

THE USE OF TAPE PATTERNS AS AN ALTERNATIVE METHOD FOR  
CONTROLLING WANDERERS' EXITING BEHAVIOR IN A  
DEMENTIA CARE UNIT

by

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**(Abstract)**

The number of elderly people moving into long-term care facilities is expected to increase as the population of people 65 and older continues to rise at a significantly high rate. Simultaneously, the number of people expected to be diagnosed with dementia will also increase unless a cure for this devastating disease is found. In the meantime, caregivers face many problems in providing healthy and humane treatments. One such problem that is a major concern for caregivers is controlling wandering behavior. This behavior often places patients in life threatening situations, and the current methods used by many facilities do not promote a high quality of life.

The purpose of this study was to examine the effects of various tape patterns on the wandering behaviors of residents living in a special dementia care unit in Heritage Hall Nursing Home, Blacksburg, Virginia. Similar studies revealed that alternative methods using tape patterns could reduce exiting attempts at a fire exit door or could possibly increase these attempts.

In order to address these inconsistencies, exiting attempts at a fire exit door were recorded during one baseline and two similar test conditions. It was

found that exiting attempts was a serious problem in this unit as 40% of the residents attempted to exit the facility during the study. The use of tape patterns reduced exiting attempts by 19.05% and 11.12%; however, this reduction was not statistically significant. In conclusion, the use of these tape patterns affected wandering behavior differently for each of the residents, suggesting that a multi-method approach for controlling exiting behavior may prove to be more successful when dealing with a heterogeneous sample and their multi-needs.

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## CHAPTER ONE

### INTRODUCTION

The United States population of individuals over the age of 65 has tripled since the turn of the century, and it is estimated that by the year 2030, this age group will comprise approximately 22 percent of the population (Longino, Soldo & Manton, 1990). For example, in 1985, the population gain of persons over the age of 65 increased by 560,000, or 1,540 per day (Hull, 1989). By examining age demographics, one can foresee that the elderly population will continue to increase during the next several decades.

Between the years 2010 and 2030, the elderly population will dramatically increase by a predicted 1.3 million annually due to the post- World War II baby boom. Around the year 2035-2045 there will be a sharp decline as the "baby-bust" cohorts of the mid 1960's and 1970's reach old age. The second increase in the elderly population will occur around the year 2045, as the children of the baby-boomers turn 65. These cohorts will pace the growth of the elderly population, and it is predicted that by 2040, the 65 and over age group will reach an astonishing 66.6 million (Longino et al., 1990).

The baby boom plays an important role in the increase of the elderly population in two ways. First, as mentioned previously, they will comprise the 65 and older age group during the years 2010-2030. Second, twenty years later, when their children are reaching 65, the baby boomers will be reaching 85 and older. This group, the oldest old, is the fastest growing segment of the entire population (Longino et al., 1990).

Contributing to the rise in the elderly population is the increase in life expectancy. During the 1950's, the life expectancy period was relatively stable;

however, over the last 25 years there has been a major increase. This increase is due to the reduction in acute and infectious diseases as well as some recent improvements in chronic disease mortality rates (Longino et al., 1990).

This increase in life expectancy, associated with illness and disabilities, as well as changes in family lifestyles will contribute to the number of elderly moving into nursing homes. Lifestyle changes such as divorce, family proximity, number of women in the work force, and neighborhood stability will mean less informal care by family members and more reliance on formal community care (Longino et al., 1990). In 1985, 5% of the elderly population resided in institutional settings which accounted for approximately 1.4 million of the elderly population that year (Hull, 1989).

While most older adults currently live in family settings (Hull, 1989), the present nursing home industry is not prepared to handle the projected increase in the elderly population (Peppard, 1986). Because the 85 and older segment has already saturated existing nursing home facilities (Longino et al., 1990), effective planning by architects and interior designers will be needed to accommodate the predicted growth in the elderly population.

One major cause of institutionalization that accounts for approximately 50% of the elderly residing in long term care facilities is dementia. Predictions estimate a 41% increase in the demented population between 1980 and 2000 (Henderson & Jorm, 1986). As our society continues to age at a proportionately high rate, the instance of persons suffering from some form of degenerative dementia will also increase unless a medical breakthrough occurs and a cure is found (Peppard, 1986). The onset of dementia rises steeply with age, and

therefore, is one of the most costly public health problems the U.S. is likely to face during the next 50 years (ADRA, 1988).

People with dementia suffer from a wide variety of symptoms including memory loss, disorientation, impaired judgment, visual and spatial problems, apraxia, agnosia and wandering (Winchip, 1990); consequently, they may have more difficulty adjusting to the environment than healthy elderly individuals. Special attention to the physical environment may help to maintain and improve the functional capacity, self-respect and dignity of those suffering from dementia (Winchip, 1991).

Wandering, one of the characteristics associated with dementia, is a major concern for caregivers (Coons, 1988). This behavior often places patients in potentially life threatening situations. For example, approximately 20% of staff members at one nursing facility recalled at least one incident in which wandering resulted in serious injury or death (Burnside, 1981). Different techniques are available for controlling wandering; however, most involve the use of restraints, medications or alarm systems, which in most cases are not ideal or humane (Coons, 1988).

Recently, investigators have focused on alternative methods for controlling wandering behavior (e.g., Hussian & Brown, 1987; Namazi, Rosner, & Calkins, 1989). Patients with dementia were often reported to have misinterpreted sensory information and visual input. In one instance, the use of two-dimensional grid patterns in front of an exit door were used to decrease wanderers from exiting through an emergency door (Hussian & Brown, 1987). In contrast, visual patterns similar to those used by Hussian and Brown were found to increase wandering behavior at an emergency door (Namazi et al., 1989).

The inconsistencies of these results pose several questions. First, is it possible to control exiting behavior through the use of visual patterns? If so, which visual pattern is most effective? These questions form the focus of this thesis.

## **PURPOSE OF STUDY**

The purpose of this study was to examine the effects of various visual patterns on the wandering behaviors of residents of a dementia care unit. The objective of this experiment was to determine whether tape patterns applied to the floor at an emergency exit would reduce the number of times a wanderer attempts to leave the building.

### **Justification**

The most popular methods for controlling wandering behavior are restraints, medications, and electronic devices (Namazi et al., 1989); however, restraining patients who want to wander causes agitation and frequent falling. Restraints are also degrading and humiliating for those individuals who are capable of ambulation (Coons, 1988). Medications are damaging because they can cause extreme agitation and loss of personality (Coons, 1988). Electronic devices have been introduced into the environment; however, they are often very expensive to install. These devices usually include an alarm which can frighten wanderers and increase anxiety levels (Coons, 1988).

The results of this study may suggest an alternative method for controlling wandering that differs from the current methods used in long term care facilities. The advantages of controlling wanderers by this method include improved

emotional and mental well being of the residents and an efficient and economical solution for caregivers to use in controlling wandering behavior.

## CHAPTER TWO

### LITERATURE REVIEW

This chapter begins with a general background of dementia including definitions, characteristics, diagnosis and stages. Furthermore, this chapter will focus on environment and behavior theories related to aging and the environment as well as a brief discussion of design goals and case studies of special dementia care units. Wandering behavior will be discussed in detail including definitions, possible causes, behavioral mapping, types, effects, and the variety of ways to care for wanderers. The final section of this chapter will focus on research studies of alternative methods for controlling wanderers' exiting behavior.

#### **Background of Dementia**

Dementia refers to a decline in intellectual function, accompanied by cognitive impairment while being in clear consciousness, i.e. awake and alert (Baillie & Foxworth, 1991). At one time, dementia was believed to be a natural consequence of aging, and the term "organic brain syndrome" was used to classify demented elderly (Bollinger & Hardiman, 1989). Different names were applied to dementia based on the patients age at onset such as presenile dementia which occurred before age 65, and senile dementia which occurred after age 65. Because the symptoms for both groups are similar, the trend today is not to differentiate between the senile and presenile forms (Winograd, 1988).

The terms dementia of the Alzheimer's type (DAT) and primary degenerative dementia are used to refer to dementia for which no specific cause can be found (Kern, 1988). Finally, the phrase "Related Disorders" is often used to include other types of degenerative diseases such as Multi-Infarct dementia, Pick's disease, Huntington's disease and Parkinson's disease.

Alzheimer's disease (AD) is the most common form of dementia accounting for 50% - 70% of degenerative dementia among older persons (Bollinger & Hardiman, 1989). First described in 1906 by a German physician named Alois Alzheimer, Alzheimer's disease is a disease that has a gradual but relentless onset. The disease causes impairment of recent memory, disorientation, confabulations, and retrogressive loss of remote memories. Eventually, the sufferer loses reasoning ability, concentration and speech, and can deteriorate to a vegetative state (Kern, 1988).

Another form of degenerative dementia that accounts for 15% to 25% of progressive dementias is Multi-Infarct dementia (MID) (Bollinger & Hardiman, 1989). This disease was once termed "hardening of the arteries" (Winograd, 1988), and is a cognitive-behavioral complex that usually occurs abruptly due to strokes or cerebral infarcts (lesions) caused by the rupture of capillaries or blood vessels (Willott, 1990). In the early stages of MID, sufferers' behavior seem quite different from AD due to the location and extent of the lesion; however, as the disorder progresses, MID and AD patients appear very similar (Winograd, 1988).

Pick's disease is a rare degenerative disease that usually occurs during the seventh decade (Brody, 1980). Pick's disease appears similar to AD in time and nature of onset and progression of intellectual and personality

disorganization (Bollinger & Hardiman, 1989). Unlike AD, this disease has early symptoms of language deficits, changes in social behavior and emotionality while cognitive dysfunction is minimal (Willott, 1990).

Huntington's disease is another form of dementia which usually affects persons between the age of 25 and 45. The patient is usually nervous and fidgety during the early years and may progress to jerking, irritability, paranoia and even memory loss. Eventually, the patient is rarely still and moves constantly (Brody, 1980).

The final type of dementia to be discussed is Parkinson's disease which is first noticed during the fifth and sixth decades. This type of degenerative dementia includes symptoms such as memory and intellectual decline, rigidity, tremor, and motor speech dysfunction (Bollinger & Hardiman, 1989). A drug known as L-dopa can be very effective in controlling the symptoms, and this treatment may serve as a model for other dementias (Willott, 1990).

Currently, no treatment or cure for most degenerative dementias exists. Diagnosis in many patients is difficult and a definite diagnosis can only be made by postmortem examination of brain tissue. However, a probable diagnosis can be made based on neurological and physical examination, EEGs and CAT scans, observation, mini-mental state examination scores, and other various characteristics displayed by the patient (Baille & Foxworth, 1991).

## **Characteristics of Dementia**

Although persons suffering from dementing illnesses exhibit deficiencies at various rates, there are some common characteristics associated with the disease. These symptoms can be classified into two categories: Cognitive/neurological and behavioral/psychological (Baillie & Foxworth, 1991).

### **Cognitive / Neurological Symptoms**

The term cognitive deficit refers to deficiencies in acquiring and manipulating knowledge (Jorm, 1987). Thus, this category of symptoms includes problems associated with memory, language, perception, disorientation, and learning (Baillie & Foxworth, 1991).

One of the first noticed signs of dementia is memory loss. Short-term memory is used for temporary storage of information in everyday tasks and has a very limited storage capacity. For people suffering from mild, moderate, and severe dementia, forgetfulness in short-term memory is more prevalent than in the healthy elderly population (Jorm, 1987).

Long-term memory is a more permanent type of memory. In contrast, long-term memory has a larger storage capacity than short-term memory and can store information for decades (Jorm, 1987). Examples of long-term memory deficits include forgetting once familiar faces (Kern, 1988), getting lost in familiar places, and losing the ability to carry out activities of daily living such as answering the telephone, shopping, bathing and dressing (U.S. Congress, Office of Technology Assessment, 1987).

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**Table 1**                      **Cognitive / Neurological Symptoms of AD**

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<i>Symptom</i>	<i>Impact</i>
• Memory Loss	Difficulty in learning new information Requires daily routines Difficulty remembering people, places, things, and events. Memories of distant events are remembered longer than recent events Clutter becomes disturbing Increased confusion and frustration
• Apraxia	Difficulty operating telephone and appliances Difficulty dressing, bathing, grooming and eating Difficulty in mobility, increasing falls
• Aphasia	Jargon becomes frequent Digressing from topic and seeming unsure and vague Frustration occurs with inability to retrieve words
• Agnosia	Difficulty interpreting environment due to glare Perception of colors change Difficulty adjusting to lighting changes More frequent falling
• Disorientation	Getting lost in once familiar surroundings Anxiety increases due to frustration and confusion Wandering increases

Other cognitive/neurological symptoms include: 1) aphasia: a severe language disorder which causes difficulty in naming objects correctly 2) apraxia: an inability to carry out purposeful motor acts, 3) agnosia: a visual perception disorder, and 4) disorientation to time and place.

Assessment of these characteristics can be made by using the Alzheimer's Disease Assessment Scale or the Mini-Mental Status Exam. Family members can also assist in assessment by observing the patients' ability to work, drive, handle finances, and perform household chores (Kern, 1988).

### **Behavioral / Psychological Symptoms**

Symptoms in this category include depression, apathy, catastrophic reactions, paranoia, disruptions in sleep cycle, wandering, impaired judgment and reason, delusions, hallucinations, social inappropriateness, and repetitious activity (U.S. Congress, Office of Technology Assessment, 1987). Assessing these non-cognitive functions is important, but they are often downplayed in the discussion of the disease (Kern, 1988). There are only a few formal tests that address these non-cognitive features; however, mental health examinations may reveal symptoms such as depression, anxiety and delusions.

### **Stages of Dementia**

Degenerative dementias progress at different rates for each individual. While one patient may enjoy years of stability, others may progress from one phase to another more rapidly. In addition, the symptoms of the disease may

vary considerably from patient to patient (Winograd, 1988). Many elaborate schemes have been developed to describe these stages. Most schemes include an early, middle and late stage; however, a fourth stage, the terminal stage, has also been discussed.

Early in the disease, loss of short-term memory, apathy, social withdrawal, decreased energy, anxiety, and difficulty with novel or complex tasks are common. In many cases, the patient is aware of these changes. The disease typically begins with mild cognitive and/or personality changes, and progresses into the middle stage characterized by symptoms such as disorientation to time and place, language disturbance, apraxia, and moderate to severe objective memory deficit. During this stage, the sufferer cannot survive without supervision (Winograd, 1988).

Symptoms associated with the late stage include severely limited verbal communication, incontinence of bladder and bowel, untestable intellectual functions, social and physical disabilities and the lack of ability to carry out daily activities such as eating, grooming, and dressing. When entering the terminal stage, the patient becomes bedridden, mute, and unaware of the environment. The patient may vegetate until pneumonia or sepsis from pressure sores prove fatal (Winograd, 1988). Table 2 summarizes the stages of dementia.

### **Environment / Behavior Concerns**

According to Lawton (1982) persons with less competence are most sensitive to the effects of the physical environment. "Environmental docility", (Lawton, 1982) suggests that as competence decreases, behavior becomes



increasingly determined by factors outside the individual. A second possible explanation, "person-environment congruence", suggests that the psychological well-being of an individual is an outcome of congruence between personal needs and perceived environmental dimensions (Kahana, 1982). In other words, individuals with certain types of needs are most likely to seek or be found in environments that meet their needs. When the individual is not in this optimal environment, they will function in a "dissonant milieu" and stress and discomfort will follow (Kahana, 1982).

In light of these possible explanations, many health care providers have debated whether the cognitively impaired should be integrated with more competent persons or segregated into separate units (Coons, 1991). Caregivers who favor integration believe that the impaired need the role model of the alert residents who engage in social interaction and other activities. The caregivers who favor segregation argue that the needs of each group differ to such a degree that one environment cannot accommodate them both. This group stresses that the environment for an alert individual will be too demanding for the impaired, and the environment for the demented will be too limiting and confining for an alert individual (Coons, 1991).

Several studies have addressed this concern. One study surveyed several long term care facilities in Chicago to establish advantages and disadvantages of a separate unit for the cognitively impaired. The findings reflected increased verbal responsiveness as well as decreased behavior problems and medication usage. The disadvantages of having the unit were cost and staff related (Glick, 1986).

Another study focused on the impact of "special dementia units" over a one year period of time. The investigator observed an increase in the patients' level of functioning both mentally, physically, and emotionally (Benson, Cameron, Humbach, Servino & Gambert, 1987).

Oaknoll Retirement Residence in Iowa City, Iowa opened a special dementia care unit in its facility and observed a significant improvement in the quality of life of its residents and caregivers (Cleary, Clamons, Price & Shullaw, 1988). An experimental dementia care unit was designed to house 11 patients suffering from AD and related disorders. Using a pre-test /post -test design, the investigators assessed levels of agitation, wandering, food consumption, incontinence, sleep, restraint usage and perceived safety 3 months before and after the opening of the unit. The results from this experiment support the separate unit because significant improvements in levels of agitation, patient interaction, and weight gain were observed as well as a reduction in the need to use restraints (Cleary et al., 1988).

Other advantages include a decrease in medication usage, improved orientation, formation of friends, and less vocal outbursts (U.S. Congress, Office of Technology Assessment, 1987). These studies suggest that a patients' quality of life can be improved by segregation; however, improvements in the neurological functioning are seldom affected by these units (Coons, 1991).

Regardless of this debate, dramatic increases in the number of dementia care units have occurred during the past several years. In 1987, a total of 22,064 nursing facilities existed in the United States, and of these, an estimated 1,668 facilities had special dementia units. The number of special units was

predicted to increase to 3,112 facilities by 1991 (Leon, Potter & Cunningham, 1990).

A special dementia care unit is a living area that is designed to house people suffering from AD and related dementia. The unit is self-contained and self-sufficient in terms of staff, services, and congregation areas. Meals are usually served within the unit as well as other specialized activities (Coons, 1991). A unit is not considered "special" just because it is segregated from the rest of the nursing home. A successful unit is one that provides specialized activities, specialized staff and organization as well as an environment that supports the patients and staff ( Mace, 1989). These units must also bring about positive patient changes as discussed previously (Coons, 1991).

The physical, social, and psychological environment needs to compensate for or counteract the deficits associated with dementia (Coons, 1991). The following section will identify environmental design goals that provide direction in creating more supportive environments.

### **Design Goals for Special Dementia Units**

Currently, many publications establish detailed design recommendations for the special dementia care unit (Coons, 1991; Winchip, 1990; Hyde, 1989; Cluff, 1990; Calkins, 1988). For the purpose of this thesis, these recommendations have been categorized into three general categories identified as accessibility, cognitive support, and safety. Table 3 lists the appropriate design considerations for a special dementia care unit.

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**Table 3            Design Considerations for Special Dementia Care Units**

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<b>Accessibility:</b>	Lever type door handles Railings (2" dia.) @ 32" above floor Secure carpeting and rugs Minimum 8'-0" corridors Bedroom doors minimum 44" wide Grab bars in toilet and showers Wheel chair accessible shower w/ seat Level thresholds Ramps
<b>Cognitive Support:</b>	Use double signage with photo and name plate Allow for display of personal items Incorporate favorite furniture into room design Increase lighting levels Incorporate color coding system for room identification Provide small seating areas for 4-6 individuals Decrease clutter Provide orientation cues for date, time, and weather Reduce noise levels (alarms, television etc.) Include abstract wall art rather than realistic Reduce glare on surfaces Avoid patterns and stripes on finish materials Provide several smaller activity rooms Provide a quiet room Provide seating alcoves for passive observers
<b>Safety:</b>	Specify non-skid, non-glare surfaces Specify sturdy furniture with rounded corners Wrap exposed plumbing pipes Provide adequate contrast between floor and walls Secure exit doors, stairways and elevators Centralize nurse's station; furthest room should be no greater than 110 feet from nurse's station

Accessibility refers to the extent to which an environment is easy to approach and function within. An accessible environment allows for circulation without hindrance (Calkins, 1988). Special effort should be made to provide for accessibility in a special dementia care unit in order to promote independence and well being. Accessibility can be achieved by widening doorways and leveling thresholds, avoiding throw rugs and securing carpet, allowing generous passage between furniture, removing objects in heavy traffic areas, providing ramps, handrails and grab bars, and providing showers with seats that are also large enough to accommodate wheelchairs (Winchip, 1990).

The second design goal is to provide cognitive support. Because cognitive deficiencies occur early in the stages of AD, it is important to modify the environment to compensate for these losses. A supportive cognitive environment will decrease confusion, agitation and anxiety. Design considerations for cognition include personalization, wayfinding, signage, orientation, minimizing clutter, and reducing glare and patterns on finish materials (Winchip, 1990).

The third design goal is to consider the safety and security needs of the residents. Because people with dementia suffer from cognitive and physical disabilities, they are more vulnerable to their surroundings. Health institutions are responsible and liable for the safety of its residents. Safety features should not only include those necessary by codes (fire exits, sprinkler systems etc.), but should also include features such as non-skid, non glare surfaces , adequate lighting, rounded corners on furniture, windows which do not allow passage, and closed access to stairways, elevators and fire exits (Winchip, 1990). The

remainder of this chapter will discuss the importance of safety in controlling wandering behavior as well as current methods for controlling this behavior.

### **Wandering Behavior**

Institutions assume moral and legal responsibility for the protection of its patients and staff. A frequent and serious problem for caregivers, as well as patients suffering from AD and related dementia, is wandering (Coons, 1988). Wandering often places patients in life threatening situations, and many facilities have not developed a comprehensive approach for controlling this behavior (Rader, 1987).

Wandering has been defined in a variety of ways, creating some confusion about its meaning. The dictionary (Webster, 1984, p. 1600) defines wandering as "to move or go about aimlessly, without plan or fixed destination; ramble; roam; to go to a destination in a casual way or by an indirect route; idle; stroll; lose one's way; to stray from home, friends, familiar places, etc.". Another definition of wandering is "a tendency to move about, either in a seemingly aimless or disoriented fashion, or in pursuit of an indefinable or unobtainable goal "(Snyder, Rupperecht & Pyrek). A third definition of wandering is "moving about under one's own volition into unsafe situations while experiencing an impaired cognitive status " (Robb, 1985).

All of these definitions combined contain many of the elements associated with wandering behavior. However, two studies concluded that wandering behavior was not random, but came under the control of external, environmental control (Hussian, 1980,1982) . By mapping the routes of

wanderers, the investigator noted that wandering behavior was modified or terminated when certain stimuli were encountered.

### **Types of Wandering Behavior and Patterns**

Using behavioral mapping, a number of investigators have attempted to classify different types of wandering behavior and patterns. One study categorized wandering behavior as either goal-directed or nongoal-directed (Snyder, 1978). This categorization easily relates to several other classifications of wandering behavior.

Wanderers have been classified into four categories including exit seekers, akathesiacs, self-stimulators, and modelers (Hussian, 1985). Exit seekers are wanderers who try to leave an area for a variety of reasons, but their main goal is to get through the door. "Akathesiatic" is a term used to categorize wanderers who pace and fidget and appear restless. Self-stimulators are wanderers who seek stimulation within the environment, and move from one stimulus to another. The fourth group, modelers, simply follow other people. If the person they follow stays in an area, the modeler will also stay; however, if the person leaves the area, the modeler will try to leave as well.

Four types of independent travel behavior have recently been identified as direct travel, random travel, pacing, and lapping (Saltzman, Blasch, Morris & McNeal, 1991). Direct travel is the most efficient in which the wanderer travels from one location to another without diversion. Random travel is roundabout or haphazard travel to many locations within an area without repetition while pacing

is a repetitive back-and-forth pattern within a small area. Lapping, another form of repetitive travel, is characterized by a circling pattern. See Figure 1.

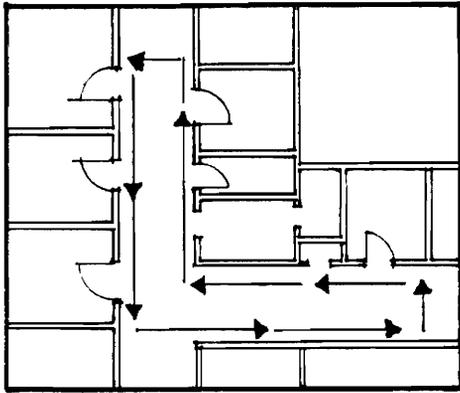
### **Reasons for Wandering**

There are several possible reasons for wandering. One reason is searching behavior (Snyder et al., 1978). This goal-directed behavior is associated with wanderers who often call out for something or someone that is unattainable (mother, home, etc.). Another goal-directed reason is industrious behavior which is characterized by an apparent need or drive to remain busy. Industrious behavior is usually related to the wanderers past life and work role experiences. Nongoal-directed behavior is associated with aimless wandering from one stimulus to another and short attention spans for each stimulus encountered (Snyder et al., 1978).

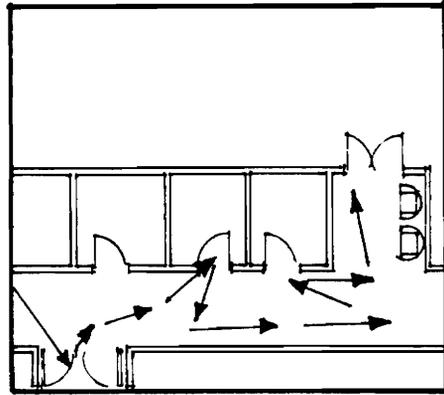
Additional reasons for wandering behavior stem from disorientation, boredom, the need of exercise, the need to release tension resulting from stress and anxiety, and the need to escape from noise and crowds (Coons, 1988).

### **Effects of Wandering**

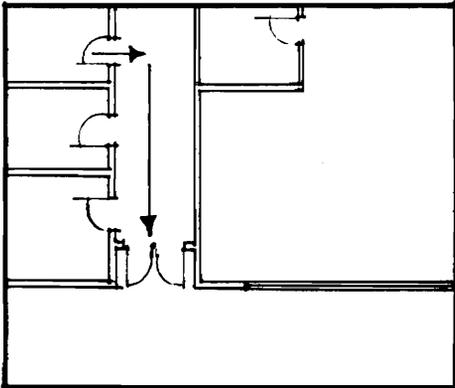
Wandering is actually beneficial for some patients as it promotes exercise (D. Burchard, personal communication, April, 1992). However, for most patients, wandering is a serious problem. First, some patients wander to such extremes



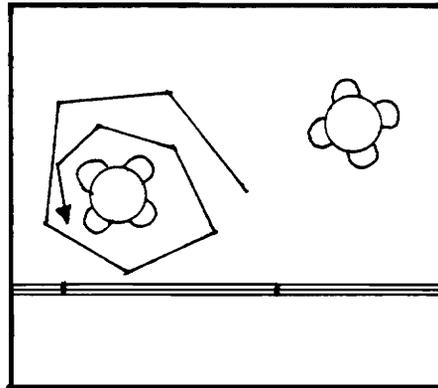
1) Pacing



2) Random



3) Direct



4) Lapping

Figure 1. Four Types of wandering patterns (Adapted from Saltzman, Blasch, Morris & McNeal, 1991).

that excessive exercise causes weight loss. Second, many wanderers misinterpret their environment, and are more likely to fall and sustain injuries (D. Burchard, personal communication, April 1992). A final concern is that many wanderers enter areas that are potentially life threatening to the patient. These areas include kitchens, stairs, elevators and exit doors. This form of wandering behavior is a major concern for caregivers. Institutions are faced with the question of how to appropriately deal with this behavior (Snyder et al., 1978).

### **Methods for Controlling Wandering**

Institutions have different philosophies in dealing with wandering behavior. For some institutions, protection is the first priority. Methods for controlling wandering from this perspective include restraints and medications (Snyder et al., 1978; Coons, 1988).

Restraining an individual in a wheelchair or gerichair increases restlessness, agitation, and confusion, and also decreases the patients strength, balance, and endurance (Rader, 1987). The use of restraints in the healthcare system is one of the most humiliating and degrading interventions today , and does not serve as protection against falls (Coons, 1988). Restraints as a method for controlling wandering should be used sparingly, if at all (Saltzman et al., 1991).

Medications are often used by institutions for controlling wandering behavior. Over-medication can be damaging by causing a loss of personality in the elderly individual as well as cause further agitation and disturbances (Coons, 1988).

Both restraints and medications lead to further loss of control, loss of dependence, loss of mobility and sensory deprivation (Hussian, 1982). Confused elderly have the right to be as free from physical and chemical restraints as is humanly possible. Thus, the ideal philosophy would be to focus on the quality of care of the residents in order to eliminate the use of restraints and medications (Rader, 1987).

Alternative methods for controlling wandering that do not involve restraints and medication can also have adverse side effects, and may not significantly control the behavior. These methods include electronic devices, door locks, special door knob covers, painting the doors the same color as surrounding walls, and full length mirrors (Coons, 1988).

Electronic devices are often used to prevent wanderers from exiting the building; however, this expensive approach increases anxiety in the wanderer as well as other residents when the alarm sounds throughout the unit (Coons, 1988). Door locks may be useful in certain cases, but are not permitted in emergency fire door locations because of fire codes (D. Burchard, personal communication, April, 1992). Other methods previously mentioned may help reduce wandering, but may not be applicable for all situations due to specific needs and environmental limitations. For example, an open nurse's station cannot paint a door or install a door knob cover if a door does not exist.

As mentioned previously, two studies examined alternative methods for controlling problematic wandering at fire exits (Hussian & Brown, 1987; Namazi et al., 1989). These studies focused on cognitive and biological deficiencies associated with aging and dementia in order to control wandering. The remaining section of this chapter will focus on these studies.

## **Alternative Methods for Controlling Exiting Behavior**

Hussian and Brown, (1987) and Namazi et al. (1989) are two recent studies that examined alternative methods for controlling wandering behavior at a fire exit door. Their method was based on cognitive deficits and biological changes in the eyes of elderly and demented patients.

As a person ages, biological changes in the eye create perception problems which affect the ability of the senses and the meaning imputed by stimuli. One such age change occurs with the cornea. The cornea is the principal refracting surface of the eye, and as a person ages, the cornea flattens, thickens, and increases in horizontal diameter relative to its vertical diameter. Thus, changes in the curvature have a significant effect on image forming ability (Marsh, 1980).

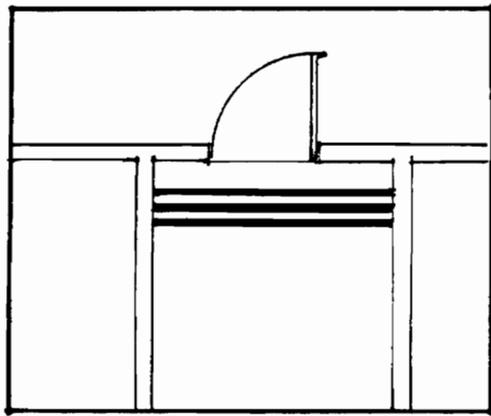
A second age-related change occurs in the lens. The lens is "a pale yellow, oval spheroidal collection of radially oriented fibers enveloped by a membrane called the capsule" (Marsh, 1980, p. 148). With increasing age, the lens becomes less transparent and more yellow, thus resisting the passage of the shorter wavelengths of light. This results in the loss of ability to perceive colors between yellow and blue on the color wheel (Marsh, 1980). Colors with similar intensity, brightness or dullness are difficult to differentiate from each other, while the easiest color to recognize are the "pure" or primary colors (Hiatt, 1981).

Other changes in the aged eye include visual field limitations, an increase in blind spots, loss of depth perception and an increase in sensitivity

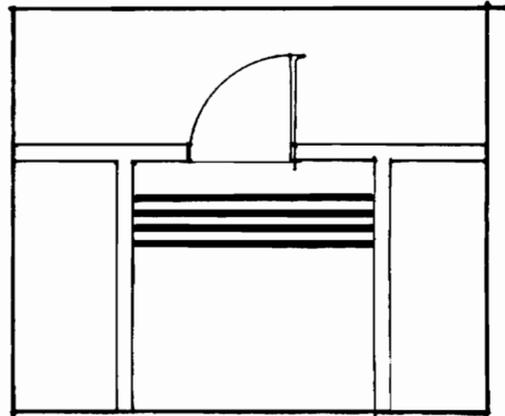
to glare (Marsh, 1980). According to Steffes and Thralow (1987, p. 203), "restricted visual field in AD patients is directly related to cognitive levels in that the higher the cognitive level of functioning, the less the restriction in the patient's visual field." While depth perception is not fully understood, it is associated with the aging eye, as well as glare, which becomes a problem after the age of 40, especially in the presence of cataracts (Marsh, 1980).

Perception deficits were observed when patients with dementia stepped over points of contrast in the floor and tried to pick up the fillers between floor tiles (Hussian & Brown, 1987). These patients were also seen walking around glare spots on the floor and would often comment about spilled water. The purpose of the Hussian and Brown study was to determine if two dimensional grid patterns applied to the floor at a fire exit door would reduce the number of exiting attempts by wanderers suffering from dementia. Their sample consisted of 8 male residents residing on a ward of a public mental hospital. All participants were administered an 11 point mental exam and were classified with moderate (n=2) to severe (n=6) dementia. All participants ambulated independently.

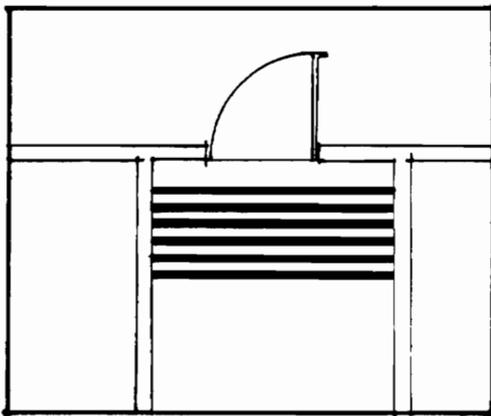
Two observers recorded wandering behavior during 2 baseline conditions as well as 5 test conditions. Beige masking tape was applied to a light green floor at a fire exit door at 1-1/2" intervals extending the entire width of the floor in the following conditions: 3 strips horizontally, 4 strips horizontally, 6 strips horizontally, 8 strips horizontally, and 10 strips vertically (see Figure 2 ). Observers recorded whether the grid patterns were crossed or not crossed during ambulation. A total of 139 exiting attempts was observed during the two



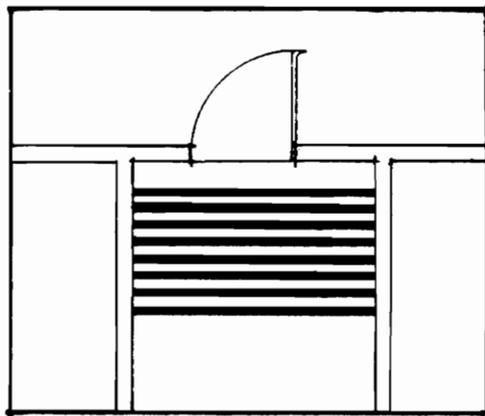
Three Strips



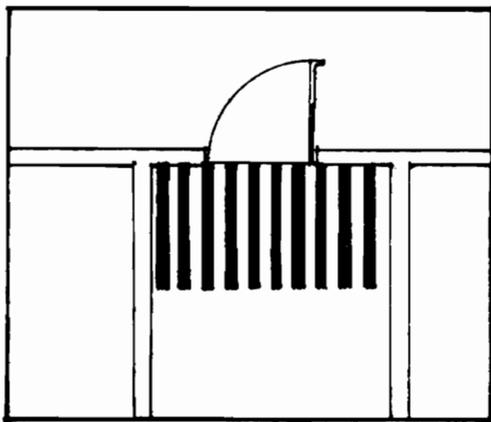
Four Strips



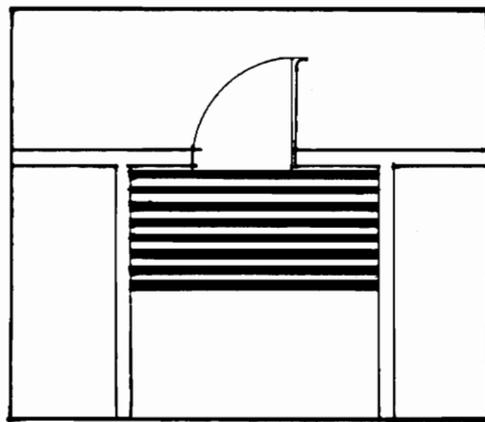
Six Strips



Eight Strips



Ten Strips Vertical



Eight Strips to door

Figure 2. Tape patterns used by Hussian and Brown (1987).

month observation period. The second baseline condition was observed following all 5 test conditions.

During the first baseline, the observers recorded that 94% of the opportunities ended in exiting attempts. The placement of the 3, 4, and 6 strips horizontally on the floor reduced exiting attempts from 94% to 55% and the 8 horizontal strips reduced attempts to 30%. The 10 vertical strips were less effective than the horizontal conditions. The final baseline, which followed the 5 test conditions, revealed a decrease in exiting behavior.

The researchers concluded that a relatively safe, economic, and unobtrusive stimulus can limit potentially dangerous ambulation in many demented patients. They recommended that future studies should examine other grid patterns and other barriers as well as increase the contrast between the floor and tape. An additional recommendation was to study the effects of brightly colored walls and ceilings from the grid to the door.

The study by Namazi et al. (1989) took these suggestions, but also replicated the methods used in the Hussian and Brown study (1987). The purpose of their study was to examine whether any visual barrier condition would stop residents with Alzheimer's disease from leaving the unit through an emergency door. The sample consisted of 4 males and 5 females all suffering from dementia of the Alzheimer's type.

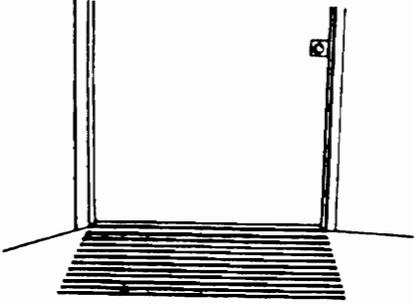
This study consisted of 1 baseline condition, 6 test conditions, and 1 no-barrier condition. A record sheet was posted next to the exit door, and every time the alarm sounded, the staff would record the date, time and name of the wanderer. All conditions were recorded for 2 weeks using this method.

The conditions included: 1) Baseline, 2) Strips of 1-1/2" wide brown tape placed parallel to the door at 1-1/2" intervals and extending 35" from the door, 3) Strips of 1-1/2" wide beige masking tape applied in the same position as test 1, 4) Strips of black 1-1/2" wide tape placed at a 45 degree angle to the door and 1-1/2" apart. This pattern extended 36" into the corridor and 28" up onto the door. 5) An 18" wide beige cloth (which matched the door color) was applied with velcro to hide the door knob. 6) This condition was the second no-barrier condition which examined the potential learning effects of prior barriers. 7) A green patterned cloth was applied using the same technique as condition 4. 8) The door knob was painted the same color as the door. 9) A door knob cover was placed over the door knob which only allowed the knob to turn when enough pressure was applied. Figure 3 illustrates these conditions.

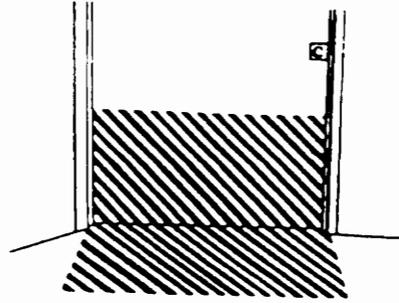
The results from this study revealed that the tape patterns actually increased the number of times a wanderer attempted to leave the building. The use of the cloth barriers eliminated all attempts, and condition 7 and 8 reduced exiting behavior. Interestingly, an additional significant finding from this study was that behavioral learning appeared to be successful when tasks involved repetitive actions. That is, the repeated exposure to the test conditions apparently reduced exiting attempts from 43 counts during the first no-barrier condition to 22 attempts during the second no-barrier condition.

## **Summary**

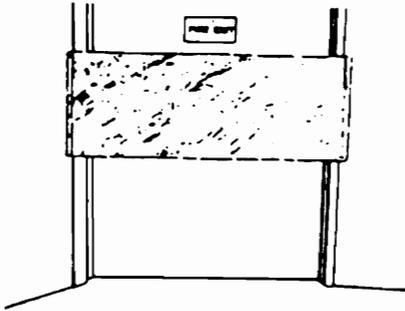
The review of literature has identified problems associated with wandering as well as problems associated with certain methods used by



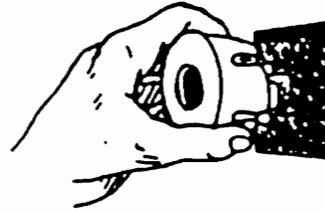
Condition #2: Brown tape  
#3: Masking tape



Condition #4: Black tape at diagonal



Condition #5: Beige cloth  
#7: Green, patterned cloth



Condition #9: Knob cover

Figure 3. Test conditions used by Namazi, Rosner, and Calkins (1989). (Reprinted with permission by Dr. Kevan Namazi.)

institutions for controlling this behavior. As mentioned in Chapter One, there is a need for more applied research in order to establish more efficient and humane treatments than the current methods (Jarvik, 1988). The studies by Hussian and Brown (1987) and Namazi et al. (1989) attempt to establish new methods; however, their results are contradictory. While Hussian and Brown reported that tape patterns reduce exiting behavior, Namazi and colleagues concluded that tape patterns increase wandering behavior. The purpose of this study was to examine the use of tape patterns applied to the floor, and determine whether the use of these patterns would reduce wanderers' exiting attempts.

## CHAPTER THREE

### METHODOLOGY

This chapter outlines the methodology for a quantitative field experiment that examined the effects of specific visual patterns on the wandering behaviors of residents of a dementia care unit. The methodology for this study was based on similar methods used by Hussian and Brown (1987) and Namazi and colleagues (1989).

#### **Objective and Hypothesis**

The objective of this experiment was to determine if tape patterns applied to the floor at an emergency exit would reduce the number of times a wanderer attempted to leave the building. An hypothesis was made that an inverse relationship would exist between the use of tape patterns and the number of times a wanderer attempted to exit the building. That is, the use of tape patterns would reduce wandering behavior at the exit door.

The pattern selected for this study was the same pattern used by Hussian and Brown (1987) and the tape pattern used by Namazi and colleagues (1989). However, in addition to these patterns, the use of red tape was tested. Some colors stimulate the endocrine and pituitary glands and send chemicals to the brain which results in the brain associating basic colors with basic concepts (Lane, 1991). The color red is associated with danger (Sorcar, 1987) thus, a red tape pattern may deter residents from exiting. These specific patterns are discussed later in this chapter.

## Setting

In selecting a setting in which wandering behavior could be observed, five criteria were used: 1) the location of the site needed to be relatively close to Blacksburg, Virginia, 2) the administration must approve and support the study, 3) the facility must have a separate dementia care unit, 4) the unit must have had problems where wandering behavior posed possible threats to the health, safety, and welfare of the residents and, 5) the staff had to work with the investigator to carry out unobtrusive observations.

The "Grove", a 30 bed dementia care unit located in Heritage Hall Nursing Home of Blacksburg, Virginia met the criteria for this study. The dementia unit opened in October, 1991 and at the time of the study, housed 30 residents suffering from some form of degenerative dementia such as Alzheimer's disease, Parkinsons disease, and multi-infarct dementia.

"The Grove" consists of 15 double occupancy rooms, one large activity/dining room, and one small nurse's station. Other features include a training toilet, sitting alcove, shower room, mini-kitchen and janitor's closet. Corridor walls are beige with beige vinyl composition tile floor and fluorescent lighting. The nurse's station is centrally located; however, staff could not view down the corridors from the present location.

## Test Site

The actual test site chosen for this study was the fire exit door. Staff members responded that wandering problems occurred at the fire exit door, and on several occasions, residents had exited the building and some had crossed the highway. (see Figure 4 for the floor plan and location of fire exit).

Problems arose after changes were made in the electronic door alarm system. The former fire exit involved an electronic alarm and door lock that could only be de-activated and opened by entering a combination code. This system was inescapable by residents, but because this system did not meet fire codes, changes were made in the existing door. The lock was altered to open on a 15 second time delay, and an alarm sounded each time the push bar was touched. If a resident touched the bar, and a nurse did not reach the door within 15 seconds, the door would unlock. To reset the system, a code had to be entered after each alarm ended. If a staff member did not re-enter the code after the alarm sounded, the doors would remain unlocked and the alarm would no longer sound. This new system increased the possibility of residents exiting the building. It also created new responsibilities and inconveniences for the staff, thus, the fire exit door became the focus of this study. (see Figure 5 for photograph of exit door).

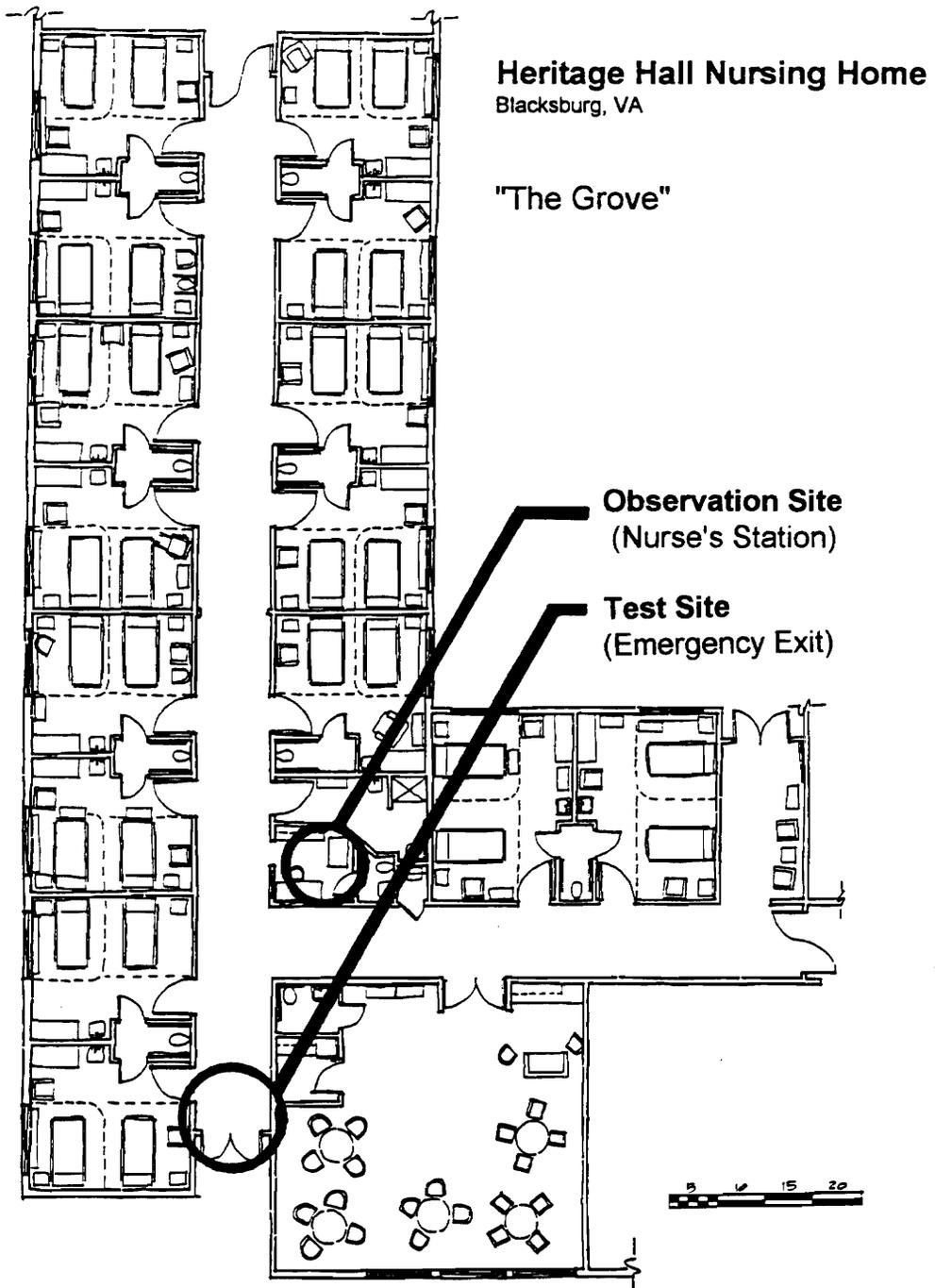


Figure 4. Floor plan of "The Grove". Fire exit and observation site are highlighted.

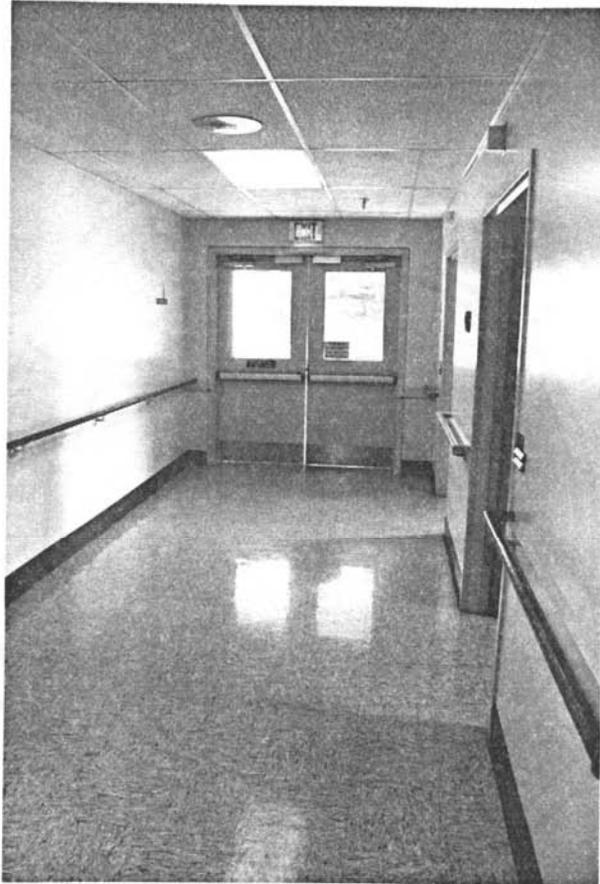


Figure 5. Photograph of Fire Exit Door. ("The Grove", Blacksburg, VA)

## Sample

The sample was determined during the baseline observation and consisted of all subjects who attempted to exit the building by sounding the alarm. During the baseline, 12 wanderers triggered the alarm; however, 1 male resident was not included in the sample because he was restrained regularly during observations. The actual sample consisted of 11 wanderers, 5 males and 6 females, who ambulated independently, and included one wheelchair bound individual. Ages ranged from 69 - 89 with an average age of 80.7. The average length of time in the unit was 7.5 months. Four of the wanderers (36.36% of the sample) were diagnosed with Alzheimer's disease, 18.18% (2) were diagnosed with senile dementia, and the remaining were diagnosed with multi-infarct dementia (9.09%), dementia (9.09%), senile dementia of the Alzheimer's type (9.09%), organic brain syndrome (9.09%), and Parkinson's disease (9.09%). These diagnoses are reported as they appeared on the medical records for each resident. See Table 4 for characteristics of sample.

As mentioned, the sample selection was based on the number of wanderers counted during the baseline. While there was the possibility that someone could have become ill or hospitalized during this experiment, this misfortune did not occur. However, because one resident was restrained regularly, his exiting attempts were omitted from this study. Additional limitations are discussed later in this chapter and in Chapter 4.

**Table 4**

**Characteristics of Sample**

Resident	1	2	3	4	5	6	7	8	9	10	11	12
Gender	M	M	F	M	M	F	F	M	F	F	M	F
Age	82	86	69	79	76	82	73	82	84	89	78	84
Months in NH	11	35	7	43	13	3	5	2	6	2	16	8
Months in Unit*	11	13	7	13	13	3	5	2	6	2	13	8
Ambulation**	W	WC	W	W	W	W	W	W	W	W	W	W
Diagnosis***	SD	SD/ AD	MID	D	AD/ PDG	AD	PK	AD	AD	OBS	SD	AD

\* "The Grove" opened October, 1991

\*\* Ambulation:

W: walk  
WC: Wheelchair

\*\*\* Diagnosis:

SD: Senile dementia  
AD: Alzheimer's disease  
SD/AD: Senile dementia of the Alzheimer's type  
MID: Multi-Infarct dementia  
D: Dementia  
PDG: Primary degenerative dementia  
PK: Parkinson's disease  
OBS: Organic Brain Syndrome

## Methods and Procedures

This experiment consisted of one baseline observation and two test conditions. Staff members were asked on each shift as to the time of day when the wanderers were most active. According to the staff, between 2:00 p.m. and 4:00 p.m. was the most appropriate time to observe since residents became more active during the 3:00 shift change. To verify this time, the investigator observed wanderers for one day between 2:00 and 4:00. Following this observation, the researcher concluded that this time period was appropriate for collecting data.

The researcher was the only observer recording data for all conditions. Observations were unobtrusive from the fire exit door by sitting inside the nurse's station (refer back to Figure 4). The investigator wore a white lab coat in order to blend in with the staff.

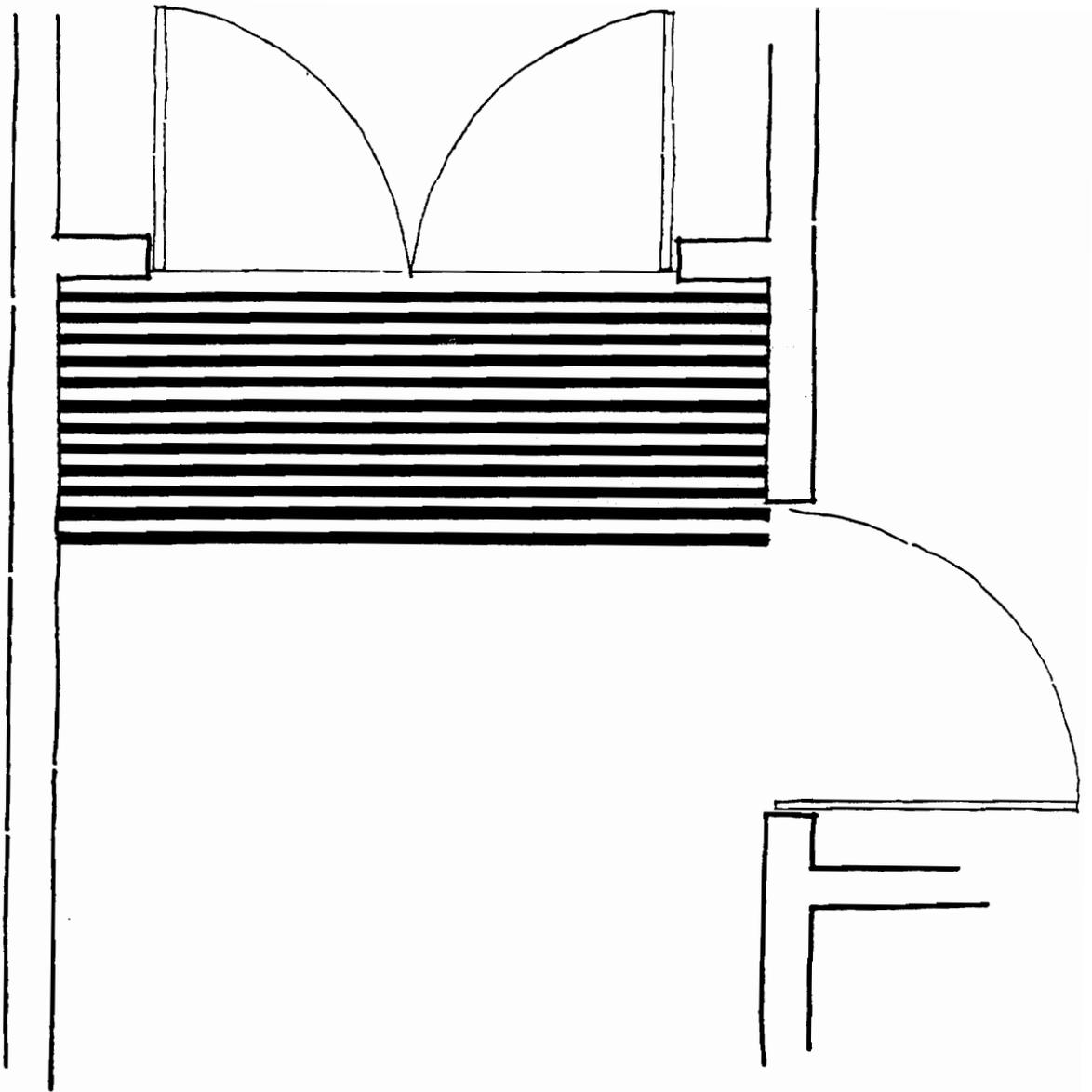
Resident names were recorded, and daily counts were kept for each resident. See Appendix A for data collection sheets. The observer recorded (by resident) the number of times the alarm sounded at the fire exit door. A weekly total for each resident was counted for each condition as well as a weekly total of all residents for each condition. Information was obtained on each subject during a daily staff meeting at 3:00 p.m. These meetings were informative on residents' health, medication, sleeping patterns, visitations, and any new daily happenings (falls, catastrophic reactions, spousal deaths, etc.). This information was recorded along with the daily counts. Observation for the three conditions extended over a 4 week period from November 9, 1992 - December 6, 1992.

**Baseline Condition ( Week 1):**

The baseline condition was observed during the first week from November 9 -16, 1992. The researcher observed during the established time each day for one week in which no visual pattern had been applied to the floor. Exterminators came on the third day to spray the corridors and patient bedrooms. Because of this event, observations were not conducted, but were continued the following day. A total of 7 days (14 hours) was observed as planned. This baseline observation provided a guideline of comparison for the following two test conditions, and determined the sample .

**Test Condition 1 ( Week 2):**

The first test condition followed the baseline observation during the second week (November 17 -23, 1992). This condition consisted of strips of 1-1/2" wide black electrical tape applied to the floor in front of the fire exit at intervals of 1-1/2" apart. This tape was sold in 3/4" strips; therefore, two strips were placed side by side to make a 1 1/2" strip. This procedure was selected because of its conflicting results from the studies by Hussian and Brown (1987) and Namazi and colleagues (1989) . To accommodate for visual deficits, black tape was selected in order to create a visible contrast between the beige vinyl composition tile and the strips of tape. The pattern at the exit door extended 8'-0" wide (corridor width) and 3'-0" deep (Hussian & Brown, 1987). This pattern was installed by the investigator the last night of the baseline observation from 9:00 p.m. - 11:00 p.m., while most residents were asleep. Figure 6 illustrates the tape pattern used for test condition 1.



**Figure 6.** Tape pattern used for test condition 1 and 2. Black was used for test 1 and red was used for test 2.

### **Week 3:**

Repeated exposure to a variety of test conditions has resulted in lower numbers of exits during second baseline periods (Hussian & Brown, 1987; Namazi et al., 1989). In order to account for this possible learning behavior, this study included a one week, no-pattern condition between test condition 1 and test condition 2. Data was not collected during this week for two reasons. First, this week fell during the week of Thanksgiving. This occasion could have influenced wandering behavior because family members would be visiting, and some residents could have been on leave of absence for the holiday season. The second reason for not recording data during this week was that learning behavior was not the focus of this study.

### **Test Condition 2 (Week 4):**

During week 4, November 30 - December 6, 1992, a second test condition was observed. This test condition used the same procedures described previously for test condition 1; however, red duct tape was used. This tape was sold in 2" strips and was cut down to 1 1/2" strips (refer back to figure 6). This pattern was installed between 9:00 p.m. - 11:30 p.m. the last night of week 3.

### **Limitations and Assumptions**

Due to the single test site and the small sample size, the results from this study cannot be generalized to all settings, but may be applied to similar settings (those with double loaded corridors containing fire exit doors with windows). The following limitations have been identified. These include: 1) illness, 2) death, 3) medication, 4) moving out of unit, 5) family and friends visiting, 6) physical

restraints, 7) special activities, 8) sleeping, and 9) maintenance. Any one of these limitations could affect the results of this study. The limitations encountered during this study will be discussed in chapter 4.

The assumptions made were: 1) the baseline observations were representative of a typical week in the unit, and 2) changes in exiting behavior were due to the visual pattern installed at the emergency door.

### Statistical Analysis

Due to the small sample size, nonparametric procedures were used for testing hypotheses about group differences. Nonparametric tests do not rely on parameter estimation and /or normal distribution assumptions. The advantage of using nonparametric tests is that the validity of the test is not affected by whether or not the distribution of the variable in the population is normal. In this study, there were several residents who accounted for the majority of the data, and since the Friedman's Rank test relies on medians rather than means, this type of analysis was used.

The statistical procedure used was the Friedman's Rank Test for  $k$  Correlated Samples. This is a nonparametric test equivalent to the one-way repeated measures anova; however, it is applied to ranks and not raw scores.

The formula for Friedman's Rank Test for  $k$  for Correlated Samples is:

$$X_F^2 = \frac{12}{Nk(k+1)} \sum_{i=1}^k R_i^2 - 3N(k+1)$$

where :  $R_i$  = the sum of the ranks for the  $i$ th condition

$N$  = the number of subjects (wanderers)

$k$  = the number of test conditions

The null hypothesis tested was: tape patterns will not effect the number of times a person attempts to exit the building. In other words:  $H_0: B=T_1=T_2$ .

## CHAPTER FOUR

### RESULTS and OBSERVATIONS

This chapter focuses on the results of the statistical analysis as well as descriptive statistics and detailed observations regarding the baseline observation, test condition 1, and test condition 2. Data were analyzed using the Mini-Tab statistical program in order to test the null hypothesis: Baseline = Test Condition 1 = Test Condition 2. That is, the number of exit attempts during the baseline observation would be equal to the number of exit attempts during test condition 1 and 2. The data were analyzed at the .05 level of significance.

The Freidman's Rank Test analysis obtained a p-value of .542, hence the null hypothesis is retained (see Table 5). However, when the counts were ranked, there were several ties between conditions which could have resulted in a distorted analysis. To adjust for this possible distortion, a Kendall "test for ties" was performed. The results of the Kendall test obtained a p-value of .482 indicating that the null hypothesis  $B = T1 = T2$  is retained (see Table 6).

#### **Descriptive Statistics**

As discussed in Chapter 3, data were collected between 2:00 - 4:00 p.m. every day for a total of 14 hours per week/condition. The data revealed that residents attempted to exit the building frequently through the exit door. During the baseline condition, 11 subjects triggered the alarm for a frequency of 63 attempts ranging from 5 - 14 attempts on any given day (see Table 7, Figure 7, and Table 8). The lowest number of subjects attempting to exit per

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**Table 5**                      **Statistical Results: Freidman's Rank Test**

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X Rank Baseline	X Rank Test 1	X Rank Test 2	n	Chi-Square	D.F.	P-value
2.27	1.86	1.86	11	1.23	2	.542

---

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**Table 6**                      **Statistical Results: Kendall Coefficient of Concordance**

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X Rank Baseline	X Rank Test 1	X Rank Test 2	n	Chi-Square	D.F.	P-value
2.27	1.86	1.86	11	1.46	2	.482

---

**Table 7****Total Exiting Attempts by Person**  
for each test condition

Resident	Baseline	Test 1	Test 2	Total
1	2	2	4	8
2	7	8	3	18
3	37	33	42	112
4	5	0	0	5
5	(17)*	(18)*	(7)*	(42)*
6	2	3	1	6
7	3	0	0	3
8	1	0	2	3
9	1	0	0	1
10	2	0	0	2
11	2	4	4	10
12	1	1	0	2
Total	63	51	56	170

n = 11

\* Data was omitted from study due to resident 5 being restrained regularly.

# Total Exiting Attempts

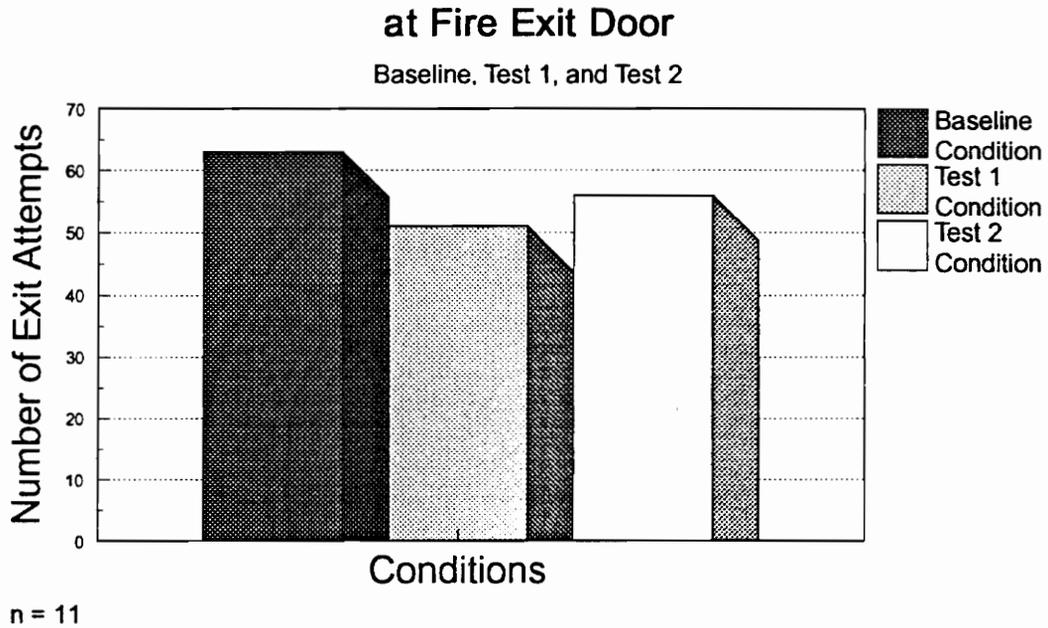


Figure 7. Total Exiting Attempts at Fire Exit Door

**Table 8**

**Lowest and Highest Daily Counts**  
Exiting Attempts

	Lowest Daily Count	Highest Daily Count
Baseline	5	14
Test Condition 1	1	15
Test Condition 2	2	16

n = 11

day during the baseline was 2 and the highest was 5 (see Table 9).

Following the application of the first test pattern, 6 of the 11 subjects attempted to exit accounting for 51 attempts ranging from 1 to 15 on any given day (refer back to Table 7, Figure 7, and Table 8). The number of subjects attempting to exit during test condition 1 ranged from 1 - 4 on any given day (see Table 9). This test condition (black tape pattern) revealed the largest decrease from baseline, and reduced exiting attempts by 19.05% from the baseline condition.

The final test condition (red tape pattern) reduced exiting attempts by 11.12% from the baseline condition. Exiting attempts ranged from 2 - 16 attempts on any given day for a total of 56 counts (refer back to Table 7, Table 8, and Figure 7). The number of subjects attempting to exit per day during test condition 2 ranged from 1 - 3 (see Table 9).

On the average, 9 attempts per day were made during the baseline condition with 3.29 people accounting for these attempts each day. During test condition 2, an average of 7.29 attempts were made each day with 2.24 residents accounting for these attempts per day. Test condition 2 averaged 8 attempts per day and 1.86 residents attempting to exit per day. The average number of exiting attempts per day was determined by dividing the total counts for each condition by 7, the total number of observation days. The average number of people attempting to exit per day was determined for each condition by adding the daily subject counts and dividing by 7, the total number of days for that observation period (see Table 10).

**Table 9**                      **Lowest and Highest Daily Counts**  
 Subjects attempting to exit

	Lowest # of Subjects Attempting to Exit	Highest # of Subjects Attempting to Exit
Baseline	2	5
Test Condition 1	1	4
Test Condition 2	1	3

n = 11

**Table 10**                      **Exiting Attempts at Fire Exit Door**

Test Condition	Exiting Attempts Per Day X	People attempting to exit per day X	Total Exiting Attempts
1) Baseline	9.0	3.29	63
2) Test 1	7.29	2.28	51
3) Test 2	8.0	1.86	56

n = 11

## Individual Responses

This section identifies the gender, age, months in unit, and diagnosis of each resident with the number of exiting attempts for each condition (refer back to Table 4 and Table 7).

- Resident 1:** This male resident, age 82, was diagnosed with senile dementia. He had lived in the unit for 11 months. His total exiting attempts during baseline was 2. His exiting attempts during test 1 remained at 2 and increased to 4 during test 2. Total exiting attempts for this resident was 8.
- Resident 2:** This male resident, age 86 was diagnosed with senile dementia of the Alzheimer's type. He had lived in the unit since it opened in October, 1991(13 months). His total exiting attempts during baseline was 7 and these attempts increased to 8 during test condition 1. His exiting attempts decreased to 3 attempts during test condition 2. His total exiting attempts was 18.
- Resident 3:** This female resident was the youngest resident in this sample. At age 69, she had lived in the unit for 7 months and was diagnosed with multi-infarct dementia. This resident attempted to exit 37 times during baseline, and her exiting attempts decreased to 33 during test 1. However, the use of the red tape pattern increased her attempts to 42 during test 2. Her total exiting attempts was 112, the highest for any one resident.

**Resident 4:** This male resident, age 79, had lived in the unit since it opened (13 months), and was diagnosed with dementia. His total number of exiting attempts during baseline was 5 and decreased to 0 during both test conditions.

**Resident 5:** This male resident, age 76, was diagnosed with Alzheimer's disease and primary degenerative dementia. He had lived in the unit for 13 months, and had escaped from the unit recently. However, his counts were deleted from this analysis because his wandering pattern was not typical of the sample. He was restrained in a geri-chair due to improper behavior 5 out of the 7 days during baseline, 5 out of the 7 days in test 1, and 4 out of the 7 days in test 2. His counts during baseline were 17 and increased to 18 during test 1. Interestingly, his counts fell considerably during test 2 to 7 attempts, and it was this condition that he was free to wander for one extra day.

**Resident 6:** This female resident, age 82, had recently moved into the unit 3 months prior to the baseline. She was diagnosed with Alzheimer's disease. Her total number of exit attempts during baseline was 2 and increased to 3 during test 1. Test condition 2 decreased to 1 attempt.

**Resident 7:** This female resident, age 73, moved into the unit 5 months prior to this study, and was diagnosed with Parkinson's disease. She attempted to exit 3 times during baseline, and both test conditions revealed a decrease to 0 exit attempts.

**Resident 8:** This male resident, age 82, had recently moved into the nursing home 2 months prior to the study, and he was diagnosed with Alzheimer's disease. He attempted to exit once during baseline, with 0 attempts during test 1 and increased to 2 attempts during test 2.

**Resident 9:** This female resident, age 84, was diagnosed with Alzheimer's disease and had lived in the unit for 6 months. She attempted to exit once during the baseline and did not attempt to exit during either test condition. This resident appeared more aware and alert than the other residents, and she commented "I touched the door and it made a sound."

**Resident 10:** This female resident was the oldest resident in the sample. At age 89, she was diagnosed with organic brain syndrome and had lived in the unit for 13 months. The staff reported that her exiting behavior was very unusual. She attempted to exit twice during baseline and did not attempt to exit during either test condition.

**Resident 11:** This male resident, age 78, had lived in the unit for 8 months and was diagnosed with senile dementia. He attempted to exit twice during baseline, and his exiting attempts increased to 4 during both test conditions.

**Resident 12:** This female resident, age 84, was diagnosed with Alzheimer's disease and had lived in the unit for 8 months. She attempted to exit once during both the baseline and test condition 1 and made no attempts during test 2.

Tables 11 and 12 summarize these individual responses for each condition. The black tape did not affect exiting attempts for residents 1 and 12, but appeared to increase exiting behavior for residents 2, 6, and 11. This black tape pattern revealed a decrease in exiting for residents 3, 4, 7, 8, 9, and 10. The red tape pattern increased exiting attempts for residents 1, 3, 8, and 11 and decreased attempts for residents 2, 4, 6, 7, 9, 10, and 12. Resident 1 and 11 were the only residents in which neither of the test conditions resulted in a reduction in exiting attempts. Both these residents were diagnosed with senile dementia.

### **Observations**

As discussed in Chapter 3, several limitations were observed during this study. These limitations include: 1) sleeping, 2) medication, 3) restraint usage, 4) visitors, 5) maintenance, 6) new residents, and 7) death of a spouse. These limitations are discussed in more detail as they were observed by the investigator.

During the baseline condition, resident 3 was observed sleeping on 3 days (4 hours total). During test condition 1, this resident was observed sleeping on 4 days (5 hours total), and 2 days in test 2 (3.5 hours total). Apparently, the counts for this subject were at their lowest during test 1, the week when this resident slept for 5 of the 14 observation hours.

Also during the baseline, resident 2 was placed on a temporary medication that altered his sleep patterns causing him to stay awake two nights in a row. Therefore, this resident was very sleepy during two days and was not acting in his normal behavior.

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**Table 11 Individual Responses to Test Condition 1**

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<i>No Change</i>	<i>Increased</i>	<i>Decreased</i>
Res. 1	Res. 2	Res. 3
Res. 12	(Res. 5)*	Res. 4
	Res. 6	Res. 7
	Res. 11	Res. 8
		Res. 9
		Res. 10

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\* Not included in statistical analysis

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**Table 12 Individual Responses to Test Condition 2**

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<i>No Change</i>	<i>Increased</i>	<i>Decreased</i>
	Res. 1	Res. 2
	Res. 3	Res. 4
	Res. 8	(Res. 5)*
	Res. 11	Res. 6
		Res. 7
		Res. 9
		Res. 10
		Res. 11

---

\* Not included in statistical analysis

Another limitation observed was the use of restraints. Resident 3 was restrained on one occasion during test condition 2; however, she managed to ambulate to the exit door and trigger the alarm. As mentioned previously, resident 5 was excluded from the sample because he was restrained and was not capable of ambulating during the observation periods.

Family visitation was encountered often for several subjects as well as other residents not in this study. Resident 3 had her son visit for 1 hour during test condition 1, her family visit for 2 hours during test 2, and a friend visit for 1 hour during test 2. Resident 12's daughter visited regularly during each condition for approximately 1 hour each visit.

Problems due to maintenance were encountered during the baseline observation. On the second day, a maintenance crew worked on the emergency door for approximately 1 hour during the observation period. This disturbance prevented the investigator from collecting data as the drill sounds appeared to attract several curious male residents to the door. On the third day, the entire unit was being sprayed for pests, and everyone was locked in the activity room for the afternoon. Data was not collected this day, but resumed the following day. A total of 7 days (14 hours) was observed as planned.

Yet another limitation was encountered during test condition 1 when a new female resident was admitted into the unit for her first admission into a nursing home. This resident was very vocal, angry, and confused, and required the majority of the staffs' attention. This resident excited several residents by trying to find "a bus station in Atlanta" while trying to exit the building on many occasions. However, because this resident was not adjusting well to the unit, her family moved her back home after 2 days.

The final limitation encountered was the death of resident 6's spouse during the baseline observation. This resident attended her husbands' funeral on day 5 and was observed crying on several occasions as she wandered the corridors carrying a photo of her late husband.

## CHAPTER FIVE

### CONCLUSIONS

The objective of this study was to determine if tape patterns applied to the floor at an emergency exit would reduce the number of exit attempts by wanderers living in a dementia care unit. The hypothesis was that an inverse relationship would exist between the use of tape patterns and the number of exiting attempts. In other words, the use of tape patterns would significantly reduce the number of exiting attempts at the fire exit door.

The results from this study revealed that wandering was a serious problem for the caregivers in "The Grove". Out of the 30 residents living in the unit, 40% wandered and attempted to exit during the four week study. Unlike Namazi and colleagues (1989), the use of the tape patterns did show some improvement over the baseline condition, however, the reduction in exiting attempts was not statistically significant. Why did these patterns not significantly reduce exiting attempts in this unit when similar techniques used by Hussian and Brown (1987) reduced exiting attempts?

One difference in the Hussian and Brown study from this study was that beige masking tape was applied to the floor in their study. It was assumed that the contrast between the tape and floor may have been minimal because the investigators recommended studying similar methods with more contrasts. Therefore, one possible explanation could be that the contrast was too apparent, meaning that the residents could have been drawn to the patterns on the floor.

A second possible explanation could be linked to the high illumination level in this area on certain occasions. That is, on some days, the sun would shine through the window in the exit door area. This additional light source possibly increased the residents visual acuity, accounting for better visual perception. Studies have determined that higher levels of illumination achieve better visual acuity in elderly and demented patients (Marsh, 1980). If their visual acuity was better in this area, then possibly, the tape patterns were not perceived as a barrier.

In an early study by Hussian (1982), data revealed that wanderers' paths were altered during ambulation due to people (59%), and windows with exterior views (29%). In this study, a wanderer could have been drawn to the fire door because of the exterior view or light source which, in turn, could have attracted other wanderers while looking out the window. The wandering patterns described in Chapter 2 indirectly support this possibility (Hussian, 1985; Saltzman et al., 1991). For instance, one wanderer exhibited a direct wandering pattern toward the door for reasons unknown, possibly because of an attraction to the view. At the same time, a second wanderer classified as a modeler, moved toward the door because of his attraction to the person at the window. Instances such as these were regular occurrences during this study and could be a third reason why the tape patterns were not successful. Quite possibly, the view out of the window and the people at the window were more of a focal point than the tape pattern applied to the floor.

Interestingly, there were several environmental differences between Hussian & Brown's test site and Namazi and colleagues' test site that support the findings from this study. While all the studies focused on wandering

behavior at an exit door, the test sites were quite different. The exit door in the Hussian and Brown study did not have a window with a view (R. Hussian, personal communication, April, 1993). Namazi and colleagues' study did not have a window in the door, but had a large side window adjacent to the door in which the blinds remained open throughout their study (K. Namazi, personal communication, April, 1993). The use of tape patterns appeared to significantly reduce exiting attempts when a window was not present, supporting the idea that the view outside attracted more wanderers and possibly increased the chance of an exiting attempt.

A final possible reason for these findings was that the actual push bar on the door seemed to attract wanderers because it was metallic and created a contrast against the light blue doors. On several occasions, resident 3 was observed brushing the bar as if trying to clean or polish its surface. This so called "exit attempt" was different from other attempts in that an escape was not intended. Should this "attempt" have been recorded? Could the results have been significant if these "exiting attempts" were not counted? Similar studies should reconsider the methods used in recording and classifying exiting attempts.

### **Recommendations for Futher Research**

While the findings from this study were not statistically significant, several of the findings could prove to be clinically beneficial to future studies. First, because the sample was not homogeneous in behavior, each resident

responded differently to the test conditions. While one pattern reduced attempts for some residents, the same pattern increased attempts for others; therefore, multi-method approaches may prove beneficial when studying a heterogeneous sample. Second, these wanderers appeared to be attracted to a stimulus (i.e. window with view, people, or a light source), suggesting that residents could be attracted to other areas of a facility by installing stimuli throughout the corridors. These stimulations could possibly deter residents from the fire exit door. Designers may consider specifying exit doors without windows; however, other forms of stimulation within the environment should be considered.

A method for controlling wandering was not discovered for this facility; therefore, further studies could focus on alternative solutions for this facility. These studies could include methods which conceal the view of the window or conceal the push bar. Other studies could also examine the effects of the light source on wandering behavior at the window by recording daily illumination levels to determine if the wanderers were attracted to the fire exit door because of the light source. Also, interactive (tactile) art work such as quilts could be displayed throughout the corridors to provide alternative stimulations rather than the exit door, in turn, possibly reducing exiting attempts.

On a larger scale, similar studies on exiting behavior could attempt to include a larger sample and additional test sites. However, the test sites should be similar in design. Studies could examine the relationship between staff stress, attitudes, and perceptions simultaneously with the various conditions being tested for controlling wandering. This approach would establish methods that would not only benefit the residents but also the staff. A final recommendation would be to conduct an investigative study by mailing a large

distribution of questionnaires to facilities with dementia care units in order to determine other methods used for controlling wandering.

## **Future Directions**

Caregivers in special dementia care units are faced with many safety concerns especially when dealing with wanderers. Many methods used by nursing homes have not been ideal or humane, and recently, studies have focused on alternative solutions that promote healthier lifestyles.

As previously discussed in Chapter 2, individuals with low competence levels require living environments that compensate for their deficiencies. The cognitive and physical limitations associated with dementia make living in certain environments very demanding. Environmental adaptations are necessary to assure that these special environments are safe, secure, accessible, and support cognition.

Until a cure for this devastating disease is found, the need for special dementia care units will continue to increase, and interior designers will need to gather their programming information from published post-occupancy evaluations of new and existing units. These evaluations will hopefully address issues in safety, accessibility, and cognitive support as well as advantages and disadvantages of segregating the cognitively impaired into special dementia care units.

There is still misinformation and lack of understanding about the environmental needs of individuals suffering from dementia. An important step

in the design process is recognizing that there is an imperfect "fit" between the living environment and its users. However, the methods applied to the design solutions are most important. Appropriate design components and elements could enhance the health, welfare and functional ability of those suffering from dementia.

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## Appendix - A

### Daily Record Sheets

<b>Baseline Counts</b>		Date:
Name	Daily Counts	Notes
Observations:		

<b>Test Condition 1</b>		Date:
Name	Daily Counts	Notes
Observations:		

**Test Condition 2**

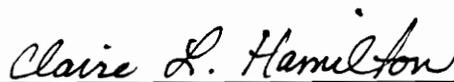
Date:

Name	Daily Counts	Notes

Observations:

## VITA

Claire Land-Hamilton was born on June 10, 1966 in Columbus, Mississippi. She received her undergraduate degree in Interior Design from The University of Southern Mississippi, Hattiesburg, Mississippi in May, 1988. Upon completion of her undergraduate studies, Claire worked as a commercial interior designer specializing in systems furniture planning, and healthcare design. She was admitted into the Master's program in Housing, Interior Design, and Resource Management at Virginia Tech in May, 1991. During her graduate studies, Claire received the 1991 Jean M. Lane Scholarship, and the 1992 IBD/ Lackawanna Leather Graduate Fellowship awarded during the 1992 Neocon show in Chicago, Illinois. Claire was a graduate teaching assistant for Two-dimensional Design and House Planning. She plans to continue within her specialty working for a major systems furniture dealership in Oklahoma City as a contract designer and a CAD operator. She also plans to pursue a career in teaching interior design with special emphasis in contract design.

A handwritten signature in cursive script that reads "Claire L. Hamilton". The signature is written in black ink and is positioned above a horizontal line.

Claire L. Hamilton