. New York: Pergamon Press, 235-256.
- Hanawalt, N. G. (1959). Revised visual retention test. Buros fifth mental measurement yearbook. Highland Park: The Gryphon Press, 401-403.
- Hart, L. A. (1975). How the brain works. New York: Basic Books, Inc., Publishers.
- Humphrey, J. H. and Sullivan, D. D. (1970). Teaching slow learners through active games. Springfield: Charles C. Thomas Publisher.
- Kaye, A. G. (1988). Senior Therapeutic Recreation Specialist. The Patricia Neal Rehabilitation Center. Knoxville, Tennessee.
- Kirby, J. R. (Ed.) (1984). Cognitive strategies and educational performance. Orlando: Academic Press, Inc.
- Kirchner, A. B. (1979). Basic beginnings A handbook of learning games and activities for young children. Washington, D.C.: Acropolis Brooks Ltd.
- Learning about stroke A manual for families and patients. (1982). Chicago: Encyclopedia Britannica Educational Corporation.
- Levin, H. S., Benton, A. L., and Grossman, R. G. (1982). Neurobehavioral consequences of closed head injury. New York: Oxford University Press.
- Lezak, M. D. (1976). Neuropsychological Assessment. New York: Oxford University Press.

- Lezak, M. D. (1987). Assessment for rehabilitation. In Meier, J. J., Benton, A. L., and Dillard, L. Neuropsychological rehabilitation. New York: Churchill Livingstone, 41-58.
- Lynch, W. J. (1982). The use of electronic games in cognitive rehabilitation. In Trexler, L. E. (Ed.) Cognitive rehabilitation conceptualization and intervention. New York: Plenum Press, 263-274.
- Marshall, L. F., Sadler, G. R., and Bowers, S. A. (1981). Head injury. San Diego: The Comprehensive Central Nervous System Injury Center for San Diego County.
- Matos Sanchez, D. A. (1967). Estudio del Test de Retencion Visual de Benton en un grupo de niños de inteligencia promedio y superior. Tesis, Pontificia Universidad Católica del Perú, Lima. Cited in Benton, A. L. (1974). Revised visual retention test clinical and experimental applications. New York: The Psychological Corporation.
- Meier, M. J., Benton, A. L., and Dillard, L. (1987). Neuropsychological rehabilitation. New York: Churchill Livingstone.
- Miller, E. (1984). Recovery and management of neuropsychological impairments. New York: John Wiley and Sons.
- Mossman, P. L. (1976). A problem-oriented approach to stroke rehabilitation. Springfield: Charles C. Thomas.
- Nicolsi, L., Harryman, E., and Kresheck, J. (1978). Terminology of communication disorders. Baltimore: The Williams and Wilkins Company.
- O'Connor, M. and Cermak, L. S. (1987). Rehabilitation of organic memory disorders. In Meier, M. J., Benton, A. L., and Dillard, L. Neuropsychological rehabilitation. New York: Churchill Livingstone, 260-279.
- Patricia Neal Rehabilitation Center Policy and Procedures Manual. (1987). Knoxville: Patricia Neal Rehabilitation Center.

- Pendergrass, T. (1986). Family response to computerized cognitive retraining with brain injured individuals. Unpublished doctoral dissertation, Ball State University, Muncie, Indiana.
- Pendergrass, T. (1987). Clinical Neuropsychologist. The Patricia Neal Rehabilitation Center. Knoxville, Tennessee.
- Peterson, C. A. and Gunn, S. L. (1984). Therapeutic recreation program design principles and procedures. 2nd ed. Englewood Cliffs: Prentice - Hall, Inc.
- Poitrenaud, J. and Clement, F. (1965). La deterioration physiologique dans le Test de Retention Visuelle de Benton: resultats obtenus par 500 sujets normaux. Psychologie Francaise, 10: 359-368. Cited in Benton, A. L. (1974). Revised visual retention test clinical and experimental application. New York: The Psychological Corporation.
- Popper, K. R., Eccles, J. C. (1977). The self and its brain. New York: Springer International.
- Rosenthal, M., Griffith, E. R., Bond, M. R., and Miller, J. D., (Eds.) (1983). Rehabilitation of the head injured adult. Philadelphia: F. A. Davis Company.
- Russell, R. V. (1982). Planning programs in recreation. St. Louis: The C. V. Mosby Company.
- Salmon, D. P., Butters, N. (1987). In Meier, J. J., Benton, A. L., and Dillard, L. Neuropsychological rehabilitation. New York: Churchill Livingstone, 280-293.
- Shivers, J. S. and Fait, H. F. (1975). Therapeutic recreational services. Philadelphia: Lea and Febiger.
- Sister Kenny Institute Staff. (1978). About stroke. Minneapolis: Sister Kenny Institute - Abbott - Northwestern Hospital.
- Stedman's medical dictionary. 24th ed. (1982). Baltimore: Williams and Wilkins.
- Stroke: Why do they behave that way? (1974). Dallas: American Heart Association.

Strokes: A guide for the family. (1981). Dallas:
American Heart Association.

Thomas, C. L. (Ed.) (1985). Taber's cyclopedic medical dictionary. 15th ed. Philadelphia:
F. A. Davis Company.

Thomas, J. D. and Trexler, L. E. (1982). Behavioral and cognitive deficits in cerebrovascular accident and closed head injury: Implications for cognitive rehabilitation. In Trexler, L. E. Cognitive rehabilitation conceptualization and intervention. New York: Plenum Press, 27-61.

Thorun, A. R., Stearns, E. C., Harms, K. L., Vlient, D. F., Martinez, G. (1976). Instructional materials for the handicapped. Salt Lake City: Olympus Publishing Company.

Wahlstrom, P. E. (1983). Remediation of perceptual dysfunction. In Rosenthal, M., Griffith, E. R., Bond, M. R., and Miller, J. D. (Eds.) Rehabilitation of the head injured adult. Philadelphia: F. A. Davis Company, 335-344.

Webster's ninth new collegiate dictionary. (1986).
Springfield: Merriam - Webster Inc.

Wehman, P. (Ed.) (1979). Recreation programming for developmentally disabled persons. Baltimore: University Park Press. Wilson, B. A. (1987). Rehabilitation of memory. New York: The Guilford Press.

Wittrock, M. C., Beatty, J., Bogen, J. E., Gazzangia, M. S., Jerison, H. J., Krashen, S. D., Nebes, R. D., and Teyler, T. J. (1977). The human brain. Englewood Cliffs: Prentice - Hall, Inc.

Zwann, E. J., DeVries, E. and Van Dijk-Bleker, H. (1967). De Benton-Test: aspecten bedoeld en onbedoeld. Nederl. Tijdschr. Psychol. Grens., 22: 427-438. Cited in Benton, A. L. (1974). Revised visual retention test clinical and experimental applications. New York: The Psychological Corporation.

APPENDICES

APPENDIX A

APPENDIX A

LEVELS OF COGNITIVE FUNCTIONING

I. NO RESPONSE

Patient appears to be in a deep sleep and is completely unresponsive to any stimuli presented to him.

II. GENERALIZED RESPONSE

Patient reacts inconsistently and non-purposefully to stimuli in a nonspecific manner. Responses are limited in nature and are often the same regardless of stimulus presented. Responses may be physiological changes, gross body movements and vocalization. Responses are likely to be delayed. the earliest response is to deep pain.

III. LOCALIZED RESPONSE

Patient reacts specifically but inconsistently to stimuli. Responses are directly related to the type of stimulus presented as in turning head toward a sound or focusing on an object presented. The patient may withdraw an extremity and vocalize when presented with a painful stimulus. He may follow simple commands in an inconsistent delayed manner, such as closing his eyes, squeezing or extending and extremity. Once external stimuli are removed, he may lie quietly. He may also show

a vague awareness of self and body by responding to discomfort by pulling at nasogastric tube or catheter or resisting restraints. He may show a bias toward responding to some persons, especially family and friends, but not to others.

IV. CONFUSED-AGITATED

Patient is in a heightened state of activity with severely decreased ability to process information. He is detached from the present and responds primarily to his own internal confusion. Behavior is frequently bizarre and nonpurposeful relative to his immediate environment. He may cry out or scream out of proportion to stimuli even after removal, may show aggressive behavior, attempt to remove restraints or tube or crawl out of bed in a purposeful manner. He does not discriminate among persons or objects and is unable to cooperate directly with treatment efforts. Verbalization is frequently incoherent or inappropriate to the environment. Confabulation may be present; he may be hostile. Gross attention to environment is very brief and selective attention often nonexistent. Being unaware of present events, patient lacks short term recall and may be reacting to past events. He is unable to perform self-care activities without maximum assistance. If not

disabled physically, he may perform automatic motor activities such as sitting, reaching and ambulating, as part of his agitated state but not as a purposeful act or on request necessarily.

V. CONFUSED-INAPPROPRIATE

Patient appears alert and is able to respond to simple commands fairly consistently. However, with increased complexity of commands or lack of any external structure, responses are nonpurposeful, random, or at best, fragmented toward any desired goal. He may show agitated behavior, but not on an internal basis, as in Level IV, but rather as a result of external stimuli and usually out of proportion to the stimulus. He has gross attention to the environment, is highly distractible and lacks ability to focus attention to a specific task without frequent redirection. With structure, he may be able to converse on a social-automatic level for short periods of time. Verbalization is often inappropriate; confabulation may be triggered by present events. Memory is severely impaired, with confusion of past and present in reaction to ongoing activity. Patient lacks initiation of functional tasks and often shows inappropriate use of objects without external

direction. He may be able to perform previously learned tasks when structured for him, but is unable to learn new information. He responds best to self, body, comfort and, often, family members. The patient can usually perform self-care activities with assistance and may accomplish feeding with supervision. Management on the unit is often a problem if the patient is physically mobile, as he may wander off either randomly or with vague intention of "going home."

VI. CONFUSED-APPROPRIATE

Patient shows goal-directed behavior, but is dependent on external input for direction. Response to discomfort is appropriate and he is able to tolerate unpleasant stimuli; e. g., as NG tube when need is explained. He follows simple directions consistently and shows carry-over for tasks he has relearned; e. g., self-care. He is at least supervised with old learning; unable to maximally assisted for new learning with little or no carryover. Responses may be incorrect due to memory problems but are appropriate to the situation. They may be delayed to immediate and he shows decreased ability to process information with little or no anticipation or prediction of events.

Past memories show more depth and detail than recent memory. The patient may show beginning awareness of his situation by realizing he doesn't know an answer. He no longer wanders and is inconsistently oriented to time and place. Selective attention to tasks may be impaired, especially with difficult tasks and in unstructured settings, but is now functional for common daily activities. He may show vague recognition of some staff and has increased awareness of self, family and basic needs.

VII. AUTOMATIC-APPROPRIATE

Patient appears appropriate and oriented within hospital and home settings, goes through daily routine automatically but robot-like, with minimal to absent confusion and has shallow recall of what he has been doing. He shows increased awareness of self, body, family, food, people and interaction in the environment. He has superficial awareness of but lacks insight into his condition, decreased judgment and problem solving and lacks realistic planning for his future. He shows carryover for new learning at a decreased rate. He requires at least minimal supervision for learning and safety purposes. He is independent in self-care activities and supervised

in home and community skills for safety. With structure, he is able to initiate tasks or social and recreational activities in which he now has interest. His judgment remains impaired. Prevocational evaluation and counseling may be indicated.

VIII. PURPOSEFUL-APPROPRIATE

Patient is alert and oriented, is able to recall and integrate past and recent events and is aware of and responsive to his culture. He shows carryover for new learning if acceptable to him and his life role and needs no supervision once activities are learned. Within his physical capabilities, he is independent in home and community skills. Vocational rehabilitation, to determine ability to return as a contributor to society, perhaps in a new capacity, is indicated. He may continue to show decreases relative to premorbid abilities in quality and rate of processing, abstract reasoning, tolerance for stress and judgment in emergencies or unusual circumstances. His social, emotional and intellectual capacities may continue to be at a decreased level for him, but functional within society.

(Hagen, 1979).

APPENDIX B

APPENDIX B

MEDICAL TERMINOLOGY

Brain Stem: "The stemlike part of the brain that connects the cerebral hemispheres with the spinal cord" (Thomas, 1985).

Embolism: "Obstruction of a blood vessel by foreign substances or a blood clot" (Thomas, 1985).

Cerebral Hemorrhage: "The result of rupture of a sclerosed or diseased blood vessel in the brain" (Thomas, 1985).

Thrombosis: "The formation, development, or existence of a blood clot or thrombus within the vascular system" (Thomas, 1985).

Cranium: "That portion of the skull that encloses the brain" (Thomas, 1985).

Dichotomous: "Dividing into two parts" (Webster's ninth new collegiate dictionary, 1986).

Hippocampi: A curved elongated ridge that extends over the floor of the descending horn of each lateral ventricular of the brain and consists of gray matter covered on the ventricular surface with white matter (Webster's ninth new collegiate dictionary, 1986).

Meninges: "The three membranes investing the spinal cord and brain" (Thomas, 1985).

Mnemonics: "The art of improving or assisting memory" (Thomas, 1985).

Prosodic: Physical attributes of speech that signal linguistic qualities such as stress and intonation; includes the fundamental frequency of the voice, the intensity of the voice, and the duration of the individual speech sounds (Nicolosi, 1978).

Schemata: "A plan, outline, or arrangement. . . . The organized unit of cognitive experience" (Stedman's medical dictionary, 1982).

Spatial: "Relating to space or a space" (Stedman's medical dictionary, 1982).

Vascular System: "The heart, blood vessels, lymphatics, and their parts considered collectively" (Thomas, 1985).

Ventricular System: Relating to the ventricles (Webster's ninth new collegiate dictionary, 1986).

Visual: "Relating to vision" (Stedman's medical dictionary, 1982).

APPENDIX C

APPENDIX C

STATEMENT OF INFORMED CONSENT

Recreation Therapy is a well established technique for the rehabilitation of physical and cognitive deficits resulting from traumatic brain damage and cerebrovascular accidents. Recreation Therapy utilizes selected recreation activities as a treatment modality. This study is interested in the effectiveness of such selected recreation activities in the rehabilitation of short-term visual retention.

There are only minimal risks involved in this treatment. The risks are no greater than the risks encountered in other methods of recreation therapy or psychological testing.

I, _____ hereby agree to voluntarily participate in a research study being conducted by M. Louise Donahue, a graduate student at The University of Tennessee, Knoxville. The study is entitled: The Effectiveness of Selected Recreation Activities in the Rehabilitation of Visual Retention.

My involvement in the study is limited to the following:

1. Participation in additional sessions of recreation therapy.
2. Completion of The Revised Visual Retention Test twice during the course of the study.
3. I understand that my participation is voluntary, and I may terminate my participation at any time without relinquishing services of the Recreation Therapy Department.
4. All research information will be maintained in secure fashion and my anonymity will be completely protected.
5. All information obtained during the study will be strictly confidential.
6. The investigator accepts professional responsibility.
7. No treatment will cause any mental or physical discomfort.

If I have any questions about the study, they will be directly and honestly answered by the principal investigator.

I may contact the investigator at

M. Louise Donahue
Recreation Department
The University of Tennessee
Knoxville, Tennessee
974-6045.

I have read the above statements and agree to participate in this study.

Date

Participant or Legal Guardian

Date

Investigator

RESEARCH PROJECT INFORMATION

I would like to take this opportunity to invite you to participate in a study of patients who have experienced traumatic brain injury or right cerebrovascular accident. Therapeutic recreation specialists use a variety of techniques to aid in cognitive rehabilitation. This study utilizes selected recreation activities (e.g. manufactured table games such as Simon, Memory, and Concentration) in the treatment of visual memory impairments which often follow any damage occurring to the right hemisphere of the brain. The goal of the study is to test the effectiveness of selected recreation activities in the rehabilitation of visual memory impairment.

Research suggests that there is little, if any, risk involved to those utilizing this method of treatment. The treatment sessions will be provided free of charge to the patients in this study.

If you are interested in this study please contact

M. Louise Donahue
Recreation Department
The University of Tennessee
Knoxville, Tennessee
974-6045.

Thank you for your consideration.

Sincerely,

M. Louise Donahue

APPENDIX D

APPENDIX D

BENTON VISUAL RETENTION TEST PROTOCOL

Administration A - Form C (As outlined in Revised Visual Retention Test Clinical and Experimental Applications Benton, 1974)

1. The subject is given a blank sheet of paper (5 1/2 X 8 1/2), a pencil and eraser.
2. He/she will receive the following instructions: "You will be shown a card on which there are one or more figures and you are to copy the card from memory, making the drawing as much like the original card as is possible. You will then have ten seconds to study the card and then it will be removed. If you start to draw before the ten seconds are up, the card will be removed. Please use the full ten seconds to study the card so you may do your best."
3. Each stimulus card will be timed for ten seconds.
4. If the subject begins to draw a design before the ten seconds is elapsed, the examiner will give the following instructions: "I know this design is an easy one, but the others are harder, and I want you to get into the habit of looking at the card for ten seconds." If the subject begins to draw before the time has elapsed on subsequent cards, the card will be removed without comment.
5. The remainder of the cards are to be presented without comment with the exception of "Be sure to draw everything you see".
6. No spontaneous praise is offered, but the subject may be reassured if he/she questions the quality of his/her performance.
7. Scoring: All scoring will be completed by psychologists experienced in the technique for standardized scoring as outlined by Benton in the 1974 manual. Scoring parameters will include the number of correct reproductions, error score and quantitative

scoring of error forms such as right/left field errors, distortions, omissions, perseverations, rotations, misplacement, and size errors. All scores will then be compared to the norms for age and estimated premorbid IQ as established by Benton (Pendergrass, 1987).

APPENDIX E

APPENDIX E

JURY MEMBERS

Dr. James Broughton, C.T.R.S.
Therapeutic Recreation Coordinator
Memphis State University
Memphis, Tennessee

Gloria Cleveland
Recreation Therapist
Baptist Hospital
Nashville, Tennessee

Karen Hyman
Recreation Therapist
Vanderbilt Hospital
Nashville, Tennessee

Linda Swanson, C.T.R.S.
Director of Recreation Therapy
Patricia Neal Rehabilitation Center
Knoxville, Tennessee

APPENDIX F

APPENDIX F

Dear

I am a master's student at The University of Tennessee, Knoxville. I am currently working on my thesis which is entitled The Effectiveness of Selected Recreational Activities in the Rehabilitation of Visual Retention. It is the purpose of this study to determine the effectiveness of selected recreational activities in the rehabilitation of visual retention of clients functioning at a level 5 and above on the Rancho Los Amigos Cognitive Functioning Scale. Sub-problems include

1. Determining the criteria for selection of recreation activities based on approval from the jury.
2. Select the battery of recreational games.

The population involved will be composed of patients suffering from traumatic brain injury and right cerebrovascular accident. The patients will be functioning at a level 5 and above on the Rancho Los Amigos Cognitive Functioning Scale as identified by a clinical psychologist.

I would like to take this opportunity to invite you to participate in the study as a jury member. It will be the job of the jury to make suggestions and

approve the components of activity analysis which should be considered for game selection.

This is an initial contact requesting your suggestions based on your professional expertise and experience as a recreation therapist. I will send you a final copy of the completed list of the criteria for official confirmation after I receive feedback from all of the jury members, and after I present the list of criteria to the thesis committee at the thesis proposal meeting.

Enclosed is a check sheet identifying various aspects of activity analysis. Please check which criteria you feel are the most pertinent when choosing a manufactured table game to use as an individual treatment modality with the population described in the rehabilitation of visual retention. Please complete the check sheet and return in the enclosed self addressed stamped envelope by December 28, 1987.

Thank you for your willingness to participate as a jury member in this study. I look forward to hearing from you by December 28, 1987.

Sincerely,

M. Louise Donahue

PATIENT CHARACTERISTICS**Physical:**

Parts of the body required
Types of movement required
Coordination
Endurance
Energy Level
Flexibility
Dexterity
Fine motor skills
Gross motor skills
Body position

Social:

Verbalization
Appropriate social interaction

Cognitive:

Complexity of rules
Short term memory
Strategy / planning
Problem solving
Attention to task
Decision making
Sequencing
Over stimulation
Retention
Repetition

Affective:

Anger
Frustration
Anxiety
Depression
Accomplishment
Self confidence

Suggestions:

GAME CHARACTERISTICS

Sensory Stimulation:

Color _____

Sound _____

Visual _____

Texture _____

Purchase Information:

Cost _____

Available _____

Multiple uses _____

Adaptable _____

Planning and Implementation:

Equipment _____

Time required _____

Structure _____

Controlled environment _____

Supervision _____

Materials:

Size _____

Storage _____

Portable _____

Age appropriate _____

Safety:

Swallowing foreign objects _____

Toxic _____

Infection control _____

Flammable materials _____

Eye strain _____

Suggestions:

Dear

Thank you for your response to the activity analysis check sheet and for your assistance in the thesis study The Effectiveness of Selected Recreational Activities in the Rehabilitation of Visual Retention. I compiled the returns, and the majority of the jury members found these items to be pertinent when choosing a manufactured table game to use as an individual treatment modality in the study. This is the completed list of the criteria for game selection based on the feedback I received from the jury members. Official confirmation is needed before I can select the games to be used in the study. Your return response is needed as soon as possible.

Game Characteristics

Visual stimulation
Adaptable equipment
Time required to complete activity
Size of materials / equipment
Age appropriate
Safety measures:
Avoid swallowing foreign objects
Nontoxic
Infection control
Nonflammable material
Minimize eye strain

Patient Characteristics

Fine motor skills
Gross motor skills
Complexity of rules
Short term memory
Attention to task
Decision making
Sequencing
Over stimulation
Retention
Repetition
Avoid frustration
Accomplishment

Sincerely,

M. Louise Donahue

_____ Yes I approve this list as pertinent criteria for game selection.

_____ No I do not approve this list as pertinent criteria for game selection, and I make the following suggestions for changes which would ensure my approval.

Suggestions:

Date

Signature

Title

APPENDIX G

APPENDIX G

GAMES

Simon (Milton Bradley Electronics)

Simon is a computer controlled game that consists of a base unit with four color lenses which flash and a control panel. Two variations of the game were used with four levels of difficulty. In Game 1, "Simon Says" the object is to correctly repeat a sequence of signals in which the sequence gets longer each time the sequence is repeated correctly. Game 3, "Choose Your Color" is similar to Game 1 however Game 3 involves an elimination aspect. When one lens is eliminated, play continues with the remaining lens.

Math Lotto Game (Media Materials)

This study used the two decks of cards "Attributes" and "Pattern Sequences". The object of "Attributes" is to pick up matching pairs of attribute cards. To play, select ten (twenty cards) from the deck of cards. A number of games may be played with the selected pairs. Shuffle the cards, place them in four rows of five, face down, on the table. The first player turns up two cards. If he has a matching pair, he keeps it and turns up two more cards. When he fails to get a matching pair, he replaces these

cards face-down and the next player has a turn. Play continues until all cards have been played.

There are two small and two large sizes of each "Pattern Sequence". Shuffle the cards and place them on the table face-down in five rows of eight cards each. The object is to be the player who turns over the most pairs of matching "Pattern Sequences". In his turn, each player turns two cards face-up. If they are identical, (shape, sequence, size, and color) the player keeps the pair and turns two more cards face-up. He continues to play until he turns up two cards that do not match and the next player takes his turn. The game continues until all forty cards are matched in pairs. The winner is the player who has collected the largest number of matching pairs. (In this study, the investigator began by using only twenty cards before using the full deck of forty cards.)

Colorado (Bemiss - Jason Creative Learner)

There are twenty-four cards, each one displaying three concentric squares in three different colors and tokens for accumulating points. The object was to match colors to accumulate points. Cards only match when they have one or more concentric squares in common - color and position. One token is worth one point for each color matched. Shuffle cards, deal seven cards to each player. Player one

shows one card to the other player for ten seconds and then turns the card face-down. The other player tries to match with the most points. Players take turns until a preset number of points is reached in order to win.

VITA

Martha Louise Donahue was born in Corryton, Tennessee on December 16, 1962. She graduated from Gibbs High School in June 1981 and entered Maryville College the following August. In May of 1985 she received a Bachelor of Arts. In the fall of 1986 she began study toward a master's degree in Recreation with an emphasis in Therapeutic Recreation. Ms. Donahue was awarded this degree in June 1988.

Ms. Donahue is a member of the National Recreation and Parks Association, the National Therapeutic Recreation Society, the American Therapeutic Recreation Association, and the Tennessee Recreation and Parks Association. Ms. Donahue has a particular interest in physical rehabilitation.