TEMPORAL ORIENTATION OF INSTITUTIONALIZED STROKE PATIENTS

A THESIS
SUBMITTED IN PARTIAL FULFILLMENT OF THE
REQUIREMENTS FOR THE DEGREE OF
MASTER OF SCIENCE
IN THE GRADUATE SCHOOL OF THE
TEXAS WOMAN'S UNIVERSITY

COLLEGE OF NURSING

BY

CAROL LIPIN, B.S.

DENTON, TEXAS

AUGUST, 1975

The Graduate School

Texas Woman's University

Denton, Texas

July 15 1975

We hereby recommend that the Thesis prepared under our supervision by Carol Lipin entitled "Temporal Orientation of Institutionalized Stroke Patients"

be accepted as fulfilling this part of the requirements for the Degree of MASTER OF SCIENCE.

Committee:

Lois Hough
Chairman

Opal H. White

Linda B. Brown

Accepted:

Mary Evelyn Huey
Dean of The Graduate School

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ACKNOWLEDGMENTS

The researcher wishes to express her appreciation to the following persons whose guidance and cooperation made this study possible:

To members of my committee--Ms. Lois Hough, Dr. Opal White, and Ms. Linda Brown, for their time and valuable assistance.

To Ms. Cornelia Kenner, teacher and respected friend, for her advice and encouragement throughout my graduate studies.

To family and friends for their support, patience, and constant encouragement.

To the stroke patients and their families for their cooperation in this study.

CHAPTER I

ORIENTATION TO THE STUDY

Introduction

The ability to be oriented to person, place, and time is prerequisitite to being able to function as a human being. Any difficulty in a person's perception of time is frequently interpreted as confusion, and in the older individual, as a component of senility.

Impairment of temporal orientation can occur in the institutionalized stroke patient who is often dependent upon nursing personnel and family who assist in meeting his needs. The stroke patient in this setting is subject to a routine that soon becomes monotonous and often revolves only around physical care. Failure to meet the problem of temporal disorientation encourages greater degrees of dependency and, hence, more problems. Stimulation of the auditory and visual senses comprises an aspect of nursing that can be employed to reinforce the link between the stroke patient and his environment.

Statement of Problem

The problem in this study was to determine whether or not the temporal orientation of institutionalized stroke patients was altered by a sensory stimulated environment.

Purposes

The purposes of this study were as follows:

1. To identify the temporal orientation of a patient following a stroke.

2. To determine the effects of a sensory stimulated environment on the temporal orientation of stroke patients.

3. To discern factors that influence the temporal orientation of the stroke patient in the institutionalized setting.

Background and Significance

For clarity of the presentation, the background and significance of this study were separated into three sections: temporal orientation and its relationship to patients with cerebral disease, properties and effects of sensory stimulation, and sensory stimulation in the institutionalized environment.

Temporal Orientation and Its Relationship to Patients with Cerebral Disease

Time represents a feature of daily existence which is almost always a fundamental assumption. Although normal human beings often take it for granted, an estimate of the passage of time does not always coincide with the clock. Gooddy describes two kinds of time: government time or the public time keeping as seen on clocks, watches, and radio signals; and personal time or the awareness of the succession of events arranged in serial order in the memory (Gooddy 1969).

Any disease in which a patient is aware of or which disables him from normal activity of mind or body alters the personal time sense to some extent. Only when an illness becomes overwhelming does the personal time disintegrate. Without personal time, memory ceases and the subject becomes confused or unconscious. Such sudden alterations in personal time are seen in the stroke patient (Gooddy 1969).

Without government time or other external forms of clock-like activity, there would be no obvious method to detect when personal time has changed. In regaining personal time, external means such as dates on a calendar, newspaper, hearsay, or a change of scenery can be used to reconstruct the passage of government time. If government time and personal time have been incongruous for more than two or three weeks, it seems unlikely that awareness of the two will ever be quite normal again. There will be some defect in the government time-personal time relationship in diffuse brain-damage conditions (Gooddy 1969).

Impairment in temporal orientation is a prominent feature of the presenting symptoms in certain types of cerebral disease. Selective impairment of either orientation in time, that is, knowing the date, day of week and hour of day, or estimates of brief temporal durations may occur (Benton, Van Allen, and Fogel 1964).

A study at the University of Iowa by Benton, Van Allen, and Fogel (1964) was concerned with the temporal orientation of brain-damaged patients and their ability to perceive and assess brief temporal durations. It was hypothesized that some patients may have a diagnostically significant degree of temporal disorientation which may not be grossly evident due to a lack of deliberate objective assessment. The subjects had a disease involving one or both cerebral hemispheres, attained a maximum age of sixty years and had been hospitalized an average of six days. It was concluded that: (1) an objective assessment based on empirically derived standards will sometimes show temporal disorientation that is not detected on a typical routine clinical examination; (2) temporal disorientation may occur within a framework of general mental impairment but may not necessarily be a cause and effect relationship; (3) lesions in cerebral areas other than the hippocampal-mammillary complex may involve temporal disorientation;

(4) temporal orientation and the ability to estimate brief time periods are essentially independent processes (Benton, Van Allen, and Fogel 1964).

Properties and Effects of Sensory Stimulation

Man's development of emotion, purposeful behavior, and intelligence is dependent upon contact with the environment. This is achieved through the six sensory modalities--auditory, visual, tactile, kinesthetic, olfactory, and gustatory. There is a drive to maintain a constant range of varied sensory input in order to maintain cortical arousal at an optimal level. Man interacts with his environment in the form of increasing or decreasing sensory input in order to maintain his arousal at a level optimal for himself (Schultz 1965).

Schultz goes on to explain the mechanism by which sensory input maintains cortical arousal as that involving the reticular-activating system. The two sources of stimulation for this system are sensory stimulation, such as visual or olfactory, and cortical impulses, such as ideation. The reticular-activating system has been thought of as a barometer adjusting and regulating input-output relations. These changes are projected upon the forebrain by the ascending reticular activating system, thereby influencing alertness and attention, that is, cortical arousal. Sensory input can then be thought of as a major factor in cortical arousal (Schultz 1965).

If sensory input influences cortical arousal which in turn allows for efficient behavior, some relationship must exist between sensory input and behavior. An individual's reticular-activating system becomes adapted to certain levels of activity or sensory input. If the level of stimulation is not high enough for the individual, then the arousal level is not sufficiently high to facilitate and maintain adaptive behavior. If the stimulation is too intense, the arousal level is too high and there is an inability to acquire new adaptive responses. The result is excited behavior (Schultz 1965).

The brain depends as much upon change in stimulus conditions as it does on existence of stimuli. Stimuli must vary to maintain cortical arousal. They must provide meaningful contact with the environment. There are individual differences in the need for sensory variation and differences over time within the same person. The optimal level of sensory variation varies according to the task to be performed, the present state of the organism, and the level of the preceding stimulation (Schultz 1965).

Sensory Stimulation in the Institutionalized Environment

In the environment of the extended care facility, the older person is often exposed to sensory input that seldom changes and relationships that are less meaningful than those he has previously known. Deterioration and regression are often seen under institutionalized conditions of isolation and stimulus deprivation, depersonalization, monotonous routines, and blandness in the physical surroundings. It is possible that a more intense and diversified social, psychological, and physical environment would result in partial remission of such regression and degenerative processes (Loew and Silverstone 1971).

A study by Loew and Silverstone sought to develop and evaluate the effects of a program of increased social, psychological, and physical stimulation on the cognitive, affective, and social functioning of older senile patients. The rationale underlying the planning of the experimental program was that of reinforcing links between the patient and his environment and the encouragement of responsiveness. Male geriatric patients between ages eighty and ninety-six were studied using an experimental and control group. Physical environment was altered by means of colorful decoration, live plants, family pictures, and personal items of the patient. A large clock was installed, and several daily calendars which the patients were encouraged to keep up-to-date. Efforts were made to stimulate the patient's cognitive resources and emotional responses by group involvement and intellectual tasks such as telling time and remembering names (Loew and Silverstone 1971). Six psychological tests were administered to the two groups before the program was implemented and six months subsequent to its inception. The tests included the Mental Status Questionnaire consisting of ten questions regarding orientation in time and space; the Bender-Gestalt test for adequacy in copying designs; the Digit Span Backward and Forward portion of the Wechsler Adult Intelligence Scale; the Oberleder Attitude Scale concerning attitudes about growing old; the Energy Scale in which intensity of affect in relation to daily activities was studied; and the Ward Behavior Inventory to determine severity of individual disturbance.

The results of the study indicated that the functioning of the very old can be influenced in a limited way by changes in the social, psychological, and physical environments. The experimental group did enhance their ability for retaining information, memory, attention, and orientation for time. The study also showed that intensified sensory input produces increased affective states and stimulates one's behavior in the direction of a desire for some sort of change (Loew and Silverstone 1971).

A study has also been made of the factors related to individual differences in mental status of institutionalized aged. Kahn and co-workers found that age was the least important factor, while physical condition, psychiatric status, and educational level were more highly related to mental functioning. Mental status was also predictive of the comparative mortality rates among the institutions sampled (Kahn, Pollack and Goldfarb 1961).

Hypothesis

To carry out the purpose of this study the following hypothesis was formulated. The temporal orientation of institutionalized stroke patients is not altered by a sensory stimulated environment.

Definition of Terms

For the purpose of this study the following definitions were formulated.

1. Temporal orientation--the ability to know one's self in relation to time.

2. Sensory stimulated environment--surroundings characterized by more intense action that can be perceived by either auditory or visual modalities.

3. Stroke--acute onset of neurological deficit caused by a disturbance in brain circulation affecting one or both cerebral hemispheres.

4. Institutional setting--any nursing home or extended care facility in which a stroke patient lives.

5. Respond--to give a verbal reply to an auditory stimulus.

Limitations

There were five limitations observed in this study.

1. The extent of neurological pathology present was different in each patient.

2. The length of stay in the institutional setting prior to the study was of a variable nature.

3. The administration of medications that may affect the central nervous system was not manipulated.

4. The need for sensory variation was subject to individual differences.

5. The amount of visitation of family and friends was not controlled.

Delimitations

There were four delimitations included in this study.

1. The patients studied had incurred a stroke involving one or both cerebral hemispheres within the past year.

2. The patients were confined in an institutionalized setting.

3. There was a minimum age limit of sixty-five years of age for inclusion in the study.

4. Only those patients who were able to respond to the tests given were included in this study.

Assumptions

The following assumptions were made for this study.

1. Man has physical, psychological, and social needs.

2. Man is dependent upon a certain amount of sensory input in order to maintain himself as an integrated bio-psycho-social being.

3. The amount of stimulation perceived by each individual varies according to his capability to receive the input.

Summary

Impairment of temporal orientation may accompany cerebral disorders such as strokes. Sensory input influences cortical arousal and subsequent behavior. Therefore, reinforcing links between the patient and his environment is important in achieving and maintaining temporal orientation. It was the purpose of this investigation to determine whether or not the temporal orientation of institutionalized stroke patients was altered by a sensory stimulated environment.

Chapter II presents a review of medical, nursing, and psychosocial literature pertaining to temporal orientation and its relationship to patients with cerebral disease, properties and effects of sensory stimulation, and sensory stimulation in the institutionalized environment. Chapter III contains the research methodology for the study. The setting, sample, and tool utilized to determine whether the temporal orientation of stroke patients is altered by a sensory stimulated environment is described. The method of data collection and analysis is included. The findings of this study, a statistical analysis and interpretation of the findings are presented in Chapter IV. Tables are used to clarify the data. Chapter V presents the summary, conclusions, recommendations, and implications derived from this investigation.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

The subject matter for this study encompasses topics from several disciplines which have not been investigated with quite the same emphasis before. A review of the literature from the past ten years was undertaken. There was a paucity of literature dealing with temporal orientation of stroke patients and the effect of the environment upon the level of orientation. However, it was from consulting literature concerning the time sense, sensory input, and the institutionalized setting that the following review emerged.

The nature of the time sense and its relationship to recent memory will be discussed in this chapter. Numerous studies with variable results will be presented to validate an alteration in time sense during alienation, anxiety, and depression, and its existence in schizophrenics, brain-damaged patients, hemiplegics, and the aged. Because this study is concerned with stroke patients, factors that affect their orientation level, morbidity and mortality, and rehabilitative care will be discussed.

The second major part is concerned with the neurophysiological basis for the significance of sensory input, particularly its influence on cortical arousal, behavioral efficiency, and adaptation levels. Man's interaction with the environment may be disturbed in four different ways, namely, sensory deprivation, perceptual deprivation, perceptual monotony, and sensory overload. An understanding of these concepts is preliminary to the discussion of sensory stimulation.

Due to the specific environment in which this study was undertaken, a discussion of the aged in institutions, their social nature, and the effect of the environment will be explored. Factors related to differences in the mental status of institutionalized aged and the alternative available, namely, reality orientation, will conclude the review of the literature.

Time Sense and Its Relationship to Recent Memory

Since Czermak first hypothesized a general time sense in 1879, its existence in man has remained an enigma (Vernon and McGill 1963). Research in the past two decades has not been isolated to temporal experience alone. The relationship of time to other personality phenomena, normal and abnormal, has been pursued (Wallace and Rabin 1960 and Casella 1967).

Efforts to identify an organic or physiological locus for the "time sense" have been highly disputed. Schilder (1936) sited the parietal and temporal lobes for the location of time experience. Campbell (1954) later described it in terms of a sensorimotor organization of the central nervous system. He believed that motor activity occurred in the future and sensory experience in the past. This divided the cerebral cortex into past and future time orientation.

Coheen (1950) supported the view that the whole structure of temporal organization involved memory, awareness, attention, reasoning, and association and could not be localized to any one portion of the brain. There is no objective way to test these theories since such experimentation would necessitate the placement of lesions in the cortical and subcortical area of the brain to determine whether disruption of temporal experience would result (Casella 1967).

Physiological hypotheses were inadequate to explain the perception of time so external factors were explored (Wallace and Rabin 1960). Wallace and Rabin (1960) have correlated the development of temporal experience with the evolvement of self or ego. Such development begins early in life and continues with the increasing consciousness and discrimination of events which form the boundaries for the conceptualized periods of time. One learns the relationship of personal experiences and events to conventional units of time. Cultural factors affect this relationship.

Temporal orientation itself may be viewed as an index to the integrity of recent memory (Benton, Van Allen, and Fogel 1964). Memory has been defined by laymen, neurologists, psychologists, and others in various ways. Webster (1970) describes memory as a process of reproducing or recalling what has been learned or retained. Eccles (1966) defined memory as a property of the nervous system that is effective both in the storage and retrieval of information. It is difficult from a clinical standpoint to differentiate between the various phases of memory--retention and immediate recall, recent memory, and remote memory (DeJong 1973).

Guyton (1969) reports that although every part of the central nervous system can participate in the phenomena of memory, most of the process probably occurs in the cerebral cortex since 75 percent of the neurons in the brain are located in this area. Short-term memory is likely due to the stimulation of neuronal cells connected in reverberating circuits. The signal continues around the circuit even after the incoming sensation is gone. The thought is retained in the mind as long as these reverberations persist. The signal is localized to a particular area of the cerebral cortex depending upon the type of stimulus.

Reverberating signals in the brain cannot last indefinitely, and yet there is a long-term memory for events. Such is possible since the input passes through a set of neuronal synapses that act as facilitators for similar signals in the future. Passage of a signal through a synapse must occur repeatedly during the course of an hour or more after the input begins in order to develop the concept of long-term memory (Guyton 1969).

> However, once this engram has been established, almost any stray signal in the brain can at some later date set off a sequence of signals exactly like those originally initiated by the incoming sensation, whereupon the person experiences the same original thought (Guyton 1969, p. 343).

Whether a memory will be short-term or long-term depends not on the cerebral cortex but on the hippocampus (Guyton 1969). Anatomically, the hippocampus is located on the medial aspect of the brain and projects from the floor and wall of the lateral ventricles. DeJong, Itabashi, and Olson (1969) believe that memories are not stored in the hippocampus but rather the information is received there and integrated for storage elsewhere. Guyton (1969) further states that ingoing thought that provokes pain, pleasure, or some other strong sensation stimulates the hippocampus. Once the hippocampus is stimulated, other regions of the brain assist in causing the reverberating signals between the cortex and thalamus that lead to permanent storage of the memory.

Loss of memory is known to occur in widespread disturbances of cerebral function (DeJong, Itabashi, and Olson 1969), such as the senile cerebral degenerations, presenile and other organic psychoses, toxic and deficiency states, encephalitis, post-traumatic and post-anoxic sequelae, and after electroshock therapy and status epilepticus (Symonds 1966). Milner and Penfield (1955) believe it unwise to localize memory as a global function of any particular part of the nervous system despite clinical evidence that shows impaired memory with lesions of the temporal cortex, parahippocampal cortex, cingulate gyrus, mammillary bodies, thalamic nuclei, midbrain reticular formation, and the hippocampi and their connections with other centers via the fornices. Memory may not be localized in these areas and these parts may not form a memory center, but it is known that lesions of these sites precipitate devastating effects on memory and learning (DeJong 1973).

Alterations in the Time Sense

As can be readily determined, the locus of the time sense and recent memory is disputed, depending on the resource consulted. The methodology and usage of terms in this field are highly diversified, making broad generalizations subject to scrutiny.

What is known is that the ability to estimate, reproduce, or produce units of time is a judgmental process based on experience and an awareness of these in relation to time. A variety of conditions show some impairment in the time sense (Woodrow 1951).

Social-psychological factors may predispose one to experiencing an alteration in the time sense as seen in persons undergoing alienation (Hamid and James 1973), anxiety (Cohen and Mezey 1961), and depression (Cohen and Mezey 1961; Dilling and Rabin 1967; Straus 1947; and Wallace and Rabin 1960). People view their psychological center as either past, present, or future. To focus on the past emphasizes memory, history, conservation, nostalgia, and tradition. Concern with the future entails anticipation, planning, preparation, and saving. Still others focus on the present where activity and experience in the here and now are emphasized (Hamid and James 1973).

Hamid and James (1973) studied the time perspective of two groups of college students ranging in age from seventeen to twenty-six years by giving them the Lines Test developed by Cottle and Pleck. The Lines Test measures the relative significance of six time zones--the time before birth, the personal past, the present, the future, the life span or combined past, present, and future, and the future following one's death. The assumption here is that the more important a time zone appears to be, the longer it is perceived in linear terms (Cottle and Pleck 1969).

The same students were then given a radicalism/ conservatism questionnaire on two occasions, one to reflect their own value systems and the other, the perceived values of the Western culture. Those whose scores differed greatly were termed radically alienated whereas those in closer compliance with societal values were termed conservatively alienated (Hamid and James 1973).

The results showed significant effects on length scores with both time zone and the interaction between time zone and alienation type. Scores for the future were nearly three times as long as those of historical future and present, and nearly twice those of personal past. Radically alienated subjects were more present and future oriented whereas conservatively alienated subjects placed greater emphasis on the past. Personal future was the most important time area as anticipated due to the age of the subjects (Hamid and James 1973).

Such a linear conception of time engenders speculative notions of the outcome if an older population were studied. It would seem that the object of alienation--Western life and culture--with its rapid and often disruptive changes has entailed a "psychological distancing of the past, a sense of ignorance of the future, and a new emphasis on the present" (Hamid and James 1973, p. 144).

In order to appreciate the disturbance of time judgment in subjects with organic problems, another group of "normal" individuals are presented. Twenty-four doctors, ages twenty-seven to thirty-six years, were studied one hour before giving a lecture to a critical audience, a condition representing anxiety, and then again during the course of a working day. The tests, including production, reproduction and verbal estimation of time intervals were to determine whether anxiety is associated with an impaired judgment of time (Cohen and Mezey 1961). Twelve of the twenty subjects who described themselves as anxious or tense prior to the lecture exhibited a subjectively altered experience of time. Objective changes in time judgment were not apparent (Cohen and Mezey 1961).

The last psychosocial factor that may precipitate an alteration in the time sense is the depressive state. It has been widely reported by Straus (1947), Wallace and Rabin (1960), Mezey and Cohen (1961), and Dilling and Rabin (1967).

Straus (1947) noted changes in the space-time-motion perception of depressed patients as characterized by the following remarks. A depressed patient in viewing the present may say "time doesn't move at all . . . all is timeless, hopeless . . . time is nothing to me." In terms of the past, complaints were "everything seems years ago, very remote" whereas "the future is also remote . . . I can't envisage the future." Thus it is that an individual's concept of time is not homogeneous with the cosmic order of time. Time may be perceived as fast or slow. Time passes slowly on a boring day, yet appears short in retrospect. On an eventful day, it passes quickly, but there appears to be a long distance between morning and night (Straus 1947). In the pathologic discordance of personal and objective time, as in depression, world time is not reintegrated into personal time. Depressed individuals are in a sense unable to abandon the past and progress toward the future (Straus 1947).

In contrast to the previous discussion of the effect of anxiety on time estimation, Mezey and Cohen (1961) did a second study with depressed patients. Seventy-five percent of the depressed patients felt that time was passing more slowly than normal. However, they were unable to show an alteration of time judgment in depression.

Dilling and Rabin (1967) compared the temporal experience of depressed patients, schizophrenic patients, and a normal control group. There were significant differences between the coherence of future time perspective for the three groups: the schizophrenic group was the least coherent, followed by the depressive group, and then the normal control group. The findings generally supported the hypothesis that psychopathological disturbances affect temporal experience.

Methods employed in evaluating temporal experience in schizophrenics has included a recall of significant events in one's life and the passage of both short and long periods of time (Johnson and Petzel 1971). The measure used to determine temporal orientation in the study of forty hospitalized schizophrenic patients was their stated age. The sample was not seriously deficient in reporting their ages when compared to actual age. Earlier reports that patients tended to give their age at onset of illness or hospitalization were not substantiated by this study. In regard to time estimation, the schizophrenics tended to overestimate the passage of an unspecified time interval although they underestimated passage of a thirty-second period. The duration of both trials was thirty seconds (Johnson and Petzel 1971). These results in time estimation disagreed with the conclusion of Dilling and Rabin (1967) that temporal disturbance existed only over long periods of time.

The only studies found on temporal orientation in brain-damaged patients were undertaken about ten years ago by the Neurosensory Center and Departments of Neurology and Psychology at the University of Iowa. Benton, Van Allen, and Fogel (1964) were concerned with the frequency of temporal disorientation in patients with known cerebral disease. The subjects for their experimental study included sixty non-psychotic patients with disease involving one or both cerebral hemispheres. Their behavioral disabilities varied widely. About 80 percent of the total sample of both brain-damaged and control groups were outpatients. The mean age was forty-three years and the mean educational level was eleven years of schooling.

A brief temporal orientation test regarding day of week, date, and time, and several subtests of the Wechsler Adult Intelligence Scale were given to each patient. From the subtests a verbal scale IQ score was computed for each patient and then compared with the expected score based on his educational level. The presence and degree of mental impairment was estimated by the differences in these two scores. Brief temporal durations were also studied (Benton, Van Allen and Fogel 1964).

Of the sixty patients with cerebral disease, five showed evidence of temporal disorientation on clinical examination. Results showed that 45 percent made perfect scores and 76 percent made scores within the range of scores of 97 percent of the control group. Fourteen patients performed on an inferior level and were classified as grossly or moderately defective in time orientation. Eight of these were termed grossly defective and six were moderately defective in performance. The five who showed signs of disorientation on clinical examination were among the former group (Benton, Van Allen, and Fogel 1964).

> The rank order of the frequencies of the different types of errors was the same as in the control group, i.e., missing the day of the month was the most frequent type of error, mis-estimating the time of day was the next most frequent, and missing the day of the week was third in order of frequency (Benton, Van Allen and Fogel 1964, p. 113).

The month was misidentified by four brain-damaged patients, and the year by five subjects--errors not made by the control group. There were apparent differences in the relative frequencies of the various types of error. In the control group, twenty-two misestimated the time of day and only one misidentified the day of the week. On the other hand, eighteen of the sixty brain-damaged patients mis-estimated the time of day and thirteen misidentified the day of the week. For this study, misidentification of the day of the week seems to be a characteristic of the patients with cerebral disease (Benton, Van Allen, and Fogel 1964).

When correlating these results with the hemispheric location of the lesion, 70 percent of the ten patients with bilateral involvement showed defective orientation as compared with 12 percent of the twenty-six with left hemisphere involvement and 17 percent of the twenty-four subjects with right hemisphere disease. Those with bilateral involvement showed a significantly higher incidence in defective orientation when compared with the other two groups (Benton, Van Allen, and Fogel 1964).

This study was then followed by a survey of eight neurologists to determine criteria of normal temporal orientation. This was precipitated by the fact that some of the brain-damaged persons previously studied were noted as being orientated for "person, place, and time" when in fact they exhibited some degree of temporal disorientation on objective assessment. The neurologists may have been using other types of questions or different criteria with respect to orientation. The results of this questionnaire indicate that a neurologist should utilize a set of questions consistently and score them on the basis of some empirically established normative standards rather than on uncontrolled subjective impressions (Benton, Van Allen, and Fogel 1964).

There was no relationship in the control patients between accuracy of temporal orientation and factors such as age, educational level, intelligence level, or length of hospitalization. However, the control group's oldest participant was sixty years of age, the mean length of hospitalization was six days, and the group fully expected to return to their usual livelihood. The experimental group of brain-damaged patients likewise showed no relationship between orientation level and age or education. However, most of those showing defective orientation had a significant degree of general mental impairment (Benton, Van Allen, and Fogel 1964).

> It would seem to be a tenable conclusion that temporal disorientation belongs among those behavioral defects (denial of illness, motor impersistence) which typically appear within a setting of general mental impairment but which are not necessary consequences of the impairment (Benton, Van Allen, and Fogel 1964, p. 118).

The following year another study was done on brain-damaged patients to determine their ability to discriminate between very short temporal durations of 0.4 to 1.0 seconds. The results showed more difficulty in determining visual durations than auditory ones. One reason may be that visual stimulation necessitates focusing on the stimulus whereas such focal attention is not necessary in discriminating auditory durations (Van Allen, Benton, and Gordon 1966).

Both brain-damaged and control subjects estimated auditory durations more accurately. An observation here that did not show statistical significance was that patients with left hemispheric lesions performed less well than did those with right hemispheric lesions. If this finding were substantiated, language functioning would necessarily be involved in comparing hemispheric locus to brief temporal duration (Van Allen, Benton, and Gordon 1966).

Perception of time for both filled and empty intervals was the nature of a study by Casella (1967) in which the temporal judgmental experience of both brain-damaged and normal subjects were tested. The first group were patients with hemiplegia due to a recent cerebrovascular accident who were on the physical medicine and rehabilitation service. The mean age was 46.1 years. Length of hospitalization ranged from three weeks to two months. All were ambulatory with assistance.

Two control groups were utilized. The first to control for hospitalization and ambulation factors were diabetic patients with above-knee amputations who were being rehabilitated for prostheses. The second control group was composed of hospital staff who were matched according to age and sex to be comparable to the hemiplegic group. The subjects were given two experimental conditions in which they were to estimate an empty time interval and then an interval that had been characterized by activity and verbal and auditory stimulation (Casella 1967).

The conclusions from this study represent a continuum of ability to estimate a temporal interval. The hemiplegic patients had the least capacity to judge the intervals which exceeded fifteen minutes whether the interval was empty or filled. There was no consistent direction in their estimates. The diabetic control group had difficulty estimating the empty interval but closely approximated the normal group during the filled interval. They tended to overestimate the empty period and even expressed annoyance at having to wait for the examiner to see them. The normal group was closest in estimating both filled and empty time periods (Casella 1967).

Pathophysiology of Strokes

From the studies by Benton, Van Allen, and Fogel (1964) and Casella (1967), it is apparent that an alteration in the time sense occurs in patients with brain damage. In order to understand factors that may affect the orientation level of stroke patients, the particular subjects in this study, the pathophysiology, morbidity and mortality, and rehabilitative care of the stroke patient will be presented.

Chusid (1970) classifies the types of stroke or spontaneous cerebrovascular accident according to their etiology: cerebral thrombosis, cerebral hemorrhage, cerebral embolism, and subarachnoid hemorrhage. It is usually associated with disease involving the intracranial vascular network.

This network consists of two arterial inflows into the brain, the carotid and vertebral arteries. The internal carotid artery arises from the common carotid artery at the level of the thyroid cartilage and projects upward in the neck to the base of the skull before giving off any branches. The internal carotid artery gives off the ophthalmic, posterior communicating and anterior choroidal vessel, then bifurcates into the anterior and middle cerebral arteries (Netter 1972).

The vertebral artery, a branch of the subclavian, ascends through the foramina of the transverse processes of the upper six cervical vertebra, winds behind the articular process of the atlas, and enters the skull through the foramen magnum. It continues forward on the anterior surface of the medulla oblongata uniting with the corresponding vessel on the opposite side at the lower border of the pons to become the basilar artery. The cranial branches of the vertebral basilar artery include the cerebellar, the pontine, and the posterior cerebral arteries. The union between the branches of the internal carotid and basilar arteries result in the Circle of Willis which provides collateral circulation to the brain when certain of the major vessels are occluded (Netter 1972).

Each internal carotid artery supplies the ipsilateral cerebral hemisphere whereas the basilar artery of the vertebral system transports blood to structures in the posterior fossa. The effects of a stroke depend on the anatomical location of the cerebral insult (Chusid 1970).

Occlusion of the anterior cerebral artery which supplies the medial aspect of the anterior two-thirds of the cerebral hemisphere may cause contralateral hemiplegia. This is more pronounced in the lower extremity due to the involved cortical area and is accompanied by some sensory deficit. Mental deterioration, apraxia, and a forced hand grasp reflex may be present. This is indicative of frontal lobe damage. Although these patients usually survive, there is little clinical improvement (Ross and Klassen 1973).

The greater portion of the convexity of the cerebral hemisphere is supplied by the middle cerebral artery. Occlusion of the main branch of the middle cerebral artery may cause coma, contralateral flaccid hemiplegia, hemianesthesia, and hemianopsia. The hemiparesis shows greater involvement of the arm, hand, and face than of the leg since the leg motor area of the cerebral cortex receives its blood from the anterior cerebral artery. Profound motor and sensory aphasia are seen if the dominant hemisphere is affected. Survivors have severe residual neurological deficits (Chusid 1970).

The posterior cerebral artery completes the arterial supply of the cerebral cortex by supplying the posterior pole and posterior medial third of the cerebral hemisphere. The basilar artery is the usual supplier of blood to this vessel although the internal carotid artery is occasionally involved. Occlusion of the posterior cerebral artery may cause contralateral hemiplegia, often transient, contralateral hemianesthesia and homonymous hemianopsia. Sensory aphasia exists if the dominant side is affected (Chusid 1970).

The transmission of motor signals from the motor cortex to the spinal cord accounts for the occurrence of symptoms on the side contralateral to the cerebral involvement. Fibers in the corticospinal or pyramidal tract cross to the opposite side in the medulla or the upper segments of the spinal cord. As a result, stimulation of the left motor cortex contracts the muscles on the right side of the body. Likewise, injury to the cerebral cortex of the left hemisphere of the brain causes neurologic deficits on the right side of the body (Guyton 1969).

Few studies have followed the course of the lives of patients after a stroke. Health statistics invariably list longevity and death as parameters for evaluation. Kottke (1974) estimated that 65 percent of patients following a stroke should achieve partial to full independence through rehabilitation. Less than 5 percent of stroke patients should remain totally dependent.

Hurwitz and Adams (1972) categorized the survivors of strokes according to physical and psychological manifestations:

Grade 1--This patient is fully independent, has a clear intellect, a confident gait, and has regained some use of the involved upper extremity. Twenty percent of stroke survivors belong in this group.

Grade 2--Mental clouding is characteristic of this patient who walks unaided but has retained upper extremity paresis. Forty percent of stroke patients belong in this group.

Grade 3--These patients are confined to either bed or chair, are mentally confused, and often incontinent. This group accounts for 30 percent of stroke patients.

The final 10 percent die within two months of the onset.

Criteria to determine the level of rehabilitation after a stroke were developed by the Joint Committee for Stroke Facilities (1972). They include the patient's state of mentation, his ultimate functional capacity, the degree of residual function in areas of deficit such as speech or paretic limbs, the degree of deficit, survival, and the probability of further complications. Kottke states that "in the absence of attempts to restore and maintain ability, these patients do deteriorate rapidly" (1974, p. 10).

Diller and Weinberg (1968) studied perceptual differences in right and left hemispheric lesions in a series of seventy hemiplegic adults who were brain-damaged due to a stroke. Tasks stemming from visual and auditory stimuli that required short-term and long-term storage to complete successfully were utilized.

The results showed profound differences. The left hemiplegics were impaired in the short-term visual stimulus task but performed satisfactorily in response to short-term auditory stimuli. There was likewise no impairment in long-term tasks initiating from either visual or auditory stimuli. On the other hand, the right hemiplegics were superior to the left hemiplegics only in the short-term task from a visual stimulus.

A differential loss in memory processing existed in the two groups of patients. The left hemiplegic will retain the information, since his language and seriation ability are intact, if the visual stimulus is given for a longer period of time. The right hemiplegic often has verbal deficiencies which would negate his ability to perform auditory tasks. Seriation is deficient in the absence of language making long-term tasks difficult to complete. The right hemiplegic needs to utilize cues and rehearsal that are independent of memory to maintain activities (Diller and Weinberg 1968).

Hurwitz and Adams (1972) believe that patients with a right cerebral hemispheric lesion and subsequent left hemiplegia show constructional apraxia and visuo-spatial difficulties. Such patients as a group do not do as well as right hemiplegics including those with aphasia. One possible explanation can be found in the right-left hemispheric specialization described by Ornstein (1972). The left hemisphere is involved with analytical, logical thinking in verbal and mathematical function. It seems to process information sequentially. The right hemisphere seems specific to orientation in space, body image, and recognition of faces. It processes and integrates information and is more holistic. This specialization is based on right-handed individuals. Left-handed individuals which account for 5 percent of the population have mixed specialization or a reversal (Ornstein 1972).

Neurophysiological Basis for Significance of Sensory Input

Schultz (1965) describes a drive state of cortical arousal in man that impels him to maintain an optimal level of sensory variation. Recent evidence reveals that the drive for stimulation is neurophysiologically based in the reticular activating system. This is a dense network of neurons that form a central core extending from the medulla of the lower brainstem to the thalamus in the diencephalon. Its fibers contribute impulses upward to the cortex and downward to the musculature. A selectivity of attention exists in that the reticular activating system may suppress some responses in favor of responses to other stimuli (Schultz 1965).

Optimal sensory input is individual and depends on early postnatal levels of stimulation and genetic factors. One's adaptation level is developed early in life although an adult's sensory experience may change the adaptation level. For example, sensory deprivation for the neonate leads to a low level of cortical arousal. The ascending reticular activating system adapts to this level and keeps sensory input at a reduced level. Due to low cortical arousal, performance on tasks requiring higher levels of activation would also be impaired. The effect of genetics is not understood but it is known that a rich sensory environment can raise one's level of adaptation (Schultz 1965).

An optimal level of external stimulation must be maintained to ensure adaptive behavior. Otherwise, learned responses are disrupted and new learning impeded. Some people have a higher optimal sensory level and therefore a greater need for stimulation (Schultz 1965).

Schultz (1965) lists four types of disturbed man-environment interactions.

1. Sensory deprivation: stimuli received by the central nervous system is reduced to as low a level as possible.

2. Perceptual deprivation: stimuli may be at a normal level but the meaningful organization or patterning of the input is reduced.

3. Perceptual monotony: variation of stimuli is lacking.

4. Sensory overload: sensory stimulation is intense but its effect is similar to perceptual deprivation in that there is decreased meaningfulness or patterning of stimuli.

The actual cause of a sensory restriction may influence the behavioral response. Schultz (1965) states that there is greater behavioral response from perceptual deprivation than sensory deprivation which in turn has greater behavioral response than perceptual monotony. Impairment of vision and auditory senses effects a greater behavioral disturbance than the tactile, olfactory, and gustatory senses. The specific modalities involved as well as the number of modalities influences the behavioral response. Intervention should begin with the existing stimuli and be at a normal level of intensity, variable, meaningful, and desirable to the individual.

The Aged in the Institutionalized Environment

The aged share certain characteristics of the ill that arise from an interaction between society and the aging process. Similarity between aging and illness is apparent as disconnection from the larger world, personal vulnerability, and a feeling of being controlled rather than having control. Society tends to reinforce the subsequent physical dependency by the attitude that aging is an illness (Cassell 1972).

Reitan (1967) describes the psychologic changes that accompany aging as follows. There may be a decline in activities and interests to the point of depression as involvement with the environment is reduced. The aged individual may become introverted and suspicious of close emotional relationships and be resistant to change. Unfamiliar surroundings cause a disorientation in time and place. There is also a decline in intellectual ability, especially in areas of abstraction, conceptualization, memory for recent events, and problems for which past experience is not immediately relevant.

Behavioral motivation is based on achievement through positive reinforcement in society. However, in the aged, there is a shift from aggressiveness to defensiveness in an effort to avoid failure. Risk-taking behavior is decreased. Negative feedback results in atrophy of function (Busse and Pfeiffer 1969).

Wallace and Rabin (1960) report that in a measure of temporal orientation by Fink using the Thematic Apperception Test, aged institutionalized patients had a time perspective more concerned with the past than their noninstitutionalized contemporaries. Cassell (1972) refers to this as a casting out of the time sense.

The existence of a time perspective in the aging patient would serve two purposes. First, it would liberate the individual from being dominated by the immediate situation. It would also provide a framework for the development and maintenance of self-identity. An aged patient whose illness, institutionalization, and dependency becomes intolerable to him can reminisce of a satisfying past and anticipate an improved future. Ego strength is bolstered by recalling past autonomy (Kastenbaum 1966).

Cohen (1967) goes further to stress the importance of "futureness." Implicit in all actions are plans for the future. Without believing in a tomorrow, much of what is done today would be pointless.

The aging process coupled with the change in environment has an effect on the patient's behavior. Any change in environment or an unfamiliar setting results in confusion in the aged. The elderly are frail, borderline in residual capacities, and least adaptive to change. Institutionalization represents deterioration and disability. The decline in sensory function, especially a loss of visual and auditory acuity, heightens their feelings of isolation (Rossman 1971).

Burnside (1969) has done group work with the aged to try to increase their interpersonal communication. She found that the relative immobility of the patients contributed greatly to their lack of socialization and subsequent isolation.

Since the late nineteenth century, the effects of institutionalization on the aged has been a question of humanitarian interest. Such a setting implies permanent or indefinite residence involving a change from conventional living. People in an institution find themselves in a defensive shell of isolation with little access to society. They are deprived of family relationships in their separate existence (Lieberman 1969).

Physical illness among the institutionalized aged affects psychological status. Also the meaning of institutionalization for the individual may affect his reactions. Shanas (1961) found that the aged associated moving with a loss of independence, prelude to death, and rejection by his family. Miller, Keller, Liebel, and Meirowitz (1966) believe that chronic illness and institutionalization cause a conflict within the family structure. Intrafamily stress involving multiple siblings and only-child relationships are accentuated. Feelings of guilt, hostility, and resentment in the family-patient relationship affect the patient's behavior.

However, it should be realized that the common stereotype about the destructive influences of institutional living on the aged is overrated. Some of the supposed psychological effects are either characteristic of the person before entering the institution or are associated with the change upon entering the institution (Lieberman 1969).

Reality Orientation

A new therapeutic mode, called reality orientation, has gained acceptance in allaying the disorientation associated with the aged. It is based on consistent positive reinforcement of such basic motifs as name, day, month, year, and other information. This affords the patient orientation to the three spheres commonly assessed--person, place, and time (Phillips 1973). In cerebral disease the most abstract of these concepts and the first to be affected is orientation to time, then orientation to place, and finally orientation to person. If repeatedly asked for time or date, the patient may find the answer from a visitor so he can give the expected answer (Smith 1967).

The concept of reality orientation was initiated in 1958 at Winter Veterans Administration in Topeka, Kansas. A similar program was established in 1961 at the Mental Health Institute in Mount Pleasant, Iowa with elderly mentally ill patients. The technique was refined in 1965 by James C. Folsom, M.D. at the Veterans Administration Hospital in Tuscaloosa, Alabama. Since 1965, components of that program have been utilized in many general hospitals, psychiatric hospitals, and other nursing care facilities (Phillips 1973).

Hillhaven Homes, a California nursing home chain, adopted a reality orientation program based on the following conditions:

> . . . a calm environment, a set routine, clear but not necessarily loud responses to patients' questions with the same type of questions asked of the patients, clear directions and assistance in directing or guiding patients to and from their destinations if they need it, constant reminders of the date and time, interruption of the patients who start to ramble in their speech or actions, firmness when necessary, sincerity, requests of patients in a calm manner, and consistency (Phillips 1973, p. 48).

When the patient seems aware of basic data such as name, date, and season, he is given further information and progressed according to his ability. The program at Hillhaven utilizes nursing assistants since reality orientation is not so much an activity specific to nursing but a social interaction between any member of the team and the patient that affords the patient's return closer to reality. Of the first fifty-five patients in the program, nineteen showed significant improvement in retaining what they had learned in the classes. Physical appearance and mental outlook improved. These patients were initially withdrawn, depressed, in poor physical condition, and openly expressed fear and anger. Another twenty showed moderate improvement and were more cooperative with ancillary personnel. Five of the fifty-five showed only slight improvement and eleven were discontinued due to illness or disruptiveness (Phillips 1973).

Temporal orientation is one component in the reality orientation program. In caring for the disoriented person, specific guidelines have been established at the Reality Orientation Training Program in Tuscaloosa, Alabama. These are:

1. Give concise directions in simple short statements.

2. Speak in clear, distinct tones on an adult level.
3. Repeat information as necessary.
4. Be patient and allow extra time for a response or reply.
5. Refer to clocks and other reality orientation props when appropriate.
6. Use reality information such as time, date, place, and name in all conversational contact.
7. Maintain an expectant manner.
8. Maintain consistency and establish routine.
9. Watch for small changes in behavior which indicate progress.
10. Reward persons for correct responses with verbal praise, touch, smiles, etc. (Scarbrough 1974, p. 13).

Reality orientation is not a short-term panacea but a continuous way of communicating more effectively with confused individuals (Scarbrough 1974). Burnside (1973) states that patients should be given all the information necessary to orient themselves in all spheres. Calendars should give the day, month, date, and year. Access to clocks and personal watches should be afforded. Schedules such as meal times and bath time allow the patient to gauge the time of day.

Summary

The time sense, as a component of recent memory, has been seen to be subject to alteration in conditions of both physical and psychological origin. The stroke patient is but one of many groups of individuals who may be subjected to a loss of temporal orientation.

The drive to maintain a constant range of sensory input in order to maintain cortical arousal is neurophysiologically based in the reticular activating system. In order to be effective, intervention should consist of existing stimuli that are of normal intensity, variable, meaningful, and desirable to the individual. Concepts of the effects of institutionalization on the behavior of the aged has given impetus to reality orientation measures which serve to keep the patient in touch with his environment.

CHAPTER III

PROCEDURE FOR COLLECTION AND TREATMENT OF DATA

Introduction

This study was conducted utilizing the experimental design in which the experiment is done in the natural setting with a one-group before-after technique (Abdellah and Levine 1965). The independent variable, a sensory stimulated environment, was applied to the study subjects to determine the effect this had on the temporal orientation of institutionalized stroke patients. The methods used in collecting and analyzing the data are presented.

Setting

This study was conducted at a 135-bed proprietary extended care facility in Dallas, Texas. This institution was selected for two reasons: (1) it contained the population to be studied, and (2) no other variables were present that would interfere with the study. The extended care facility received its clients upon discharge from any acute care hospital in the area. The average length of stay in this environment was twenty-one days, the period of time that Medicare coverage insured. After this time period, the responsible party for the client subsidized part of the hospitalization. Consequently, many of the clients were discharged home or transferred to a nursing home. Permission was obtained in writing from the administrator of the facility to conduct the study (Appendix 1).

Population

The subjects for the study were selected by means of purposive sampling (Abdellah and Levine 1965). The criteria for inclusion which were considered representative of the target population were as follows: the patients were sixty-five years of age or older and had incurred a stroke during the past year involving one or both cerebral hemispheres. The subjects were also able to respond verbally.

Written consent of the participants and/or their responsible party was obtained prior to initiation of the study (Appendix 1). An explanation of the study was given to the consenting party with assurance that anonymity of the participant would be preserved. There were several occasions in which permission was not obtained. These patients, therefore, were not included in the study.

Tool

The tool for this study has been standardized by Benton, Van Allen, and Fogel (1964) in their study of temporal orientation of patients with cerebral disease (Appendix 2). At that time, 110 patients were used as a control group in their study and 60 brain-damaged patients were used to provide accurate norms in evaluating performance.

The Temporal Orientation Test consists of three questions and requires the patient to provide five types of information: time of day, day of the week, day of the month, month, and year. Each answer is scored for accuracy and a single total score representing the subject's temporal orientation is compiled.

Pilot Study

A pilot study of five patients was initiated over a four-week period in order to determine any areas in the research design where improvement or change would be needed before the major study was begun (Treece and Treece 1973). The average length of stay in these five patients was about two weeks which was the factor in determining the length of experimentation. The pilot study consequently was completed on only two patients.

The results from the two subjects in the pilot study were as follows:

1. One subject with a right hemispheric lesion showed a defective orientation to time on the pre-test in regards to the month, day of month, and time of day, scoring 79 points. The post-test revealed a perfect score of 100.

2. The other subject had a left hemispheric lesion and scored only 20 points on the pre-test with errors occurring in relation to the month, day of month, and year. The post-test score on this subject was 80 with errors remaining concerning the month and day of month.

Administration of the Tool

Except for the time interval change for the study from four weeks to two weeks, no other changes were made in administration of the tool. The data for the study were collected between March 15, 1975, and June 12, 1975, the time period needed to obtain a sample of thirty patients. The medical record from the institution was consulted to determine the age of the patient and the date the stroke was incurred. Patients who were aphasic were excluded from the study. All patients who met the criteria were admitted to the study.

Each subject was pre-tested utilizing the Temporal Orientation Test (Appendix 2) to determine the level of temporal orientation prior to any introduction of a changed environment. The questions that comprise the test were asked in the same order each time and the responses were recorded and scored. Then for a period of two weeks following the pre-test, a sensory stimulated environment was provided through the use of a large calendar placed in the patient's room. The calendar was a daily date wall calendar that stated "To-Day Is . . ." The individual pages with the date and day of the week measured 6 by 6-1/8 inches.

Participation of the personnel in the institution was required in order to keep the daily calendars up-to-date. A series of inservice education classes were held to introduce the nature of the study and elicit staff cooperation. Written directives were then placed on the bulletin board of each nursing station with the instructions to tear off the previous day's date each morning. Verbal reinforcement of the date, day of week, and time of day was provided each study subject by the personnel twice a day for each day of the experiment.

Following the two-week period, the same test was given verbally by the researcher to the sample subjects to determine whether or not the temporal orientation of stroke patients was altered by the sensory stimulated environment. Demographic data was obtained (Appendix 3) to determine if correlations existed between temporal orientation and the following variables: the hemispheric location of the lesion, type of room, amount of visitation, prior living accommodations, participation in physical therapy and/or speech therapy, the level of activity, the type of feeding, and the loss of a roommate through death, transfer, or discharge. This information was collected to determine changes in the patient's environment that may be significant to the study.

Procedure for Treatment of the Data

The criteria utilized when the temporal orientation test was standardized was implemented in evaluating the data: (1) One point off for each day removed from the correct day of week with a maximum of 3 points. (2) One point off for each day removed from the correct day of the month to a maximum of 15 points. (3) Five points off for each month removed from the correct month to a maximum of 30 points. A qualification is added that if the stated date is within fifteen days of the correct date, no points are taken off for incorrect month. (4) Ten points deduction for each year removed from the correct year to maximum of 60 points. The qualification here is that if the stated date is within fifteen days of the correct day, no points are taken off for incorrect year. (5) One point off for each thirty minutes removed from the correct time of day to a maximum of 5 points. The total amount of "points off" for errors was subtracted from an assigned perfect score of 100 to obtain the patient's score (Benton, Van Allen, and Fogel 1964).

A nonparametric test was selected that would utilize information about the direction and the magnitude of the differences between pre-test and post-test scores. The Wilcoxon Matched-Pairs Signed-Ranks was selected because it contains these properties. It is a nonparametric test based on ranks and may be used to test hypotheses when related samples come from the same (or identical) populations. Its use assumes that at least an ordinal scale of measurement has been obtained. The Wilcoxon test is appropriate since the data are difference scores from two related samples with each subject representing his own control (Siegel 1956).

To determine the level of significance by the Wilcoxon Matched-Pairs Signed-Ranks test, all the differences in scores are ranked without regard to sign: the rank of 1 is assigned to the smallest difference, the rank of 2 to the next smallest difference, and so forth. Tied differences are assigned the average of the tied ranks. The sign of the difference (+ or -) is affixed to each rank to distinguish those ranks arising from negative differences from those arising from positive differences. The test statistic, T, is equated to the smaller of the sums of the like-signed ranks. The significance of the observed value of T depends on the sample size of N, the total number of signed differences. For sample sizes larger than 25, T is normally distributed. In order to test the significance of an observed value for T, the corresponding standard normal statistic, z, is computed according to the formula

$$z = \frac{T - \frac{N(N+1)}{4}}{\sqrt{\frac{N(N+1)\ (2N+1)}{24}}} \qquad \text{(Siegel 1956).}$$

A nonparametric measure of correlation, the contingency coefficient C, was utilized to determine the extent of association between temporal orientation and the following information: type of error on the test, hemispheric location of the lesion, type of room, amount of visitation, prior living accommodations, participation in physical therapy and/or speech therapy, the level of activity, the type of feeding, and the loss of a roommate through death, transfer, or discharge. This test is useful when only categorical information about one or both sets of these attributes is available (Siegel 1956). The 0.05 level of significance was desired. The results of these statistical procedures appear in Chapter IV of this study.

Summary

This study was developed as an experimental design which is concerned with the effect of a sensory stimulated environment on the temporal orientation of institutionalized stroke patients. The setting from which the population was selected and the data collected was an extended care facility. Subjects participating in the study were patients sixty-five years of age or older who had incurred a stroke involving one or both cerebral hemispheres during the past year. The subjects were also able to respond verbally to the tool.

The tool for this study was the Temporal Orientation Test standardized by Benton, Van Allen, and Fogel (1964). The Wilcoxon Matched-Pairs Signed-Ranks test and the contingency coefficient were the two statistical methods utilized in the treatment of the data.

CHAPTER IV

ANALYSIS AND INTERPRETATION OF FINDINGS

Introduction

The problem of this study was to determine whether or not the temporal orientation of institutionalized stroke patients is altered by a sensory stimulated environment. The change in temporal orientation was measured by administering a temporal orientation test both before and after the introduction of sensory stimulation. The findings are presented in terms of the raw score corresponding to the type and magnitude of errors in each patient's response. The set of observed differences in temporal orientation was tested statistically to determine if a significant improvement in orientation occurred. Associations between the degree of temporal disorientation, the degree of improvement in temporal orientation following sensory stimulation, the hemispheric location of the patient's lesion, type of hospital room, the amount of visitation, and the patient's prior living accommodations were also investigated.

Presentation and Analysis of Data

Temporal Orientation Scores

The sample employed in the study consisted of thirty patients, ages sixty-five or older, who had incurred a stroke within the past year. Each subject was pre-tested utilizing the temporal orientation test. After two weeks of daily sensory stimulation, the patient was post-tested in the same manner. The criteria for scoring consisted of deducting points from 100 for each particular type of error made; that is, an error in identifying the correct month, day of month, year, day of week, and approximate time of day. The pre-test and post-test scores of the subjects sampled are listed in Table 1.

As can be seen from the data in Table 1, an improvement in temporal orientation was observed in all but five cases. Of those five, only two subjects (6 and 21) showed greater disorientation during posttesting than during pretesting. No improvement was indicated in two cases of severe disorientation (subjects 8 and 17). No improvement was possible in the case of subject 23 since no disorientation was indicated on the pretest.

Significance of the Observed Changes in Temporal Orientation

The lower of the two scores was assumed to indicate a greater degree of temporal disorientation and the larger

TABLE 1

PRETEST AND POSTTEST TEMPORAL ORIENTATION SCORES

Subject	Pretest Score	Posttest Score
1	91	92
2	98	100
3	62	88
4	0	50
5	15	100
6	40	5
7	96	100
8	0	0
9	0	45
10	61	100
11	85	100
12	24	75
13	94	100
14	0	57
15	84	99
16	0	40
17	0	0
18	59	100
19	87	95
20	88	94
21	57	35
22	97	100
23	100	100
24	42	66
25	57	81
26	37	97
27	34	83
28	83	94
29	40	86
30	13	75

of two differences in scores a greater degree of improvement in temporal orientation. In applying the Wilcoxon Matched-Pairs Signed-Ranks test, N = 27 was used. Three of the thirty temporal orientation scores were the same on the posttest as on the pretest and were excluded because the statistic measures differences. In testing the hypothesis, T is determined to have a value of 26 and z is found to be -3.916, which is significant at the 0.00005 level. Therefore, the hypothesis: The temporal orientation of institutionalized stroke patients is not altered by a sensory stimulated environment, can be rejected at the 0.00005 level of significance.

Additional Findings

Other variables of interest in analyzing the scores of subjects in the sample include the hemispheric location of the lesion, the type of room in which the patient lived during the time of the study, the number of days per week the subject received visitors, and the patient's type of living accommodation prior to the onset of stroke.

Hemispheric Location of the Lesion

The most common type of error made on the pretest and posttest cannot be correlated to the hemispheric location of the lesion utilizing the contingency coefficient C. This statistic requires that fewer than 20 percent of the cells have an expected frequency of less than five (Siegel 1956). Errors were made in all categories, i.e., year, month, day of month, day of week, and time of day, such that the expected frequency in many of the cells was less than five. Therefore, this data was not amenable to computation.

However, relationships involving the site of the lesion can be investigated in terms of the pretest score, the posttest score, and the amount of change in temporal orientation between pretest and posttest. There were 10 subjects in the sample who had a left hemispheric lesion, and 16 with a right hemispheric lesion. Only 26 of the 30 subjects were evaluated in terms of location of the lesion since 1 had lesions in both hemispheres, and the lesion locations were not specified for the remaining 3 subjects. The 2 by 2 contingency table relating pretest scores and the hemispheric locations of the lesions is presented in Table 2.

TABLE 2

NUMBER OF PATIENTS WITH RIGHT OR LEFT HEMISPHERIC LESION AND ASSOCIATED PRETEST SCORE

Hemispheric Site of Lesion	Pretest Score	
	0 - 50	51 - 100
Right	3	13
Left	7	3

The contingency coefficient C is employed to assess the correlation between the hemispheric location of lesions and temporal disorientation pretest scores. Chi-square is computed to be 11.073 and from this the contingency coefficient is determined to be 0.547, which is significant at the 0.01 level. Therefore, an association between the hemispheric location of the lesion and the subject's pretest score is indicated. Patients with a left hemispheric lesion tend to demonstrate a significantly greater degree of temporal disorientation on the pretest.

In order to ascertain whether there is an association between the hemispheric site of the lesion and the posttest score, a contingency table is again utilized. The relationship between posttest scores and the hemispheric site of the lesion is presented in Table 3.

TABLE 3

NUMBER OF PATIENTS WITH RIGHT OR LEFT HEMISPHERIC LESION AND ASSOCIATED POSTTEST SCORE

Hemispheric Site of Lesion	Posttest Score	
	0 - 85	86 - 100
Right	4	12
Left	5	5

Chi-square is computed to be 1.698. The contingency coefficient has a corresponding value of 0.2476 which is significant only at the 0.20 level. Although those subjects with left hemispheric involvement tended to score lower on the posttest, the association between temporal disorientation following stimulation and lesion location was not found to be significant.

Since this study has shown that patients with left hemispheric lesions tend to show a greater degree of temporal disorientation initially than patients with right hemispheric lesions, but not significantly greater disorientation following a period of sensory stimulation, another analysis is undertaken to determine whether the amount of change in disorientation is associated with the hemispheric site of the lesion. The 2 by 2 contingency table representing the grouping of the sample by lesion location and difference in temporal orientation scores is presented in Table 4.

Chi-square is determined to be 6.830 and the contingency coefficient is 0.4561, which is significant at the 0.01 level. Therefore, an association between amount of change in temporal disorientation and lesion location is indicated. Those subjects with a left hemispheric lesion tended to show a greater degree of improvement following sensory stimulation than those with right

TABLE 4

NUMBER OF PATIENTS WITH RIGHT OR LEFT HEMISPHERIC LESION AND THE CORRESPONDING DIFFERENCES IN TEMPORAL ORIENTATION SCORES

Hemispheric Site of Lesion	Number of Points Difference in Temporal Orientation Scores	
	Less than or Equal to 35	Greater than 35
Right	13	3
Left	3	7

hemispheric lesions. However, those with left hemispheric lesions had indicated a greater degree of disorientation initially, and thus had a greater potential for improvement.

Type of Room

In an investigation of room environment as an independent variable of the study, the sample is limited to the twenty-seven patients who were in either private or semi-private rooms during the study period. A semi-private room is defined as one occupied by two patients, whereas a private room has only one occupant. Three subjects were excluded because each had occupied both private and semi-private room accommodations during the period of the study.

Table 5 is a grouping of the sample by room type and change in temporal orientation from pretest to posttest.

TABLE 5

CHANGE IN TEMPORAL ORIENTATION OF PATIENTS IN PRIVATE AND SEMI-PRIVATE ROOMS

Type of Room	Number of Points Difference in Temporal Orientation Scores	
	Less Than or Equal to 35	Greater Than 35
Private	3	1
Semi-private	14	9

The expected frequencies are found to be too low to test for correlation with the contingency coefficient, the appropriate nonparametric test, since two of the cells in the table have an expected frequency less than five (Siegel 1956). Only four of the twenty-seven subjects were in a private room during the study. Thus, a correlation between room type and change in orientation cannot be tested.

Amount of Visits

Another variable is the number of days per week that a patient receives visitors. An analysis of interest involves determining if visits are associated with a change in temporal orientation. Table 6 presents the number of subjects with visits in the range of 0-4 days per week and 5-7 days per week who scored less than 80 on the pretest. The sample is divided into those who showed a greater difference than 40 points between pretest and posttest scores and those who showed less than a 40-point difference.

TABLE 6

CHANGE IN TEMPORAL ORIENTATION OF PATIENTS VISITED LESS THAN FIVE DAYS PER WEEK AND FIVE OR MORE DAYS PER WEEK

Number of Visiting Days per Week	Number of Points Difference in Temporal Orientation Scores	
	Less Than or Equal to 40	Greater than 40
0 - 4	7	5
5 - 7	2	5

Eleven subjects not included in this analysis had a pretest score greater than 80. These are eliminated from consideration in order to allow sufficient potential for change in orientation in testing for an association between number of visits and change in temporal orientation. Chi-square is determined to be 1.571 and the contingency coefficient is 0.2764, which is significant at the 0.30 level. Therefore, a significant association is not observed to exist between change in temporal orientation following sensory stimulation and the number of days per week the patients received visitors. However, the number of visits can be more closely associated to posttest scores.

The relationship between the number of visiting days per week and posttest scores is illustrated in Table 7.

TABLE 7

POSTTEST TEMPORAL ORIENTATION SCORES OF PATIENTS HAVING VISITS LESS THAN FIVE DAYS PER WEEK AND FIVE OR MORE DAYS PER WEEK

Number of Visiting Days per Week	Posttest Scores	
	0 - 85	86 - 100
0 - 4	9	7
5 - 7	4	10

Chi-square for the data in Table 7 is computed to be 2.330. The contingency coefficient is 0.2685, which is significant only at the 0.15 level.

Prior Living Accommodation

Another factor that might be associated with temporal orientation following sensory stimulation is the type of living accommodation a subject experienced prior to the onset of the stroke. Table 8 shows the breakdown of prior living accommodation and posttest scores.

Because of the low frequencies in the categories corresponding to patients living alone or in a nursing home prior to illness, the contingency coefficient cannot be properly applied (Siegel 1956). If the categories of

TABLE 8

TYPE OF LIVING ACCOMMODATION PRIOR TO STROKE AND POSTTEST TEMPORAL ORIENTATION SCORES

Type	Total	Posttest Scores 0 - 85	Posttest Scores 86 - 100
Alone	8	2	6
Nursing home	4	3	1
With family unit	18	8	10

living in a nursing home or with the family unit are grouped together, Chi-square is 1.494, and the contingency coefficient is 0.2178, which is significant only at the 0.25 level. Therefore, an association between prior living accommodation and posttest temporal orientation is not established.

Other Demographic data

A flow sheet of information collected on each subject (Appendix 3) during the study concerned factors that were anticipated to have a possible effect on the study. Data collected that were not appropriate for statistical analysis included the following information:

1. All of the thirty patients were involved in physical therapy, and some were also involved in speech therapy where appropriate for slurring of speech. None of the patients in the sample were aphasic.

2. All patients included were confined to bedrest and/or wheelchair.

3. Twenty-nine of the thirty patients received oral feedings. The one exception required jejunostomy tube feeding.

4. Where a roommate situation was involved, there were no deaths or discharge of the roommate during the two-week study period.

Summary

The purpose of this study was to determine whether or not the temporal orientation of institutionalized stroke patients is altered by a sensory stimulated environment. In testing the hypothesis that a sensory stimulated environment does not alter the temporal orientation of institutionalized stroke patients, the Wilcoxon Matched-Pairs Signed-Ranks test was used to reject the hypothesis at the 0.00005 level of significance, i.e., at a level of confidence of 0.99995.

Further analyses of the temporal orientation scores were presented with the use of contingency tables. These analyses included investigations of associations between temporal orientation and the hemispheric location of the lesion, the type of room in which the patient lived, the number of days the subject received visits per week, and the patient's type of living accommodation prior to the onset of stroke. In addition, other data for which statistical analysis was not appropriate were described. Conclusions, implications, and recommendations based on the results of this study are discussed in Chapter V.

CHAPTER V

SUMMARY, CONCLUSIONS, RECOMMENDATIONS, AND IMPLICATIONS

Summary

The purpose of this study was to determine whether or not the temporal orientation of institutionalized stroke patients is altered by a sensory stimulated environment. The relationship of temporal orientation to patients with cerebral disease and the properties and effects of sensory stimulation in the institutionalized environment were discussed in the Background and Significance of this study. The following areas were included in the Review of Literature: time sense and its relationship to recent memory, alterations in the time sense, pathophysiology of strokes, neurophysiological basis for the significance of sensory input, the aged in the institutionalized environment, and reality orientation.

Subjects were selected by purposive sampling at a proprietary extended care facility in Dallas, Texas. The population consisted of thirty subjects who were sixty-five years of age or older and had incurred a stroke within the past year involving one or both cerebral hemispheres.

The research design employed was that of an experiment done in the natural setting with a one-group before-after testing technique. The instrument utilized in this study was the Temporal Orientation Test which requires the subject to provide five types of information: day of the week, day of month, month, year, and time of day. Following the pre-test to determine the level of temporal orientation, a sensory stimulated environment was provided for two weeks by means of a large daily date wall calendar placed in the patient's room. Verbal reinforcement of the date, day of week, and time of day was provided twice a day for two weeks by the personnel in the institution. The same test was then given to the sample subjects to determine whether or not the temporal orientation of stroke patients was altered by the sensory stimulated environment. Depending on the type of error, if any, in response to the test questions, points were subtracted from an assigned perfect score of 100 to obtain the patient's score.

The Wilcoxon Matched-Pairs Signed-Ranks Test was used to determine if there was a statistically significant alteration in temporal orientation following sensory stimulation. The results of the analysis of the data showed that the hypothesis: the temporal orientation of institutionalized stroke patients is not altered by a sensory stimulated environment is rejected at the 0.00005 level of significance.

The contingency coefficient C was used to determine the extent of association between temporal orientation and the following factors: the hemispheric location of the lesion, the type of room in which the patient lived during the study, the number of visits the subject received per week, and the type of living accommodation prior to the onset of the stroke. A significant relationship was demonstrated between the hemispheric location of the lesion and the pretest scores, and the hemispheric location of the lesion and the change in temporal orientation of posttest scores. Data concerned with the patient's participation in physical therapy and/or speech therapy, the level of activity, the type of feeding, and the death or discharge of a roommate were discussed.

Conclusions

From the data that were collected and analyzed, the conclusion is drawn that sensory stimulation does alter the temporal orientation of institutionalized stroke patients. Stimulation from the physical, social, and psychological spheres of the environment provide a direct linkage between organic deterioration from the stroke and the effects of the institutional environment.

The onset of stroke is often marked by a sudden change in the life style and living arrangement for the individual. Instead of the familiar surroundings of the home, family, and personal items, the patient is confronted with an unfamiliar provider of care in a strange environment.

The physical environment can be enriched by articles that typify contact with reality, such as clocks, calendars, windows, family pictures, and music via radio or phonograph. Visual stimulation from these sources coupled with verbal reinforcement of reality bridge the gap between the individual's life and patient role.

Reality orientation concerning time, place, or person represents a way of communicating more effectively with the confused patient. All conversational contact should reflect reality. To consistently approach the patient in a manner that encourages responsiveness or arousal stimulates the patient's cognitive resources and emotional responses. This type of attitude on the part of the staff can make a difference in the quality of life that is promoted.

The level of social interaction also affects the level of orientation. In this study, social factors that were considered included the room accommodation of the patient, the amount of visitation from family and friends, and the patient's previous living accommodation. Loew and Silverstone (1971) advocate a meaningful individual relationship for each patient.

The amount of stimulation perceived by each individual varies according to his capability to receive the input. The placement of clock and/or calendar in the physical environment and verbal communication and reorientation activates both the visual and auditory senses. In this study, patients with a right hemispheric lesion scored significantly higher on the pretest and tended to score higher on the posttest than did those patients with a left hemispheric lesion. These findings support those of Diller and Weinberg (1968) showing that patients with a right hemispheric lesion retain information since long-term visual and auditory perception are intact. Those with left hemispheric lesions have a decreased perception of long-term visual and auditory stimuli. Their ability to process information sequentially is impaired. Such individuals need cues and rehearsal to effect increased perception. This accounts for the fact that in this study, patients with a left hemispheric lesion showed greater improvement represented by a change in temporal orientation scores between pretest and posttest than did those with a right hemispheric lesion.

The initial study by Benton, Van Allen, and Fogel (1964) reported 12 percent of those subjects with left hemispheric involvement and 17 percent of those with right hemispheric involvement had defective orientation. This study revealed that 90 percent of those subjects with a left hemispheric lesion and 100 percent of those with a right hemispheric lesion had some degree of defective temporal orientation at the outset. This may be attributed to the fact that 80 percent of Benton's group of brain-damaged patients were outpatients with a mean age of forty-three; whereas the patients in this study were sixty-five years of age and over, and were confined to an institution. Therefore, advancing age and institutionalization after acute onset of a stroke greatly increases the incidence of defective temporal orientation which necessitates aggressive intervention to keep the patient in contact with reality.

Recommendations

The findings of this study give impetus to other areas of nursing research. It is recommended that:

1. A similar study be conducted with a larger population of subjects categorized according to the etiology of the hemispheric lesion.

2. A similar study be conducted comparing the temporal orientation of patients just admitted to the institutionalized environment with those who have been in the setting for a prolonged period of time.

3. A study be conducted to determine the effects of medications on the temporal orientation of institutionalized stroke patients.

4. A study be conducted concerning the length of the visits from family and friends on the subject's temporal orientation.

5. A similar study be conducted in the acute care hospital setting.

6. A similar study be conducted with a larger sample to determine the type of error characteristic of certain hemispheric lesions.

7. A similar study be conducted with various forms of sensory stimulation.

Implications

This study provides information concerning the temporal orientation of institutionalized stroke patients.

It engenders implications for nursing practice, nursing education, and the community.

For Nursing Practice

Alterations in temporal orientation occur in elderly patients who have had neurological impairment due to a stroke and reside in an extended care facility. Personnel working in these institutions need to be cognizant of the reasons for a patient's disorientation to time and appropriate nursing interventions. Problems of increasing dependency can be avoided by visual and auditory stimulation. This process has the potential of enhancing the link between the stroke patient and the environment.

The Temporal Orientation Test provides a uniform tool that is readily available to all personnel for assessing the patient's temporal orientation. The results of this test have implications for developing and implementing programs to enrich the lives and maintain the dignity of the individual. Reality orientation represents one means of increasing the sensory stimulation these individuals need to preserve temporal orientation.

Methods that could be utilized to effect this change include the following:

1. Inservice education classes for all levels of personnel in the institutionalized setting to identify

the nursing problems encountered that can be attributed to a patient's confusion.

2. Implementation of the temporal orientation test to assess the patient's level of orientation to time.

3. Reality orientation classes for all personnel in order to effect a continuous program.

For Nursing Education

A basic understanding of the physical and psychological needs of the aged patient, and the effects of disease processes such as stroke on these individuals will prepare nurses to implement the nursing process by assessing, implementing, and evaluating appropriate care. Nursing personnel who are aware of alterations in temporal orientation and the effects of sensory stimulation will be prepared to provide care for the whole person. Nursing education can provide this theory of care to be transformed into the practice of care by the following:

1. A nursing curriculum that reflects the physical, psychological, and socioeconomic needs of the geriatric patient.

2. A psychosocial assessment course that deals with the behavioral problems of the aged and nursing techniques such as reality orientation, remotivation, and establishment of the therapeutic environment.

For the Community

The scientific advances of yesterday and today have their impact on the lives in a community tomorrow. The older person who is sick is a unique individual with complex problems. The aims of rehabilitation encompass preventing further impairment, maintaining existing abilities, and restoring as much function as possible.

Families are often perplexed when seeking ways of coping with the disorientation of an aged individual who may also have suffered a stroke. Community services that could be implemented to alleviate this problem include:

1. Public information via seminar classes or the television media to reflect ways of coping with the disorientation of the aged.

2. Family counseling that would utilize the strengths in the patient-family relationship.

3. Educational classes in the institutions and extended care facilities that would familiarize the families with reality orientation and their role in such a program.

APPENDIX 1

CONSENT FORMS

TEXAS WOMAN'S UNIVERSITY
COLLEGE OF NURSING
DENTON, TEXAS

DALLAS CENTER
1810 Inwood Road
Dallas, Tx. 75235

HOUSTON CENTER
1130 M.D. Anderson Blvd.
Houston, Tx. 77025

AGENCY PERMISSION FOR CONDUCTING STUDY*

THE [redacted]

GRANTS TO Carol Lipin

a student enrolled in a program of nursing leading to a Master's Degree at Texas Woman's University, the privilege of its facilities in order to study the following problem:

To determine whether or not the temporal orientation of institutionalized stroke patients is affected by a sensory stimulated environment.

The conditions mutually agreed upon are as follows:

1. The agency (may) (may not) be identified in the final report.
2. The names of consultative or administrative personnel in the agency (may) (may not) be identified in the final report.
3. The agency (wants) (does not want) a conference with the student when the report is completed.
4. The agency is (willing) (unwilling) to allow the completed report to be circulated through interlibrary loan.
5. Other ______________________________

Date February 25, 1975

Signature of Agency Personnel

Signature of Student

Signature of Faculty Advisor

*Fill out and sign three copies to be distributed as follows: Original-Student; first copy - agency; second copy - TWU College of Nursing.

BV/4/10/74/sic

To the responsible party of

______________________________:
Patient's Name

I am a student enrolled in a program of nursing leading to a Master's Degree at Texas Woman's University.

I am doing a study on patients who have had a cerebrovascular accident (stroke) to determine their orientation to time. I will ask them several questions regarding time of day, day of week, and date of year twice during the study. A calendar will be placed in their room and the staff will verbally reinforce the time of day, day of week, and date of year to the patient twice a day.

Each participant can be assured that anonymity will be provided.

Consent is granted for ______________________________ to
Patient's Name

participate in this study.

____
Signature of patient or responsible party

I greatly appreciate your cooperation and interest.

Sincerely yours,

Carol Lipin, R.N.
T.W.U. Graduate Student

APPENDIX 2

TEMPORAL ORIENTATION TEST

Test Question	Pre-test Response	Actual
What is today's date? (required to give day, month, and year)	____________	______
What day of the week is it?	____________	______
What time is it now? (examiner makes sure that patient cannot look at watch or clock)	____________	______

Pre-test score: ____________

Test Question	Post-test Response	Actual
What is today's date? (required to give day, month, and year)	____________	______
What day of the week is it?	____________	______
What time is it now? (examiner makes sure that patient cannot look at watch or clock)	____________	______

Post-test score: ____________

APPENDIX 3

DEMOGRAPHIC DATA AND FLOW SHEET

Patient's I.D. No. ____________

Age____________

Date of onset of stroke______________

Hemispheric location: Right Left Both Not Specified

Date studied (pre-test)______________

Prior to illness, patient lived: alone with family nursing home

	Week 1	Week 2
Type of room:		
private		
semi-private		
Frequency of visits by family or friends:		
daily		
number of days/week		
Participation in		
physical therapy		
speech therapy		
Level of activity:		
bedrest		
wheelchair		
Type of feeding:		
nasogastric/gastrostomy		
oral		
Roommate (if applicable)		
death		
discharge home		

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