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UNIVERSITY OF ALBERTA

UNDERSTIMULATION AS A POSSIBLE CAUSE OF WANDERING IN RESIDENTS WITH ALZHEIMER'S DISEASE

BY

CORINNA P. ANDIEL

A Thesis

Submitted to the Faculty of Graduate Studies and Research

in Partial Fulfillment

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Abstract

The belief is widespread in the literature that wandering is a manifestation of agitation as a result of overstimulation. However, there are only a few empirically based studies that allegedly support this notion (Cohen-Mansfield, Marx, & Rosenthal, 1989; Snyder et al., 1978). Moreover, results of other research conflict with the results of these few studies. Dawson and Reid (1987), for instance, report that patients who were most likely to be wanderers were those who were rated by nurses as being cognitively impaired and hyperactive. In contrast, nurses' ratings of agitation and aggression were not correlated with the identification of wanderers. Results of pharmacologic studies also contradict the overstimulation hypothesis of wandering. Neuroleptics are commonly used to treat agitation in older adults, and while they are effective in reducing symptoms such as hostility and sleeplessness, they are less effective in treating repetitive behaviors such as pacing (Risse and Barnes, 1986). The purpose of this study was to investigate the hypothesis that wandering is associated with understimulation rather than overstimulation. If wanderers are understimulated they should exhibit stimulus seeking behaviors while wandering. Furthermore, co-occurrences of agitated behaviors and wandering should be relatively absent. A behavioral observation study using continuous real time measurement over discrete time intervals was conducted to provide a systematic description of behavior through direct observation and recording. A behavioral

ethogram was used to record the location, ambulation patterns, and agitated/aggressive and stimulus seeking behaviors of a group of 17 residents of long term care facilities. These resident. were transferred the facilities because of their tende to wander in their previous residences. While s op t for the understimulation hypothesis was not absolute, conting nc es between walking/standing and stimulus seeking behavi as well as cluster analyses suggest that walking, stand j and stimulus seeking are related. Moreover, the data do not sup t the hypothesis that wandering is associated with overs imulation. Residents rarely exhibited agitated behaviors but engaged in s imulus seeking app oximately half of the time they were observed, suggesting that they are understimulated rather than overstimulated. The results have implications for the concept of wandering in Alzheimer's disease and for therapeutic interventions.

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Introduction

The number of Canadians over 65 years of age has increased threefold over the past 55 years and is expected to triple again by 2030 (National Advisory Council on Aging, 1989). One consequence of the increasing size of Canada's senior population is that the number of cases of Alzheimer's disease will grow substantially, a consequence of the fact that the incidence of this form of dementia increases with age (Jorm, Korten, & Henderson, 1987). It is unlikely that a cure for Alzheimer's disease will be found in the near future and patient management will remain as a primary concern. As a result, there is a pressing need for empirical research on the behavioral manifestations of Alzheimer's disease to enable the development and implementation of more effective research-based management techniques. The purpose of this research is to investigate the cause of wandering in older adults afflicted with Alzheimer's disease.

The need for empirical research on behavioral changes associated with Alzheimer's disease is especially evident for wandering. Rosin (1977) reported that 44% of elderly people were placed in a nursing home because of "aimless wandering", while others (Burns, Jacoby, & Levy, 1990; Mann, Graham, & Ashby, 1984) found that 20% of severely demented nursing home residents were wanderers. In a survey of over 300 long-term care facilities, wandering was the patient behavior issue reported most often by respondents (Hepburn,

Severance, Gates, and Christensen, 1989). Furthermore, a wanderer is estimated to cost a nursing home an additional $2500 each year in terms of staff time (Fennelly, as cited in Grossberg, Hassam, Szwabo, & Morley, 1990), and creates safety risks not only for the wanderer him/herself, but for other residents as well (Gwyther and George, 1986).

In the past, caregivers attempted to control wandering with the use of pharmacological or physical restraints (Namazi, Rosner, & Calkins, 1989). More recently, however, researchers have begun to question whether these types of interventions are appropriate (Cohen-Mansfield, Werner, Marx, & Freedman, 1991; Martino-Saltzman, Blasch, Morris, & McNeal, 1991; McGrowder-Lin, & Bhatt, 1988; Namazi, et al., 1989). The call for alternative and more effective management techniques underscores the need for research directed toward understanding the etiology of wandering and the type of behaviors that accompany it.

The confusion surrounding wandering is reflected in the wide range of definitions provided in the literature. Definitions vary from "constant walking back and forth" (Cohen-Mansfield et al., 1991) and "seemingly aimless or disoriented movements that involve exiting to the outside" (Namazi et al., & Calkins, 1989), to "a tendency to keep on the move, either in an aimless or confused fashion, or in pursuit of an indefinable or unobtainable goal" (Stokes, 1987) and "movement changing over time with locomoting and

non-locomoting phases" (Algase, 1992). Furthermore, some researchers focus on the wanderer's poor judgement of factors such as duration, direction, and risk of ambulation (Hiatt, 1988), while others include in their definitions the presumed negative consequences of wandering, including getting lost and trespassing (Fisher & Carstensen, 1990) or the reinforcing aspects of wandering behavior (Hussian, 1987). Hope & Fairburn (1990) also discuss the conceptual and behavioral overlap between the terms "hyperactivity", "agitation" and "wandering" and argue that these terms need to be better defined and distinguished among one another if more appropriate management techniques are to be developed.

The confusion surrounding the concept of wandering is also reflected in the proposed typologies of this behavior. The typologies must be interpreted with caution because categories of wanderers within a typology are commonly at different conceptual levels. To illustrate, Hope & Fairburn's (1990) typology includes categories of wandering based on the purpose the locomotory behavior (ie. aimless walking, wandering with an inappropriate purpose, and attempts to leave), time at which the walking occurs (ie. night-time walking), and frequency of the behavior (ie. excessive activity). Purpose, time, and frequency are attributes that could be evaluated for all categories, and using a causal attribute (purpose) to define one category and observable attributes (time, frequency) to define others

does not provide an adequate basis for categorization. In addition, the development of these typologies is characterized by methodological problems. For example, data often consist of caregivers' retrospective reports, and categories are based on subjective, post hoc interpretations of data (Hope & Fairburn, 1990; Snyder, Rupprecht, Pyrek, Brekhus, & Moss, 1978; Stokes, 1987).

To date, much of the research on wandering has been accomplished in the context of studying agitation as the underlying mechanism. That is, wandering is portrayed as a behavioral manifestation of agitation. In her review of the literature on agitation and the confused elderly, Taft (1989) notes that excessive motor activity is almost always included in definitions of agitation. Researchers have not questioned the notion that wandering is a behavioral manifestation of agitation, and in most studies of agitation researchers presume wandering is a behavioral manifestation of this state (Cohen-Mansfield & Billig, 1986; Curl, 1989; Sinha et al., 1992; Struble & Siversten, 1987). At the same time, researchers argue that, conceptually, agitation reflects some type of negative emotional state or feelings of internal tension, such as discontent, frustration, or suffering (Struble & Siversten, 1987; Werner, Cohen-Mansfield, Braun, & Marx, 1989). From this conceptualization of agitation it seems appropriate to operationalize agitation in terms of obvious behavioral

expressions of this negative emotional state rather than less obvious behaviors such as wandering. Obvious behavioral expressions may include crying or yelling at another person. The co-occurrence of wandering and the more obvious behavioral expressions of agitation would then suggest that wandering and agitation are associated. However, rather than verifying this relationship by using a behavioral definition of agitation that is independent of wandering, researchers have simply presumed that wandering is a behavioral manifestation of this state.

The relationship between agitation and wandering, and consequently how wandering should be managed, is presented in two ways in the literature. Some researchers suggest that overstimulation leads to wandering, with agitation acting as a mediator between overstimulation and wandering behavior. For example, in Hall and Buckwalter's (1987) model of dysfunctional behavior in the elderly population, overstimulation causes anxiety and manifests itself in anxious behaviors such as wandering. Proponents of this perspective suggest reducing stimulation in the environment to decrease wandering (Grossberg, Hassan, Szwabo, & Morley, 1990; Knopman & Sawywer-DeMaris, 1990). While some authors recommend rest in a quiet environment and reducing caffeine intake to curtail wandering (Curl, 1989), others (Snyder et al., 1978) suggest that excessive stimulation caused by factors such as housekeeping activity or music presented

over the intercom should be reduced. Similarly, Hall and Buckwalter (1987) suggest simplifying environmental stimulation until anxious behaviors such as wandering dissipate.

Other researchers focus directly on the state of agitation (Cohen-Mansfield, 1986). That is, they attempt to manage wandering behavior by alleviating the agitated feelings rather than working with the source of the agitation. Thus, interventions such as validating the resident's feelings have been suggested (Struble & Siversten, 1987), and concern over whether chemical and physical restraints actually increase rather than decrease agitation has been expressed (Werner et al., 1989).

Regardless of the perspective, the simplest explanation of agitation cited in the literature is that it is a result of overstimulation from the environment. While there are other proposed causes of agitation, including emotional factors as well as cognitive factors (ie. the resident is lost), this discussion will focus on agitation as it relates to overstimulation.

To date, there are only a few empirically based studies purported to support the widespread belief that wandering is a manifestation of agitation caused by overstimulation. In Cohen-Mansfield, Marx, & Rosenthal's, (1989) study of agitation in a nursing home, nurses rated resident behavior using an inventory of agitated behaviors compiled from

nurses' comments and a review of the literature. A factor analysis of the nurses' ratings revealed three orthogonal factors of agitated behavior: Aggressive behavior (as indicated by behaviors such as hitting, kicking, and pushing), verbally agitated behavior (as indicated by behaviors such as screaming, negativism, and complaining), and physically nonaggressive behaviors (as indicated by pacing or excessive walking, general restlessness, repetitious mannerisms, and handling things inappropriately). The authors interpreted the first two factors as affectively toned dimensions of agitation and the third factor as a motoric expression of agitation.
In addition, Snyder et al., (1978) used a behavior observation technique to study eight pairs of wanderers and nonwanderers in a nursing home, and found that wanderers spent more time engaging in what they call "Ritual-Z behaviors" (ie. calling out and screaming). The authors also proposed a typology based on their subjective impressions. In one of the proposed categories, overtly/goal-directed/searching behavior, wanderers search for something unattainable, such as a deceased relative. This behavior is often accompanied by calling out and approaching one person after another. Findings such as these are interpreted as providing additional support for the idea that wandering is a demonstration of agitation.

Nevertheless, findings from several studies challenge

this popular belief. Dawson and Reid (1987) factor analyzed data collected from nurses' retrospective reports of behaviors of 100 residents, including both wanderers and nonwanderers. They found three orthogonal dimensions of wandering and nonwandering behaviors: 1) cognitive deficits (as indicated by ratings on elements such as speech dysfunction, reading deficits, and not knowing when lost), 2) agitation/aggression (as indicated by ratings on elements such as shouting, anger, and sleep disturbances), and, 3) hyperactivity (as indicated by ratings on elements such as perpetual motion, good gait, and social skill). The wanderers had more cognitive deficits and were more hyperactive, but were no different than the non-wanderers on the agitation/aggression dimension. Furthermore, the agitation/aggression factor was not associated with degree of wandering, number of times lost, or frequency of wandering.

The results from environmental and pharmacologic intervention studies also suggest that wandering is not a manifestation of agitation. Clearly, Clamon, Price and Shullaw (1988) evaluated the effects of a Reduced Stimulation Unit (RSU) on several behaviors of 11 patients including agitation and wandering. Stimulation was minimized on the unit by choosing pictures and wall colors that were neutral in design and color, camouflaging doors, as well as eliminating televisions, radios and telephones.

Examination of the nurses' flow sheets before and after revealed a significant decrease in agitation. In addition, wandering was no longer a concern because residents could wander safely on the unit, though there is no indication that there was any decrease in wandering per se. In their review of pharmacologic interventions, Risse and Barnes (1986) report that neuroleptics are commonly used to treat agitation in older adults. They also report that these drugs tend to be effective in managing some behaviors such as sleeplessness, hostility, and excitement, but are less effective in the treatment of repetitive, bothersome behaviors such as pacing.

In summary, the literature on wandering is far from conclusive. In fact, there is good reason to question the assumption that agitation is the underlying mechanism of wandering, and to consider alternative approaches to conceptualizing wandering. One particular approach that leads to a more consistent interpretation of the literature is that residents with Alzheimer's disease wander because they are understimulated and are therefore seeking stimulation. This notion is in direct contrast with the more popular notion that wanderers are overstimulated, as indicated by the agitated behaviors they allegedly exhibit. Two ideas are fundamental to this proposed conceptualization. The first premise is that understimulation is a result of the disease process and thus

is a chronic characteristic of at least a subset of patients with Alzheimer's disease. The disease process may affect both the amount and type of stimulation the wanderer requires. That is, the disease process may result in a change in brain function such that there is a chronic need for more stimulation. For instance disruption of the catecholamine system may affect the amount of stimulation the Alzheimer patient requires. In addition, the dementia itself may affect the kind of stimulation that is meaningful. For instance, television soap operas may provide little meaningful stimulation for demented patients because they may have difficulty following multiple plots characteristic of these shows. On the other hand, simpler or more basic forms of stimulation such as tactile stimulation may be more meaningful.

The role of the disease process is not to deny that there may be situational factors that may lead to wandering. In fact, the second premise is that the categories of wandering proposed by other researchers may not necessarily reflect different underlying causes of wandering, but instead may be situational modifiers of wandering behavior. That is, these modifiers act as temporary influences on wandering behavior. For example, until a newly admitted resident becomes familiar with his surroundings, he/she may display wandering behaviors because he/she is disoriented. In addition, some event (such as a fire alarm going off) may

cause a temporary state of agitation and manifest itself in wandering behavior, or modellers (residents who wander only in the presence of other wanderers) may be cued to wander when they see others locomoting.

To address the issue of stimulation level it is helpful to consider Helson's adaptation level theory. Helson (1964) argued that how we respond to changing stimulation depends on our adaptation level. Our adaptation level is based on a weighted mean of focal, background, and residual stimuli, and stimulation may arise from the external environment as well as from within the individual. How we interact with our environment depends on our level of adaptation. Thus, if we encounter a particular stimulus that falls within some range of this weighted mean, we adapt to it. However, if we receive stimulation that falls outside of our adaptation level we will react to it differently than if it were within our adaptation level.

Helson's model, however, does not address whether or not a certain level of stimulation is required. Moreover, how individual differences (such as induced by pathology) affect the possible types and absolute levels of stimulation that may be required is not a part of the adaptation level model. These are two issues of direct concern to the present conceptualization. More recent investigators have incorporated the notion of adaptation level within theories of optimal level of stimulation and arousal. These

researchers have gone beyond Helson's notion that we have an adaptation level that affects how we interpret stimuli, and argued that we require an optimal level of stimulation. For example, Zuckerman (1991) argues that there is a physiological need for an optimal level of stimulation to regulate brain activity and to produce organized behavior. Too much or too little stimulation disrupts cortical activity or arousal. The individual can adapt his/her cortical arousal to stimulation levels that are relatively high or low if these levels are introduced gradually and are within some absolute range of stimulation. Otherwise, when an individual is overstimulated he/she will seek less stimulation, and if he/she is understimulated he/she will behave to increase the amount of stimulus input he/she receives. The amount of stimulation sought varies according to inter- and intra-individual characteristics (such as age, pathology fatigue, pharmacological intervention) as well as stimulus characteristics (such as stimulus intensity and complexity).

It is possible that in Alzheimer's disease the ability to process stimulation is impaired, causing a qualitative and quantitative change in the stimulation required to maintain an optimal level of arousal. In addition, those afflicted with Alzheimer's disease may require different kinds of stimulation than those not afflicted with the disease. In this regard, Zuckerman (1991) asserted that

stimulation is required to maintain optimal levels of catecholamine system activity. Though he has not discussed the relationship between his theory and Alzheimer's disease, it is intriguing to note that decreases in brain levels of norepinepherine have been reported (Hardy et al., 1985; Rosser, Iversen, Reynolds, Mountjoy & Roth, 1984). This is consistent with the notion that wandering occurs because the Alzheimer resident is understimulated and consequently is seeking stimulation.

Zuckerman's emphasis on individual differences and stimulus parameters can be used to suggest that Alzheimer's disease may affect the amount of stimulation those afflicted with the disease may require. The importance of the nature of stimulation is reiterated by Mace's (1987) comment that "Stimulation and stress are not the same. A low stimulus environment may be stressful if it fails to provide good sensory clues and meaningful things to do" (p. 15). Unfortunately, the focus of past studies has been on decreasing stimulation rather than on determining what kinds of meaningful stimulation Alzheimer residents should be exposed to.

Interpretation of earlier studies from the optimal level of arousal point of view creates a more coherent picture. Recall that Cohen-Mansfield et al.'s (1989) factor analysis of the residents' disruptive behaviors revealed physical aggression, verbal agitation, and physical

nonaggression components, none of which were correlated with each other. Contrary to the authors' interpretation, the orthogonality between the three factors could be interpreted as evidence that the third factor, which includes pacing, is not a behavioral manifestation of agitation. Unlike the other two factors, the physical non-aggression factor did not contain affectively toned agitated behaviors. Rather, this component contained behaviors such as pacing, general restlessness, repetitious mannerisms, and handling things inappropriately, all of which could be interpreted as behaviors that serve to increase levels of simulation. Thus, an alternative interpretation of the findings from that study is that pacing and the other elements which loaded onto the same factor form an independent cluster of stimulus seeking behaviors, rather than a third type of agitated behavior. In addition, Dawson and Reid's (1987) finding that wanderers were more hyperactive than non-wanderers but no different in terms of agitation/aggression is consistent with the view that wandering is a stimulus seeking behavior as opposed to an agitated behavior. Similarly, the findings that reducing stimulation on units and the use of neuroleptics lead to a decrease in agitation but had no effect on the amount of wandering is consistent with the stimulus seeking hypothesis.

The proposition that wanderers could be understimulated is supported indirectly by the literature on Attention

Deficit Hyperactivity Disorder (ADHD), a disorder that has a behavioral similarity to wandering. According to Barkley (1990), one of the primary characteristics of ADHD children is their excessive levels of activity, as indicated by general restlessness, fidgeting, and gross body movements that often appear purposeless. Criteria for diagnosis of this disorder in the revised third edition of Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 1987) are largely based on factor analyses of parent and teacher rating scales. Items that best discriminate children with ADHD from normal children include fidgeting with hands or feet and having difficulty remaining seated. In a similar study conducted earlier (Barkley & Cunningham, 1979 in Barkley, 1990), ankle movements and locomotion were found to differentiate ADHD children most reliably from non-ADHD children.

The most common and most effective treatment for ADHD is a psychostimulant such as Ritalin (Barkley, 1990; Churton, 1989; Henker and Whalen, 1989). Interestingly, psychostimulants are reported to be effective in increasing attention spans and reducing restlessness and motor activity (Barkley, 1990), but less effective in reducing emotion-laden symptoms such as irritability, aggression, and explosiveness (Churton, 1989). Many of the hypotheses about the cause of ADHD have developed from the research directed toward understanding the mechanism of the stimulant drug

action. For instance, some researchers postulate that ADHD children have a higher reward threshold (Haenlen & Caul, 1987) or are more influenced by immediate reinforcement and less affected by delayed reinforcement (Sagvolden et al., 1992) than non-ADHD children. These researchers argue that psychostimulants may alleviate the symptoms by correcting for these deficiencies.

Other researchers like Zentall (1975; 1986) have considered optimal stimulation level theory to explain how psychostimulants alleviate hyperactivity. Like other optimal stimulation level theorists, Zentall (1975) argues that there is a biological need to regulate incoming stimulation to an optimal level and that behaviors can regulate how much stimulation is received. Similar to the current view of wandering, the hyperactive behaviors of ADHD children were originally thought to result from overstimulation. However, optimal stimulation level theory suggests that the converse may actually be true. That is, hyperactive children may be understimulated, and their behaviors may serve to increase their levels of kinaesthetic, motor, and visual stimulation. Amphetamines are presumed to be an effective form of treatment because they increase arousal levels of the central nervous system, consequently increasing the amount of stimulation received (Barkley, 1990). Direct support for the analogy between ADHD and wandering in Alzheimer's disease, and increasing

stimulation as an effective intervention comes from a recent case study by Hope, Patel, & Series (1991). They used a psychostimulant, dexamphetamine to treat an Alzheimer patient who was characterized as hyperactive. Prior to treatment, the subject walked for 95% of the total observation time, while after treatments she spent over 90% of the observation time sitting, and was able to sit through a meal. Within 48 hours of discontinuing treatment, her pre-treatment behaviors returned.

Although the hypothesis that at least a subset of wanderers may be seeking stimulation has never been tested directly, there are several additional studies that provide support for this possibility. Hussian & Davis (1983, cited in Hussian, 1987) observed 13 institutionalized wanderers and created a post-hoc typology. The typology includes a group of wanderers called "self-stimulators" who frequently engage in self-stimulatory behaviors (such as excessive door-knob turning) in addition to wandering. In a related study, Hussian & Hill (1980) found that some geriatric patients spent as much as 87% of their awake time exhibiting self-stimulatory behaviors. Although Hussian (1987) argues that the self-stimulators are reacting to inappropriate or insufficient stimulus control, it is also possible that this group, like the ADHD children, engage in self-stimulatory behaviors as a means of increasing levels of stimulation.

Furthermore, in a behavior observation study of a small

sample of wanderers, Hussian (1982) found that 59% of the wanderers' stops were made within one foot of one or more people, 29% were made at windows, and 11% were made at other locations, such as water fountains and chairs. The nature of the stopping points suggests that wandering may be a stimulus seeking activity.

Consistent with this notion is the finding that wanderers may be seeking stimulation through social interaction. Snyder et al.'s (1978) observation of eight pairs of wanderers and non-wanderers matched on a number of variables including mental status, length of stay, and mode of ambulation, indicated that wanderers socialized more than nonwanderers. In addition, Dawson and Reid (1987) factor analyzed a list of behaviors of 100 wanderers and nonwanderers and reported that the hyperactivity dimension differentiated these two groups of residents. This factor included elements such as social skill, lack of withdrawl, and perpetual motion.

In contrast to the overstimulation hypothesis, it follows from the ADHD analogy that effective interventions would entail creating a more stimulating environment. In fact, some researchers have suggested that cognitively impaired residents be exposed to stimulus enhanced environments (Peppard, 1991; Rader and Hoeffer, 1991). Such environments should include daily activities that the residents find enjoyable and interesting, such as music and

exercise. In addition, the importance of providing tactile stimulation through human touch and by providing textured materials such as woven wall hangings is also recognized (Hall, Kirschling, and Todd, 1986; Peppard, 1986; Wagner, 1987).

The suggestion that stimulus enhancement may be a more effective treatment intervention for wandering than decreasing stimulation is supported indirectly by a recent behavior observation study. The frequency of agitated behaviors when nursing home residents were unoccupied was compared to when the residents were involved in some type of activity (Cohen-Mansfield, Marx, Werner, 1992). Interestingly, residents exhibited significantly less pacing and fewer repetitious mannerisms when they were engaged in social interactions, structured activities, activities of daily living, or relocating to another room than when they were inactive. On the other hand, the frequency of aggressive behaviors did not decrease when residents were engaged in an activity. This finding is consistent with the hypothesis that at least a subgroup of wanderers exist for whom the excessive motoric activity is disassociated from agitation and associated with understimulation.

In summary, wandering in Alzheimer's disease and ADHD are alike in that both conditions are characterized by excessive motor activity. In addition, increasing stimulation may be an effective form of treatment for both

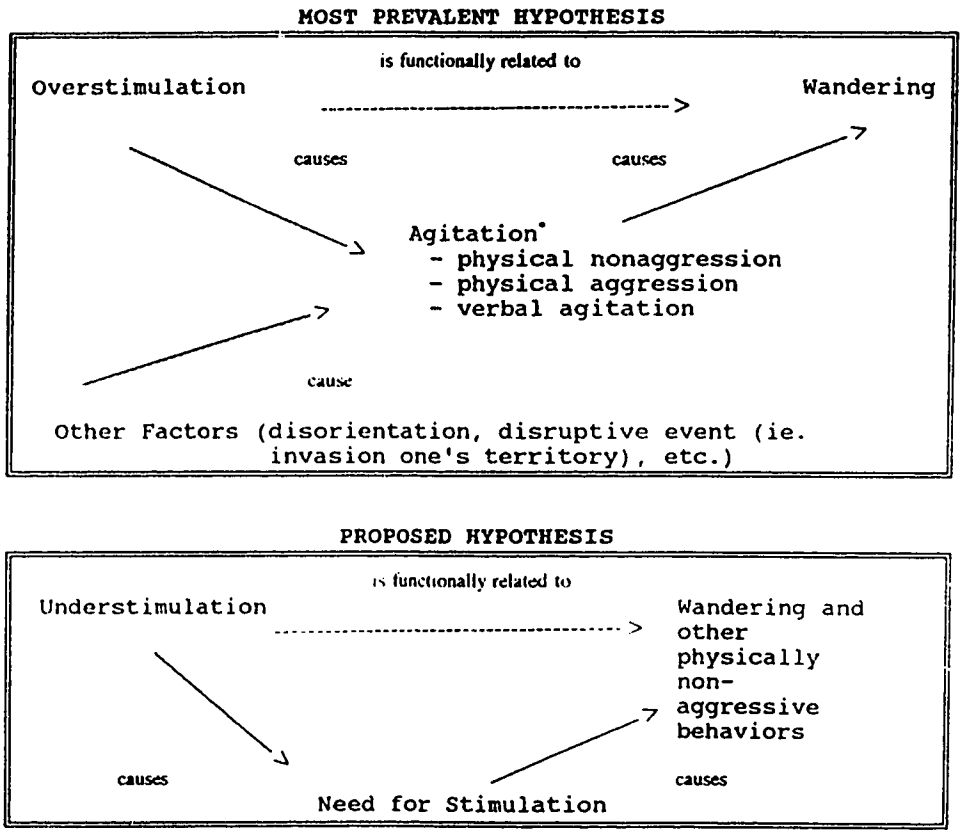
conditions. Results of neurologic and biochemical studies also suggest further noteworthy similarities. In Alzheimer's disease, some of the most prominent atrophy and neuron loss has been found in the frontal area of the brain (Goldman & Côté, 1991). Animal studies indicate that lesions in this area are associated with decreases in norepinepherine and behavioral hyperactivity (Dewberry et al., 1986; Lipsey & Robinson, 1986). Neurological studies also support the hypothesis that ADHD may be associated with frontal lobe dysfunction. Compared to normal children, ADHD children performed significantly worse on neurological tests measuring frontal lobe functioning (Boucugnani, & Jones, 1989). Furthermore, Heilman, Voeller, & Nadeau (1991), report that patients and animals who have suffered damage to the frontal lobes exhibit hyperactivity, and ADHD may be a result of frontal lobe dysfunction and an impairment of the dopamine system.

The biochemical studies also provide a link between wandering in Alzheimer's disease and ADHD on a theoretical level. As mentioned earlier, results suggest that disruption to the catecholiminergic system may be associated with hyperactivity and excessive locomotor activity. Recently, a proponent of optimal arousal theory (Zuckerman, 1991) presented a variety of neurologic and biochemical studies using animals and humans as evidence to support his argument that optimal levels of stimulation involve

regulation of the catecholiminergic system of the central nervous system. Interestingly, Barkley's (1991) recent review of the research indicates that amphetamines, the most widely used treatment for ADHD, act primarily to increase catecholamine activity in the central nervous system. Taken together, these studies suggest that wandering behavior may be one way for Alzheimer disease patients to increase the amount of stimulation they receive. In the summary of the most prevalent hypothesis and the proposed hypothesis about the causes of wandering, Figure 1 illustrates that the predominant way of conceptualizing wandering is as a behavioral expression of agitation as a result of overstimulation from the environment. In this way, wandering may be functionally related to overstimulation. In addition, there are other proposed causes of agitation, including emotional and cognitive factors, though this discussion focuses on agitation as it relates to overstimulation.

Figure 1

Summary of Current Hypothesis and Proposed Hypothesis of Causes of Wandering.



* Note that these items are behavioral indices of agitation rather than definition of agitation per se.

The second portion of the figure displays the hypothesis proposed in this discussion. Alzheimer residents may wander because they are understimulated and are therefore seeking stimulation. In this way, wandering may be functionally related to understimulation rather than overstimulation as is most often thought.

In this study, the investigation of wandering involved two important aspects of resident mobility status. First, behaviors that occurred while residents were walking were examined. Second, behaviors that occurred when residents were standing were examined because it is conceivable that walking may actually be a means of getting to a source of stimulation. In this regard, it may be that stimulation seeking behaviors would be more likely to occur when residents are standing upon reaching the source of stimulation.

The purpose of this study was to investigate the hypothesis that wanderers are understimulated rather than agitated, due to overstimulation. The second goal of this study was to investigate the hypothesis that when agitated behaviors occurred while walking or standing, the agitation could be attributed to situational factors that caused a temporary state of tension or discomfort.

In terms of the understimulation hypothesis, it is proposed that wanderers should exhibit stimulus seeking behaviors while wandering. Furthermore, co-occurrences of

agitated behaviors and wandering should be relatively absent. A behavioral observation study was conducted to provide a systematic description of behavior through direct observation and recording. A behavioral ethogram was used to record the ambulation patterns and concurrent behaviors of a group of residents who were transferred to a local geriatric facility because of their tendency to wander in their previous residences. The documentation of ambulation patterns and concurrent behaviors permitted the investigation of whether wanderers exhibited stimulus seeking behaviors while walking and standing, with little agitation or aggression.

The data on ambulation patterns and concurrent behaviors were examined in several ways. For the initial analyses, the overall amounts of stimulus seeking behaviors and agitation/aggression were calculated. Contingencies between the mobility and stimulus seeking categories were examined as well. If wandering is associated with understimulation, then these contingencies should provide documentation of a co-occurrence of walking and stimulus seeking behaviors, and/or standing and stimulus seeking behaviors. Furthermore, co-occurences of walking and agitated/aggressive behavior, and/or standing and agitated/aggressive behaviors should be rare. Disconfirmation of this hypothesis would be provided by documentation of a co-occurrence of walking and behavioral

expressions of agitation, and/or co-occurrences of standing and behavioral expressions of agitation. Correlations between mobility and stimulus seeking behaviors were examined as well. It was expected that correlation coefficients would reveal positive relationships between stimulus seeking and walking as well as positive relationships between stimulus seeking and standing. In addition, correlations indicating negative relationships between walking and agitation/aggression, as well as negative relationships between standing and agitation/aggression were expected. Finally, a cluster analysis of residents based on the amount of time they spent standing, walking and sitting was expected to produce subsets of residents who walked and stood more than other residents. These subsets were expected to engage in more stimulus seeking behaviors than residents who spent more time sitting.

Method

Participants

Criteria for inclusion required that residents were fully ambulatory and were rated by primary care nurses as wandering for more than 30 percent of the day. Rating forms completed by the nurses are contained in Appendix A. In addition, residents had no history of other major neurological diseases, and no major acute or chronic illness that would affect cognition. Criteria for inclusion also

required that residents had a diagnosis consistent with probable Alzheimer's disease, while recognizing that a diagnosis of Alzheimer's disease cannot be confirmed until autopsy, and that standards for this tentative diagnosis varied among physicians.

In order to select participants, nurses were given questionnaires and asked to indicate whether each resident listed could walk without assistance, what percent of the resident's waking time was spent walking, and whether the resident walked in the morning, afternoon, evening, night, and during mealtimes. The nurses were instructed to fill out the questionnaires independently and the investigator stayed in the room while the questionnaires were completed to ensure that this was the case. The nurses' ratings were then pooled and a mean rating of percent of waking time spent walking was calculated for each resident. In addition, the residents' nursing records were examined to obtain general demographic information (such as age, sex, and language spoken) as well as other information such admitting diagnoses, date of admission, and current medications. Twenty-three participants met the criteria for this study, though six residents were excluded from observation. One male and one female were restrained for most of their waking time and, thus, were not free to ambulate. Another female ceased wandering early in the study, and while it is not possible to be certain of why she

stopped wandering, the cessation of this behavior coincided with befriending a new resident.[1] The other three residents were excluded from the data analyses, except where length of stay was of interest, because they were admitted to their respective facilities less than six weeks prior to data collection and thus may not have fully adapted to their new environments. It was possible that this situation could have influenced their behaviors and biased the data when it was averaged across participants. Eight residents were residing on a cognitive support unit at the Edmonton General Hospital, and nine residents were residing at Capital Care Lynwood, a long term care facility. Table 1 displays the age, admitting diagnoses, sex, anti-psychotics and hypnotics taken during the observation period, scores on the Mini Mental State Exam (Folstein & Folstein, 1975), and the length of time each resident resided in the facility prior to the observations of each resident. Although some of the residents were taking anti-psychotics and/or hypnotics during the observation period, most of these drugs were administered in the evenings when no observations were conducted and there were no obvious signs of overmedication.

Table 1

Description of Participants

Participant	Age	Diagnosis	Sex	Drugs	Mental Status Score	Length of Stay
			Long Term Care Facility			
AD	87	SDAT[a]	M	Ativan, Loxapac	-[b]	9.0
CE	76	Pre-senile dementia; hypertension	F	Prozac, Loxapine	0	12.5
HE	89	SDAT; Diabetes; Depression	F	Thorazine	-	69.0
KN	89	Senile Dementia	F		-	14.0
PH	92	SDAT; Glaucoma	F	Ativan, Pimozide	-	37.0
SE	88	SDAT; Arthritis	F	Ativan, Loxapine, Aventyl	18	1.5
SI	82	SDAT; Osteoarthritis	F	Noctec, Loxapac	-	9.5
TU	75	Alzheimer's Disease; Glaucoma; Arthritis	F		-	9.0
VE	77	SDAT	F		-	5.0
WN	76	Alzheimer's Disease; Peripheral Vascular Disease	M		-	23.0

Participant	Age	Diagnosis	Sex	Drugs	Mental Status Score	Length of Stay
			Geriatric Hospital			
CN	81	SDAT; Coronary Artery Disease; Cardiac Arrythmia	F	Ativan, Haldol	-	33.0
FX	81	SDAT; Hypertension; Osteoarthritis	F	Ativan, Haldol, Mellaril	-	27.5
GE	77	SDAT	F	Ativan	-	24.5
GO	88	Alzheimer's Disease	M	Loxapine	-	15.0
HL	84	Possible Alzheimer's Disease; Arthritis; Anterior Myocardial Infarction with Congested Cardiac Failure	F	Haldol, Ativan, Noctec	15	0.5
LY	87	SDAT	M	Mellaril; Chloral Hydrate	7	0.5
NN	81	Alzheimer's Disease; Chronic Obstructive Pulmonary Disease; Hypertrophy; Benign Prostrate	M	Ativan, Noctec	18	33.0

Participant	Age	Diagnosis	Sex	Drugs	Mental Status Score	Length of Stay (months)
MO[c]	82	Cognitive Impairment With Wandering	M	Loxapine	-	0.5
ST	72	Alzheimer's Disease; Urinary Retraction	M	Ativan, Perphenazine	3	20.0
WE	78	SDAT; Diabetes; Osteoarthritis; Anemia	F	Noctec	-	11.0

[a]SDAT = Senile Dementia of the Alzheimer Type.

[b]Dashes indicate that the mental status questionnaire was not administered to the participant because he/she could not state his/her name upon request.

[c]These participants were not included in the data analyses unless reported otherwise in the results.

Ethogram

Ethogram development is a major undertaking and determines the study outcome. The ethogram for the study consisted of four categories of information: location, type of mobility, agitation (verbal/physical aggression and verbal/physical agitation) and stimulus seeking behaviors. These major categories and subcategories are shown in Appendix B. The goal of this study was to determine whether understimulation exists as a possible source of wandering. To accomplish this goal, the ethogram was designed to record the ambulation patterns and concurrent behaviors of wandering residents. Each of the four categories contained an "other" item for behaviors not captured by the remaining items listed within the categories, as well as an "unobservable" code when the observers were unable to observe the resident.

The location category included an exhaustive list of 22 functional areas within the hospital and nursing home units. The functional areas were derived from casual observation of resident ambulation patterns and from consultation with nurses from each of the units.

The mobility category was designed to capture whether residents were walking, standing or sitting. The ethogram contained items for standing/leaning, walking alone, and several other types of walking. While informally observing residents at the hospital during the development of the

ethogram, the investigator noted that before turning around and walking in the other direction after reaching the end of the hallway, some residents walked in place. This type of behavior was included in the ethogram using the "walk-in-place" item. In addition, in previous studies Dobbs and Rule (1992) reported that some residents engaged in group walking behavior with other residents, and that this type of walking tended to be social in nature. This type of behavior was captured in the ethogram for this study with the "group walk -physical proximity" item (residents in physical proximity of, but not in physical contact with, each other while walking together), and the "group walk - physical contact" item (residents in physical contact while walking together).

Of particular interest were the two categories developed to document behavioral manifestations of agitation/aggression and stimulus seeking. The list of behaviors included within the agitation/aggression category are based on Cohen-Mansfield, Marx, & Rosenthal's (1989) study of agitated behaviors in a nursing home. Recall that a factor analysis of nurses' ratings of resident behavior produced three factors. Two factors included "aggressive behavior" (such as hitting and kicking) and "verbally agitated behavior" (such as screaming and complaining). In the ethogram for this study, Cohen-Mansfield, Marx, & Rosenthal's (1989) distinction between physical and verbal

agitation was included. In addition, the ethogram categories were developed to distinguish between behaviors indicative of agitation but not hostility, and agitated behaviors directed toward other persons that could have resulted in physical/mental harm. Thus, the agitation/aggression category contained the following items: verbal/vocal agitation (such as crying or swearing, provided that these behaviors did not appear to be directed toward anyone), physical agitation (such as fidgeting when accompanied by observable signs of mental or physical discomfort), verbal aggression (such as swearing and screaming, provided that they are directed toward another person), and physical aggression (such as striking or spitting at someone).

The third factor in Cohen-Mansfield, Marx, & Rosenthal's (1989) factor analysis, "physically nonaggressive behavior" (such as general restlessness and handling things inappropriately) was incorporated into the ethogram's stimulus seeking category. The stimulus seeking category also was designed to capture behaviors presented in the ADHD literature as stimulus seeking behaviors. These kinds of behaviors are presumed to provide "basic" kinds of stimulation, including proprioceptive, kinaesthetic, visual, and auditory stimulation. Items within the stimulus seeking category include self-oriented tactile stimulation seeking (such as rubbing self and clapping), motor stimulation not

identified with a functional instrumental act (such as rocking back and forth), motor stimulation not identified with a non-functional or imaginary instrumental act (such as miming sewing and moving furniture when there is no recognizable purpose to performing these activities), visual stimulation seeking (such as looking at a flashing control panel), auditory stimulation seeking (such as cocking one's head toward a speaker when a message is presented over the intercom), and social interaction (such as appearing to listen to someone who is talking to the resident and gesturing to someone).

The list of codes within the agitation/aggression and stimulus seeking categories was not mutually exclusive. Thus, more than one item within these categories was recorded when the resident engaged in more than one agitation/aggression or stimulus seeking behavior. The stimulus seeking and agitation categories, along with the mobility category, allowed for the observation of a) stimulus seeking behaviors that may have occurred during episodes of wandering with a relative absence of agitated behaviors and b) agitated behaviors that may have occurred during episodes of wandering as a result of situational factors. Any situational factors that may have affected resident behavior were recorded by making a comment. In addition, location was recorded to determine whether agitation/aggression and stimulus seeking behaviors occur in

particular functional areas of the unit.

Apparatus

The portable computers made by Poqet Computer Corporation were used for the behavioral coding. They are approximately the size of a video tape cassette and are fully IBM compatible. Their small size made them easily semi-concealed and reduced the conspicuousness of the recording.

Program

Data were input "on line" with the assistance of a program developed for this study. The program began by having the observer first enter her identification code, followed by the resident's identification code. After confirming that the correct information had been entered, the coder then pressed the "enter" key and five columns with the titles "location", "mobility", "agitation", "stimulus seeking" and "comments" appeared on the screen, along with the current time in hours, minutes, and seconds. The behaviors included in the ethogram were represented by specific keys on the computer keyboard. Once the observer entered a location code the program ran for twenty minutes. After entering the first location code to begin a session, the curser automatically moved to the mobility column, indicating that the observer was required to enter a code that represented the type of mobile behavior the resident was engaged in. The cursor then moved to the column for

agitated behavior and after the coder entered as many keys that applied for that category the cursor moved to the stimulus seeking column when the observer hit any of the stimulus seeking codes represented on the keyboard. After the appropriate codes had been entered for the stimulus seeking category, the observer pressed the "enter" key and the cursor then moved to the "comments" column. The program required a comment for specific entries and allowed for a comment code at the end of a line of data for unusual events that would assist in interpretation. If a comment was required the coder pressed a key that resulted in the display of the current comment number and the observer recorded that number and the written comment on a "post-it" note affixed to the computer for later data entry. After the comment request was made or if no comment was required the observer pressed the "enter" key again and the cursor moved back to the location column again, ready to record a new line of data. A new line of data was entered whenever there was a change in the resident's location or in any of his/her behaviors. The program automatically entered the time whenever a new data line was initiated, enabling the calculation of durations of behaviors at the data analysis stage. The data entry program checked for and rejected illegal codes, demanding a reentry. Automatic reentry of any one or more unchanged codes was accomplished by pressing the space bar. This greatly reduced the entry time for data

lines and reduced coder fatigue. The data were stored on an internal 512 kilobytes data card and transferred to diskette via an external drive at the end of the day.

Procedure

Reliabilities. In 25% of the sessions two coders recorded the residents' behaviors simultaneously so that reliabilities of their coding could be assessed. At the hospital reliability sessions were conducted for one resident each day at 11:00 a.m. and 2:00 p.m.. At the nursing home, several reliability sessions were conducted within a day for several days spread over the course of the data collection period.

Behavioral Observations. The method of recording used was a continuous real time measurement over discrete time intervals, with the coding for behaviors defined by an ethogram developed specifically for the goals of the study[2]. During 20 minute recording sessions, time, location, and the defined set of behaviors were recorded for each entry. Two coders observed and recorded via the portable computer a resident's behavior and any change applicable to these behavior categories. Thus, whenever there was a change in a resident's actions in any of the categories, the coder entered a new line of data by selecting the appropriate keys.

General Procedures. Informed consent for participation was obtained from the guardians or closest relatives of the

residents who met the criteria for inclusion in the study. The guardians or closest relatives signed a consent form, as displayed in Appendix C. A mental status assessment instrument was administered by the researcher immediately prior to behavioral observations of each resident included in the study. The Mini-Mental State (Folstein & McHugh, 1975) was used, though residents who could not state their names upon request were not given the mental status exam.

As indicated in Appendix D, coding sessions began at a scheduled time, were of 20 minute durations, and behaviors were recorded directly into the portable computer. The schedule of observations were arranged such that the behavior of each person was coded for 40 minutes (two 20-minute sessions) for every hour. Coding sessions at the hospital occurred between the hours of 11:00 a.m. and 12:30 p.m. and between 1:30 p.m. and 4:00 p.m. during a four day series. Coding sessions at the nursing home occurred between the hours of 11:00 a.m. and 12:00 p.m. and between 1:00 p.m. and 4:00 p.m. during a five day series. This schedule resulted in eight coding sessions for each participant, with an exception of one resident at the nursing home. This remaining resident had only seven coding sessions because he fell asleep at 2:00 p.m. each day, making it difficult to collect meaningful data for that time period despite attempts to do so on several different days. Data collection occurred over 12 weeks, resulting in 160 minutes

of observation time for each of 17 residents and 140 minutes for the one remaining resident. Two coders were trained for observation, and at the hospital each coder conducted approximately half of the observation sessions for each resident. Travel to the nursing home meant that one of the coders had to leave her workplace, so all of the observation sessions were conducted by only one of the coders, except for reliability sessions.

Results

Reliabilities. Reliabilities between coders were calculated using Cohen's (1960) Kappa for ethological data. Kappas were calculated for mobility, location, agitation/aggression and stimulus seeking behaviors. Out of the 148 kappas that were calculated, 23 could not be recorded because the percent of chance agreement was 100. This occurs when the behavior within a category rarely changes, because then agreement is expected to be high simply by chance. For example, agitated/aggressive behaviors rarely occurred and, therefore, there was little, if any, variation within this category. Of the 23 instances for which kappas could not be calculated, three occurred in the location category, two occurred in the mobility category, 18 occurred in the agitation/aggression category, and none occurred in the stimulus seeking category. Kappas for mobility, location, agitation/aggression and stimulus seeking behaviors were 94.93%, 88.15%, 95.73%, and 82.24%, respectively. Kappas

calculated separately for each institution were both high and similar between facilities. Mean kappas from the geriatric hospital data were 95.07%, 87.14%, 96.60% and 81.95%, for the location, mobility, agitation/aggression and stimulus seeking categories, respectively. In the long term care facility the mean kappas for the mobility, location, agitation/aggression and stimulus seeking categories were 94.48%, 89.16%, 94.86% and 82.53%, respectively. These reliabilities are high, considering that when brief behaviors such as agitation and aggression did occur, observers had to enter this change in status within the exact same second in order to maintain a high reliability.

The presentation of the remaining data will proceed as follows. Data related to the overstimulation hypothesis of wandering will be examined next. Following this, data analyses pertaining to the contrasting under-stimulation hypothesis of wandering will be presented. Finally, general behavior patterns of the residents will be presented. This will begin with a description of resident use of space and their mobility patterns during the observation sessions. An overview of the residents' agitated/aggressive and stimulus seeking behaviors will then be presented.

Agitated/aggressive behaviors occurred very infrequently. Because of this the focus will be on the stimulus seeking behaviors, their temporal and spatial distribution, and their distribution across different forms of mobility.

Examination of these data is useful, as it provides important information for behavioral management, and very little of this type of data exists in the literature.

Differences were found frequently between the two care facilities in which the data were collected. In addition, differences were often found between behaviors recorded in morning and afternoon sessions. Thus, the data are presented separately for the two facilities and the two time periods when appropriate.

Overstimulation hypothesis of wandering. Agitation was rarely observed, with only 13 incidences occurring in total, making up less than one percent of the time residents in each facility were observed. Seven episodes of agitation occurred at the geriatric hospital and six episodes occurred at the long term care facility. These episodes were relatively brief, lasting less than two minutes each time they occurred. Almost all of the incidents involved physical or verbal aggression, and all but one incident occurred in the afternoon.

The sparseness of these data preclude analyses and make examination of when and where these instances occurred difficult. Because of this, the data for these behaviors will not be examined further. Instead, the focus will be in terms of stimulus seeking. This emphasis on stimulus seeking behaviors is not to suggest that the finding of almost no agitated and aggressive behaviors is trivial.

This finding is important because it does not support the predominant hypothesis in the literature that wandering is a manifestation of overstimulation. However, the data indicating residents exhibited little in the way of these behaviors are in stark contrast to the popular overstimulation hypothesis of wandering.

Are wanderers seeking stimulation? Unlike the results regarding agitation and aggression, the data clearly indicate that the residents engaged in much stimulation seeking behavior. Residents of the geriatric hospital engaged in stimulus seeking behaviors 40% of the time they were observed for both the morning and afternoon, while the long term care facility residents engaged in stimulus seeking behaviors 54% of the time in the morning and 56% of the time in the afternoon.

Stimulus seeking behaviors and mobility. Cross-tabulations were computed to determine the percent of time that the person was standing, walking, and sitting was spent stimulus seeking. Standing consisted of the "stand/lean" item in the mobility category; walking consisted of the "solo walk", "walk-in-place", "group walk (physical proximity)" and "group walk (physical contact)" items, and sitting consisted of the "sitting" item. Stimulus seeking behaviors included all of the items from the stimulus seeking category, except the "other", "missing" and "no stimulus seeking" items. The "other" category was used when

the observer was unsure of how to record a particular behavior within the coding scheme. After the observation session the observer changed the "other" code that was entered to one of the codes for the remaining stimulus seeking items if the behavior complied with one of the definitions for the remaining stimulus seeking items. Otherwise, the behavior remained coded as an "other" stimulus seeking behavior that was not pertinent for this study. In this way, the "other" item became a "wastebasket" category for behaviors that did not fit the definitions of the above items.

In the geriatric hospital, residents engaged in stimulus seeking behavior 71% of the time they were standing, 33% of the time they were walking, and 38% of the time they were sitting. Like the geriatric hospital residents, residents in the long term care facility engaged in stimulus seeking when standing 63% of the time. However, residents from the long term care facility engaged in more stimulus seeking while walking and sitting than the geriatric hospital residents, exhibiting these behaviors 51% of the time they were walking and 56% of the time they were sitting.

To address the question of whether wanderers are understimulated and are therefore seeking stimulation, several additional aspects of the data were considered.

To begin with, correlations between amount of stimulus

seeking and amount of walking were computed to ascertain whether residents who engaged in more stimulus seeking spent more time walking. Pearson correlation coefficients revealed no relationship between these two variables in either of the care facilities (r = .00, p > .05; r = .20, p > .05), for the geriatric hospital and long term care facility, respectively.

It was possible that no relationship was found between walking and stimulus seeking because only particular kinds of stimulus seeking were associated with walking. Thus, correlations were calculated between amount of walking and particular kinds of stimulus seeking. Stimulus seeking behaviors were grouped according to the level of cognitive activity required to perform them. The stimulation seeking activities requiring the least amount of cognitive activity are self oriented and other oriented tactile stimulation and are collapsed together to form a category of tactile stimulation seeking behavior. More cognitive activity may be required to perform motoric stimulation seeking activities such as motor stimulation not identified with a functional instrumental act and motor stimulation identified with a non-functional or imaginary instrumental act. These items were grouped together to form a motor stimulation seeking category and the average amount of time residents spent engaging in these activities was calculated. Two other categories of stimulus seeking behaviors

conceptualized in terms of increasing cognitive demand are visual stimulus seeking and social interaction, with social interaction requiring the most cognitive abilities out of all the stimulus seeking behaviors. Auditory stimulus seeking was not included in any of the above categories because it occurred so infrequently overall. Once again, no significant relationship was found between walking and any of the stimulus seeking categories in either facility The largest correlation coefficient was found in the morning for the geriatric hospital residents. The Pearson correlation coefficient for percent time walking and percent time engaged in motor stimulation was -0.67.

Two correlations also were calculated to determine the relationship between amount of stimulus seeking while standing and amount of stimulus seeking while sitting, as well as amount of stimulus seeking while walking and amount of stimulus seeking while sitting. It was expected that residents who engage in large amounts of stimulus seeking while walking or standing would require little stimulation after just having engaged in stimulus seeking behaviors while walking or standing. Thus, in these instances residents are expected to engage in little stimulation seeking while sitting. Pearson correlation coefficients do not support this hypothesis. In fact, a significant correlation between amount of stimulus seeking while sitting and amount of stimulus seeking while standing in the long

term care facility (r = .73, p < .05) suggests that the more residents stimulus seek while sitting, the more they stimulus seek while standing.

Patterns of walking also were examined to determine how often residents engaged in stimulus seeking activity while standing after an episode of walking. It is possible that wanderers may actually do a large amount of stimulus seeking while standing rather than walking per se. If this is in fact the case, and if residents are walking because they require stimulation, then they should be more likely to seek stimulation when standing after walking than they do overall. That is, the amount of stimulus seeking residents engaged in overall is the unconditional probability of stimulus seeking. Residents of the geriatric hospital residents engaged in stimulus seeking behaviors 40% of the time they were observed, and residents of the long term care facility engaged in stimulus seeking behaviors 55% of the time they were observed. Support for the understimulation hypothesis would be provided if the percent of time residents engaged in stimulation seeking when standing after walking exceeded the percent of time they engaged in stimulus seeking behaviors overall. Residents of the geriatric hospital engaged in stimulus seeking activity 69% of the time they stood immediately after walking, while residents from the long term care facility spent 56% of the time stopping and stimulus seeking.

To determine why residents of the geriatric hospital engaged in more stimulus seeking after stopping than residents of the long term care facility, the kinds of stimulus seeking behaviors residents from each facility engaged in were examined. That is, if residents from the geriatric hospital engaged in more other oriented and/or visual stimulation seeking than residents of the long term care facility, this would suggest that residents in the geriatric hospital may be engaging in more stimulation seeking because there are more opportunities for stimulus seeking in their facility. However, if the geriatric hospital residents exhibited more stimulus seeking behaviors that are less dependent on the physical surrounding (such as self-oriented stimulation and motor stimulation), this would suggest that differences may be due to individual rather than environmental factors. When residents from the geriatric hospital and long term care facility did stand and seek stimulation after walking, long term care facility residents engaged in more social interaction than did residents from the geriatric hospital (45% versus 28%). In addition, twice as much other oriented tactile stimulation was observed with the geriatric hospital residents as with the long term care facility residents (29% and 12%, respectively). However, residents from both facilities engaged in relatively large amounts of visual stimulation seeking (27% for residents of the geriatric hospital and 25%

for residents in the long term care facility). Residents from the long term care facility engaged in motor stimulation not identified with a functional instrumental act 15% of the time whereas the geriatric hospital residents exhibited this behavior less than one percent of the time. In both facilities residents spent little time engaged in self oriented stimulation (nine percent in both locations), and motor stimulation identified with a non-functional or imaginary instrumental act when they stood (nine percent versus four percent).

The possibility that percent of time spent stimulus seeking was related to percent of time spent standing rather than walking per se was investigated further. First, correlations between these two variables were calculated. The relationship between total amount of time standing and total amount of time stimulus seeking was not significant for the geriatric hospital residents (r = .35, p > .05) or the long term care facility residents (r = -.39, p > .05). As in the case for the data on walking, correlations between standing and particular kinds of stimulus seeking were calculated. Stimulus seeking behaviors were again grouped into categories based on level of cognitive demand, including tactile stimulation seeking behavior, motor stimulation behavior, visual stimulation seeking and social interaction. No correlations were significant in the morning or afternoon for either facility, except for one

case, in which the percent of time spent standing and percent of time engaged in visual stimulation seeking were strongly related for geriatric hospital residents in the morning (r = .84, p < .05).

The data were examined further to better understand the relationship between walking and stimulus seeking while standing. In particular, if residents are wandering because they are understimulated, then the percent of time walking should be positively correlated with percent of time spent stimulus seeking while standing. Pearson correlations between these two variables, however, did not reveal any significant relationships in the morning (r = .13, p > .05; r = .18, p > .05) or afternoon (r = .28, p > .05; r = .22, p > .05) for the geriatric hospital and long term care facility residents, respectively.

Residents were ranked according to the percent of time they engaged in stimulus seeking behavior when standing after walking. They were then split into two groups, one group containing ten residents who engaged in the most stimulus seeking behavior while standing and the other group containing the remaining ten residents. The mean percent of time the first group engaged in stimulus seeking behavior while standing was 75%, while the second group engaged in these behaviors 49% of the time, on average. Interestingly, the group of residents who engaged in the most stimulus seeking behaviors walked on average 45% of the time, while

the average amount of time the second group spent walking was only 26%.

A cluster analysis was conducted as well. The cluster analysis was conducted using mobility items (stand, walk and sit) as the variables to cluster residents. These items were selected to determine whether a cluster of residents who walked the most would emerge. If this type of clustering occurred, this group could be compared with the other clusters to examine whether it differed in terms of its stimulus seeking behaviors. The complete linkage hierarchical agglomerative method was used with the SYSTAT program because of its tendency to produce compact clusters rather than clusters of single individuals. This characteristic allows for the comparison of clusters on additional variables not included as the criteria for the clustering. The number of clusters selected was three because it produced a manageable number of clusters with relatively large euclidean distances between them. All residents were included in the cluster analysis, including the residents who had been in their respective long term care facilities less than six weeks to determine whether their relatively short stay would result in the formation of a cluster separate from the other residents.

Separate cluster analyses were run for the morning and afternoon data because there was a large amount of variation in the amount of standing, walking and sitting the residents

did in these two time periods. The cluster analysis produced similar patterns of clustering for the morning and afternoon data, as seen in Figures 2 and 3. For the morning data, the first cluster of residents spent the greatest amount of time sitting out of all three clusters, while the second group spent the most time walking and the third group spent the most time standing compared to the other groups. The same cluster characteristics emerged using the afternoon data, although the individuals comprising the clusters changed. The first cluster of residents sat the most, the second group walked the most, and the third group stood the most out of all three clusters.

For both sets of clusters, the average amount of time each group spent seeking stimulation while standing, walking and sitting was calculated. The amount of stimulus seeking that occurred during a particular type of mobility is the numerator and the amount of time spent in that type of mobility is the denominator. These data revealed several interesting patterns.

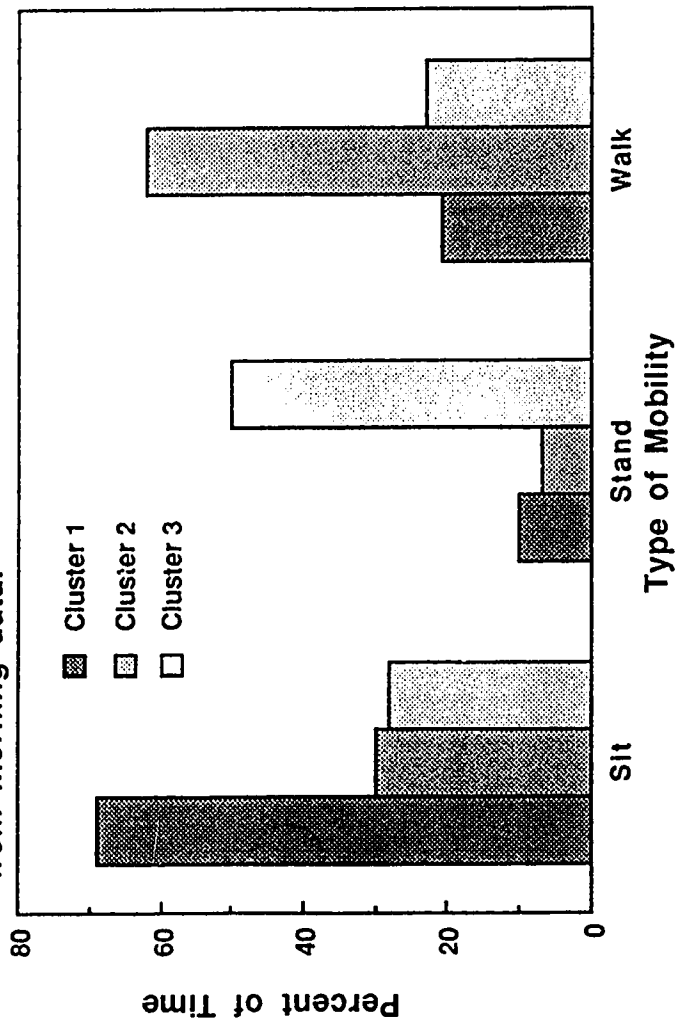


Figure 2. Mean percent of total time observed spent sitting, standing and walking for clusters generated from morning data.

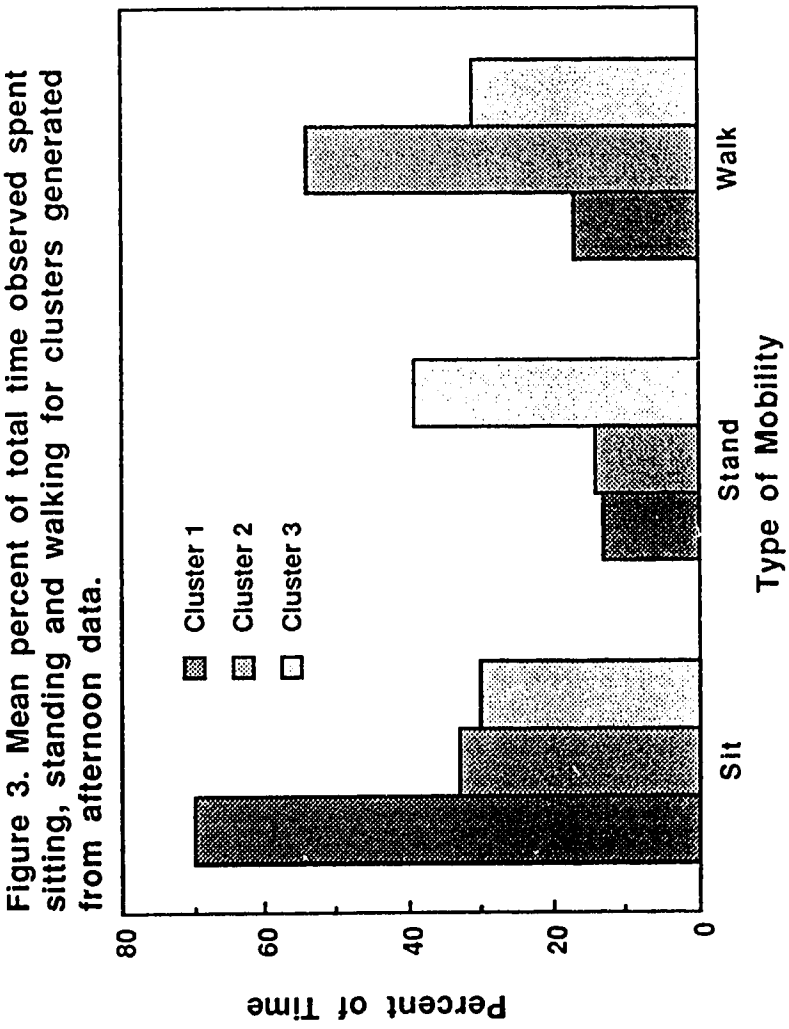


Figure 3. Mean percent of total time observed spent sitting, standing and walking for clusters generated from afternoon data.

Figure 4 indicates that the cluster of residents in the morning that sat the most out of all three clusters (cluster one) also did the most stimulus seeking when sitting out of all three clusters, but did the least amount of stimulus seeking when walking out of all three clusters. The second cluster, which walked the most out of all three clusters, did the second most stimulus seeking while walking and the most stimulus seeking while standing out of all three clusters.

Figure 5 indicates that clusters generated from the afternoon data produced a similar trend. The cluster that sat the most (cluster one) did the least stimulation seeking when walking and the least stimulation seeking when standing out of all three clusters, while the cluster that walked the most out of all three clusters did the least stimulus seeking when sitting. In addition, the cluster that stood the most did the most stimulation seeking when standing and walking out of all three clusters. Moreover, the cluster that walked the most out of all the clusters did the least amount of stimulus seeking while sitting compared to the other clusters, and exhibited similar amounts of stimulus seeking while walking to the cluster that stood the most.

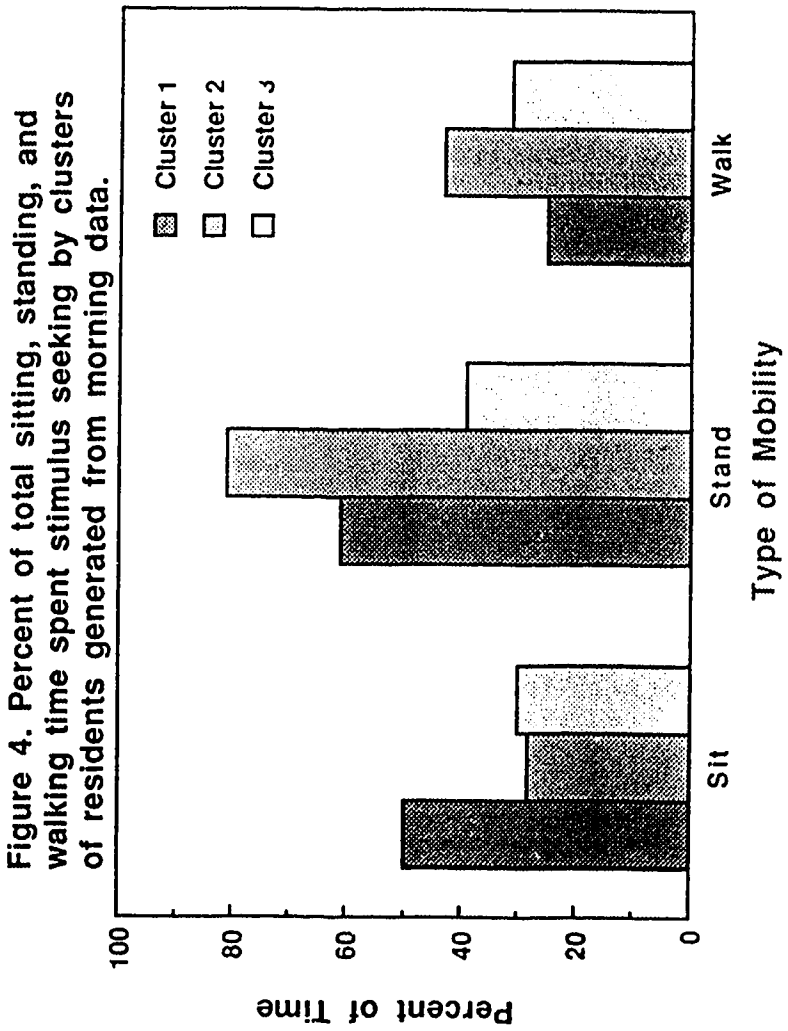


Figure 4. Percent of total sitting, standing, and walking time spent stimulus seeking by clusters of residents generated from morning data.

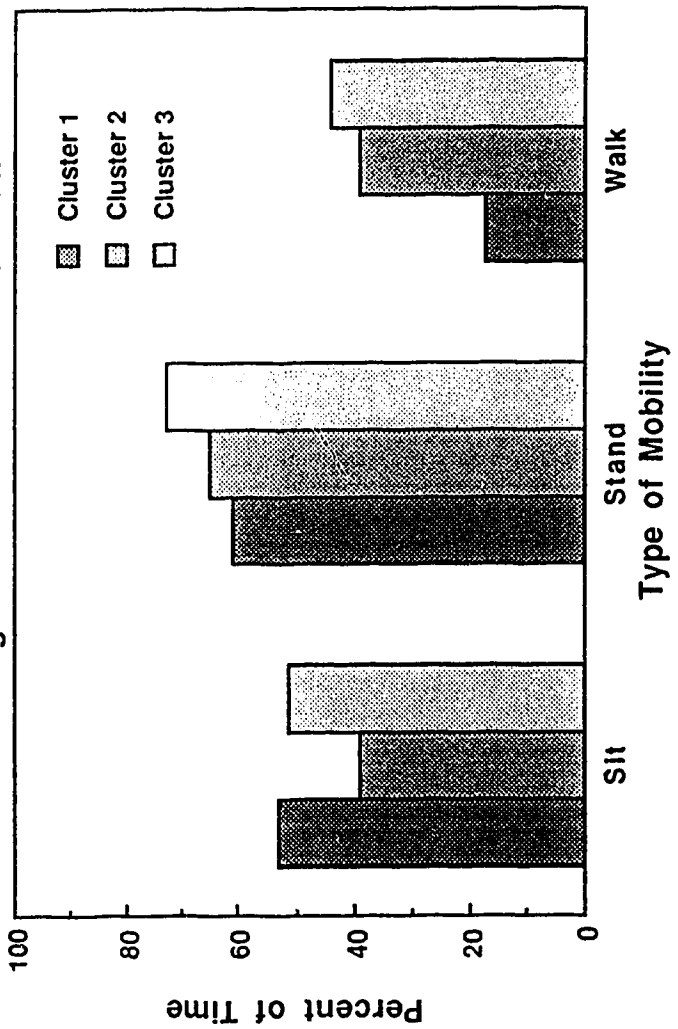


Figure 5. Percent of total sitting, standing, and walking time spent stimulus seeking by clusters of residents generated from afternoon data.

In sum, the data show that the residents who sit the most out of the three clusters do less stimulus seeking while standing and walking than the other the groups of residents who do the most standing and walking. However, the residents who sit the most also happen to do the most stimulus seeking while sitting out of all three groups, even when opportunity for stimulus seeking while sitting is take into account. This suggests that residents who obtain sufficient stimulation while sitting walk and stand less than residents who do less stimulus seeking while sitting.

The clusters were also compared to see if they differed in the kinds of stimulus seeking behaviors they exhibited. Although differences were found between the clusters in the kinds of stimulation seeking behaviors they exhibited for both the morning and afternoon clusters, the variances within groups were relatively large and made interpretation of the group differences questionable. In addition, the average percent of time residents within each cluster engaged in stimulus seeking behavior while standing immediately after walking was examined. It was expected that the cluster of residents who walked the most would be most likely to engage in the stimulus seeking behavior when standing. This occurred only for the clusters generated from the data collected in the morning, but for both the morning and afternoon data the variances between clusters on this variable were large enough to make interpretation of

the results difficult.

A cluster analysis was also conducted using tactile stimulation, motor stimulation, visual stimulation and social interaction as the clustering variables. The purpose of this analysis was to determine whether residents formed groups according to the kind of stimulus seeking behavior they engaged in. Separate clusters were run using the morning and afternoon data. The same program and agglomerative method was used as in the above cluster analysis. When the number of clusters was not specified the program generated clusters that were not adequate for further exploration. That is, the program created one very large cluster along with two other clusters, each of which contained less than three residents. Poor clustering also occurred when the number of clusters was specified at two, three, four and five, for both the morning and afternoon data. The creation of clusters made up of few individuals suggest that instead of having groups of residents who engage in similar patterns of stimulus seeking, there is much variation between residents in the kinds of stimulus seeking behaviors they exhibit. Therefore, these clusters were not examined further.

Summary. In sum, the data do not support the hypothesis that wandering is associated with overstimulation. Residents rarely exhibited agitated behaviors but engaged in stimulus seeking approximately half of the time they were

observed, suggesting that they are understimulated rather than overstimulated. While support for the understimulation hypothesis was not absolute, data on patterns of walking and standing and cluster analyses suggest that walking, standing and stimulus seeking are related.

The following data provide an overview of resident use of space and general behavioral patterns. While the data do not address directly the over- and understimulation hypotheses of wandering, they do provide much needed information for behavioral management of wandering. This outline will begin with a description of the location of residents and their pattern of mobility during the observation sessions. Following this, an overview of stimulus seeking behaviors will be presented, including a description of the types, temporal distribution and location of stimulus seeking behaviors. Finally, correlations examining whether wandering as well as stimulus seeking are related to length of stay in the facility will be reported.

Location of residents. As seen in Table 2, the mean percent of time residents spent in various locations within each facility in the morning and afternoon indicate that the vast majority of their time was spent in public areas.

Table 2

Duration of time (in percent) residents were observed in various locations in the geriatric hospital and Long Term Care (LTC) facility

	Location						
	Dine Area	Hall	Nurse Stn.	Lounge	Other Resident Room	Own Room	Other Loc.
Hospital							
Morning	40	29	0	14	3	0	14
Afternoon	42	27	1	5	6	7	14
LTC Facility							
Morning	44	24	12	9	0	0	11
Afternoon	50	34	5	3	0	0	8
Overall	44	29	5	8	2	2	12

Residents in the geriatric hospital spent most of their time in the dining area and the sitting room adjacent to the dining area, as well as the hallways and lounge at the end of the south hall. The same general pattern was evident in the afternoon, although residents spent more time in their own and other residents' rooms and less time in the lounge. The remaining amount of time was spent in several other locations, each of which comprised less than one percent of time the residents were observed.

As was found for the auxiliary hospital residents, residents of the long term care facility were found in the dining area, halls and the lounge most of the time they were observed in the morning. Unlike the residents of the geriatric hospital, however, residents of the long term care facility were also observed at the nursing station in the morning. Residents in this facility were more likely to be found at the nursing station than residents from the geriatric hospital because it is located directly in front of the dining area and in the middle of the hallway, thus providing a focal point for residents in this general area. In the geriatric hospital, however, the nursing station cannot be viewed as easily from the dining area or sitting area, and thus does not attract the residents' attention as much as residents in the geriatric facility. In the afternoon residents spent more time in the dining area and hallways, and less time in the lounge and nursing station

compared to the morning. Unlike the residents of the geriatric hospital, residents of this facility were not observed in their own or other residents' rooms. The remainder of the time residents were observed is made up of several locations, each of which comprise less than one percent of the time they were observed.

Mobility patterns of residents. Despite differences in where residents were located in the morning and afternoon, in both the geriatric hospital and long term care facility, mobility patterns were similar over the morning and afternoon observation sessions. Therefore, the data were collapsed over these two time periods. Overall, residents in the geriatric hospital stood 12%, walked 43%, and sat 45% of the total time they were observed. Residents in the long term care facility stood nearly twice as much as residents in the geriatric hospital (21% of the total time they were observed), but only walked 29% of the time. Similar to the geriatric hospital residents the long term care facility residents sat 50% of the time.

The following tabulations provide a description of stimulus seeking behaviors in terms of types of stimulus seeking behaviors that occurred, the distribution of stimulus seeking behaviors over the morning and afternoon observation sessions, locations of stimulus seeking behaviors, and kinds of stimulus seeking behaviors residents engaged in while standing, walking, and sitting.

Types and temporal distribution of stimulus seeking behaviors. The percent of time residents of each care facility engaged in the various types of stimulus seeking behaviors was calculated separately for the data collected in the morning and afternoon because differences existed in the types of behaviors that occurred during these time periods. Items in the stimulus seeking category are not mutually exclusive, in that two or more stimulus seeking behaviors could co-occur. Therefore, the sum of stimulus seeking behaviors within each facility in the morning and the afternoon exceeds 100 percent in some instances.

As displayed in Table 3, during the geriatric hospital morning observations the most common forms of stimulus seeking behavior were other oriented stimulation and motor stimulation not identified with a functional instrumental act.

Table 3

Percent of the total time spent in each of the seven types of stimulus seeking behaviors out of total time observed stimulus seeking[a]

	Geriatric Hospital		Long Term Care Facility	
	Morning	Afternoon	Morning	Afternoon
Self Oriented Stimulation	16	16	5	10
Other Oriented Stimulation	32	33	23	15
Motor Stimulation: Non-Functional	30	21	43	51
Motor Stimulation: Functional	13	5	18	2
Visual Stimulation Seeking	15	18	9	18
Auditory Stimulation	0	6	1	5
Social Interaction	10	17	15	25

[a]Column totals may exceed 100% because the stimulus seeking behaviors are not mutually exclusive.

Note that in this table "motor stimulation not identified with a functional instrumental act" and "motor stimulation identified with a non-functional or imaginary instrumental act" have been shortened to "motor stimulation: non-functional" and "motor stimulation: functional", respectively. In the afternoon, these behaviors were again the most common forms of stimulation seeking while motor stimulation identified with a non-functional or imaginary instrumental act decreased substantially from morning to afternoon.

Similarly, in the long term care facility the most common morning stimulus seeking behaviors were motor stimulation not identified with a functional instrumental act and other oriented stimulus seeking behaviors. In the afternoon, the most common stimulus seeking behavior was motor stimulation not identified with a functional instrumental act. In addition, social interaction increased in the afternoon to become the next most popular form of stimulation while other oriented stimulation decreased somewhat. In both facilities auditory stimulation accounted for less than 10% of the stimulus seeking behaviors observed in both the morning and afternoon.

Location of stimulus seeking behaviors. Auditory stimulus seeking was observed infrequently (three percent of the time, overall) and will not be presented. Cross tabulations between the remaining stimulus seeking behaviors and

locations in which they occurred are shown in Table 4. Note that once again "motor stimulation not identified with a functional instrumental act" and "motor stimulation identified with a non-functional or imaginary instrumental act" have been shortened to "motor stimulation - non-functional" and "motor stimulation - functional", respectively. As can be seen, most of the stimulus seeking behaviors occurred in public areas rather than private areas (meaning resident's own bedrooms or other resident's bedrooms) for both the geriatric hospital and long term care facility residents. The only deviations from this pattern occurred in the afternoon in the geriatric hospital, when a sizeable portion of motor stimulation not identified with a functional instrumental act and visual stimulation occurred in the residents' own rooms. For the geriatric hospital and long term care facility residents, most stimulus seeking behaviors occurred within a few public areas. Thus, in Table 4 "Public" refers to the dining area, hallways, and lounge within each of the facilities. In both facilities "private areas" refer to the resident's own room or another

Table 4

Percent of total time each of the stimulus seeking behaviors occurred in public and private areas in the geriatric hospital and long term care facility (in brackets)

	Public Morning	Private Morning	Public Afternoon	Private Afternoon
Self Oriented	93 (98)	0 (0)	93 (100)	0 (0)
Other Oriented	87 (86)	2 (1)	85 (93)	4 (0)
Motor Stimulation: Non-Functional	98 (100)	0 (0)	63 (99)	27 (1)
Motor Stimulation: Functional	96 (2)[a]	4 (0)	81 (89)	14 (3)
Visual Stimulation Seeking	66 (80)	4 (2)	51 (86)	37 (2)
Social Interaction	76 (85)	4 (2)	80 (91)	14 (5)

[a]Ninety-eight percent of this stimulation occurred at the nurses' station.

resident's room.

Mobility and stimulus seeking behaviors. The kinds of stimulus seeking behaviors residents engaged in while standing, walking, and sitting, differed between facilities, as indicated in Table 5. When standing or walking, residents from the geriatric hospital most often engaged in other oriented stimulation. In addition, they engaged in visual stimulation seeking behaviors while standing. When sitting, however, motor stimulation not identified with a functional instrumental act was the stimulus seeking behavior most often observed. In the long term care facility, residents most often engaged in motor stimulation not identified with a functional instrumental act, whether they were standing, walking or sitting. In addition to the motor stimulation, residents from this facility engaged in social interaction when standing relatively frequently.

Table 5

Percent of time geriatric hospital residents and long term care facility residents (in brackets) engaged in each of the stimulus seeking behaviors while standing, walking and sitting

	Stand	Walk	Sit
Self Oriented	5 (9)	5 (2)	8 (6)
Other Oriented	23 (10)	19 (13)	5 (8)
Motor Stimulation: Non-Functional	1 (26)	0 (31)	22 (34)
Motor Stimulation: Functional	8 (2)	4 (0)	1 (0)
Visual Stimulation Seeking	22 (16)	1 (1)	8 (10)
Social Interaction	16 (25)	4 (8)	4 (9)

To investigate why geriatric hospital residents engaged in more other oriented stimulation when standing than residents from the long term care facility, the geriatric hospital data was examined further to determine where this type of stimulus seeking behavior occurred. If other oriented stimulation occurred at locations unique to the hospital, this could partially explain the difference between the residents' behavior in the two facilities. Analyses of the data revealed that 36% of the other oriented behaviors occurred in the south lounge and the day room, while another 26% of these behaviors occurred at the north end of the hall, where a fire alarm panel, air vent, and frosted glass window are located.

The question of whether amount of wandering is related to length of stay in the facility was addressed by obtaining Pearson correlation coefficients for each facility between total length of stay in the facility prior to data collection and percent of time spent walking. It should be noted that three additional residents were included in correlations using length of stay as a variable to provide a sufficient range in the length of time residents had been living in their facilities.[3] There was no significant relationship between these variables in the geriatric hospital data ($\underline{r} = -.32$, $\underline{p} > .05$), or the long term care facility data ($\underline{r} = -.06$, $\underline{p} > .05$). In addition, Pearson correlation coefficients were computed to determine whether

total amount of stimulus seeking and length of stay were related. Again, the correlations were not significant (r = -.38, $p > .05$; r = .24, $p > .05$).

Discussion

The current and traditional view in the gerontological literature is that wandering is manifestation of agitation caused by overstimulation (Cohen-Mansfield & Billig, 1986; Curl, 1989; Sinha et al., 1992; Struble & Siversten, 1987). The main goal of this study was to investigate an alternative hypothesis that wandering in Alzheimer's disease is associated with understimulation rather than overstimulation. The postulation that Alzheimer residents may be understimulated originated from two sources. Careful but nonsystematic observations of wanderers in a long term care facility revealed that residents spent a relatively large portion of their time exhibiting stimulus seeking behaviors, such as tactile exploration of vents and handrails, and non-purposeful body movements. In contrast, there was little display of agitated behaviors, despite the fact that in the gerontological literature wanderers are often portrayed as overstimulated and manifesting this overstimulation through agitated behaviors. Second, examination of the literature on Attention Deficit Hyperactivity Disorder (ADHD), revealed that this disorder bears behavioral similarities to wandering, in that it is characterized by excessive levels of activity, such as

restlessness, fidgeting, and gross body movements (Barkley, 1990). Like wandering, ADHD was originally thought to result from overstimulation, and treatment focused on decreasing the amount of stimulation hyperactive children received. Today, however, one of the most popular conceptualizations of ADHD is that hyperactive children actually may be understimulated, and their seemingly non-purposeful behaviors may function to increase the amount of stimulation they receive. Thus, one of the most popular treatments for this disorder is the use of psychostimulants to increase stimulation levels (Barkley, 1990; Churton, 1989; Henker and Whalen, 1989).

Although the belief that wandering is a manifestation of agitation as a result of overstimulation is widespread in the literature, there are only a few empirically based studies that allegedly support this notion (Cohen-Mansfield, Marx, & Rosenthal, 1989; Snyder et al., 1978). Moreover, results of other research conflict with the results of these few studies. Dawson and Reid (1987), for instance, report that patients who were most likely to be wanderers were those who were rated by nurses as being cognitively impaired and hyperactive. In contrast, nurses' ratings of agitation and aggression were not correlated with the identification of wanderers. Results of pharmacologic studies also contradict the overstimulation hypothesis of wandering. Neuroleptics are commonly used to treat agitation in older

adults, and while they are effective in reducing symptoms such as hostility and sleeplessness, they are less effective in treating repetitive behaviors such as pacing (Risse and Barnes, 1986). On the other hand, in a case study in which a dementia patient who wandered excessively was given an amphetamine, a dramatic decline in her wandering behavior after administration of the drug was reported (Hope, Patel, & Series, 1991). Furthermore, her wandering behavior returned to pre-intervention levels upon cessation of amphetamine administration.

It possible that the disease process may alter the amount and type of stimulation the wanderer requires. In particular, the change in brain function may result in a chronic need for more stimulation. Thus, wandering may occur because residents are seeking stimulation. In order to investigate the understimulation hypothesis of wandering, a behavioral observation study of wanderers in two long term care facilities was conducted to provide a systematic description of behavior through direct observation and recording. A major premise was that if wanderers are understimulated, they should engage in stimulus seeking behaviors while walking and/or while standing immediately after an episode of walking. Support for the notion that wandering is associated with understimulation would be obtained if a relationship between wandering and stimulus seeking behaviors could be documented. On the other hand,

confirmation of the overstimulation hypothesis requires documentation of a relationship between wandering and behavioral expressions of agitation.

The most striking aspect of the current findings is how little agitated and aggressive behaviors occurred, regardless of whether residents wandered. There are at least two possible reasons why these data do not support the current literature suggesting that wandering is a behavioral manifestation of agitation (Cohen-Mansfield and Billig, 1986; Curl, 1989; Evans, 1991; Hall, Kirschling, & Todd, 1986; Rader, Doan, & Schwab, 1985). The first reason concerns the method of data collection commonly used in those studies. Ideally, resident behavior should be observed and recorded on line as it happens using strict operational definitions of behavior in which the researcher is interested. However, this method of data collection is costly in terms of labour and time. Thus, data are often collected using behavioral checklists rather than on line recording of behavioral observations (Cohen-Mansfield, 1986; Cohen-Mansfield, Marx, & Rosenthal, 1989; Jackson, Drugovich, Fretwell, Spector, Sternberg, & Rosenstein, 1989; Ware, Fairburn, & Hope, 1990). In using checklists, caregivers are asked to provide retrospective reports of the demented residents' behaviors. Caregivers' memories of agitated or aggressive incidents may be biased in that disturbing behaviors tend to be more impactful and, thus, an

incident may be remembered longer or appear to occur more often than it actually did. Secondly, in a significant portion of the literature on agitation, wandering is often presumed to be a manifestation of agitation. In these studies, however, reports of a relationship between emotional disturbances and wandering are virtually non-existent. In fact, in a study in which agitated behaviors were factor analyzed, pacing and stimulus seeking type behaviors formed a cluster separate from motor and verbal behaviors that were more suggestive of emotional disturbance, such as yelling and crying (Cohen-Mansfield, Marx, & Rosenthal, 1989).

At first glance, the overall tabulations of the amount of stimulus seeking residents engaged in while walking per se do not appear to support the understimulation hypothesis. Residents of the long term care facility exhibited stimulus seeking behaviors 51% of the time they were observed walking, while residents from the geriatric hospital engaged in stimulus seeking behaviors while walking only 33% of the time. However, residents did much more stimulus seeking while standing than while actually walking. Residents of the geriatric hospital exhibited stimulus seeking behaviors 71% of the total time spent standing and long term care facility residents exhibited these behaviors 63% of the total time they stood. In addition, the data on percent of time residents engaged in stimulus seeking behaviors while

standing immediately after an episode of walking are consistent with the notion that wanderers are seeking stimulation. Residents of the long term care facility displayed stimulus seeking behaviors after standing 56% of the time while the geriatric hospital residents exhibited these behaviors 69% of the time. This finding that residents spent a relatively large amount of time engaged in stimulus seeking behaviors is consistent with Hussian & Hill's (1980) previous research in which they report that some geriatric patients spent as much as 87% of their awake time exhibiting self-stimulatory behaviors. The authors characterize this group of wanderers as "self-stimulators" and argue that they engage in stimulation behaviors either because there is a lack of stimulus control in the environment or because the cerebral damage that accompanies Alzheimer's disease makes it difficult to shape appropriate patient behavior.

However, from the understimulation point of view, this study's finding that stimulus seeking behaviors occurred the majority of the time residents stood suggest that stimulus seeking may serve to terminate restless behavior such as wandering. In fact, this interpretation is also consistent with the results of Hussian's (1980) study in which he reports that residents wandered less and were stationary longer in places that provided stimulation, such as areas in which windows, water fountains or other people were located.

Also to be considered are the findings which were created when cluster analyses were run, creating groups of residents in terms of time spent walking, standing, and sitting. Residents who sat the most did less stimulus seeking while standing and walking than the cluster of residents who did the most standing and walking. However, the residents who sat the most also did the most stimulus seeking while sitting out of all three groups. This pattern suggests the possibility that residents who obtain sufficient stimulation while sitting consequently walk and stand less than residents who do less stimulus seeking while sitting.

Together these two sets of findings imply that the provision of appropriate stimulus seeking activities might preclude wandering. Unfortunately, the extent to which environmental intervention as an approach to managing wandering is suggested is largely limited to ensuring that the wanderer has a safe area to ambulate in (Monsour & Robb, 1982; Namazi, et al., 1989; Stokes 1987). In the few instances where environmental stimulation is recommended, the rationale for the stimulation approach to managing wandering as well as the particular activities and materials selected is not stated or not grounded on an integrated theoretical basis. To illustrate, Rosswurm, Zimmerman, Schwartz-Fulton, & Norman (1986) advocate increasing stimulation for wanderers. They argue that residents suffer

from a lack of environmental stimulus control and that they do not have adequate information about their environment, thus resulting in wandering. The authors then proceed to recommend pet and exercise therapy as a means of managing wandering. However, it is unclear how these recommendations follow from their rationale for why wanderers require more stimulation.

Cross tabulations revealed that the most common stimulus seeking behaviors that geriatric facility residents engaged in while standing and while walking were other oriented stimulus seeking behaviors. Long term care facility residents, on the other hand, most often engaged in motor stimulation not identified with a functional instrumental act when stimulus seeking and walking or standing.

There were no obvious differences between the two patient populations. Because of this, the possibility that residents of the two facilities engaged in different types of stimulation because of differences in environmental design was investigated. That is, the data were examined further in terms of where residents of the geriatric facility engaged in other oriented stimulation seeking behavior. This was done to determine if there were particular locations in the hospital that provided more opportunity for residents to engage in other oriented stimulation than residents of the long term care facility

had. Examination of the data on where other oriented behaviors collapsed over all mobility types occurred did not indicate that residents were engaging in other oriented behaviors in locations that the long term care facility residents did not have access to in their own facility. The geriatric hospital residents exhibited most of the other oriented stimulus seeking behaviors in the hallways, areas that are very similar in the long term care facility. However, tabulations of the locations of other oriented stimulation seeking behaviors when residents were standing were more informative. Over one quarter of the this type of stimulus seeking behavior when standing occurred at the north end of the geriatric hospital. This location is unique to the hospital because it contains several features that are conducive to other oriented stimulation seeking, namely a door with a frosted and slightly textured glass window, a control panel containing buttons labelled with red letters, and a large vent. Interestingly, prior to this study the researcher observed that residents often ran their hands over this series of objects. In addition, there is a control panel at the other end of the hall identical to the one at the north end, except that it is not located next to other textured objects like the frosted glass window and vent. Most of the lettering on the panel buttons at the north end are worn away while the lettering on the panel buttons at the other end are not. The residents' engagement

in these tactile stimulation behaviors is similar to Hussian and Davis' (1985) report on wanderers. These investigators found that a group of wanderers, which they called "self stimulators", often ran their hands over vents and fiddled with doorknobs.

An additional quarter of the other oriented tactile stimulation occurred in the dining room of the geriatric hospital. While the long term care facility also contains a dining area, the dining area in the geriatric hospital is set up in a manner that is more conducive to other oriented tactile stimulation. Not only are the walls of this area lined with handrails which residents often ran their hands over, but the tables and chairs are located throughout the dining area, rather than being pushed back against the walls when mealtimes are over like they are in the long term care facility. This type of set up enabled residents to touch the chairs and tables and the handrails while standing in the dining area.

The residents' attraction to other oriented tactile stimulation in the geriatric hospital is consistent with a recent study in which demented residents were provided with a variety of stimulus items and the amount of time they interacted with the objects over a series of 10 minute periods was recorded (Mayers & Griffin, 1990). Residents in this study most preferred the items that allowed for tactile kinds of exploration, such as turning and manipulating knobs

and dials and stoking plush objects. Interestingly, when provided with a fabric book, residents preferred to stroke it rather than look at it.

Additional support for the notion that wanderers are seeking stimulation is provided by the fact that residents were most often observed in the "busy" areas of each facility rather than in more private areas such as the resident bedrooms. In addition, the vast majority of their stimulus seeking behaviors occurred in public areas. The finding that the residents spent most of their time in busy areas reiterates the findings of Lawton (1981). In his study on behavioral patterns of residents of a long term care facility, he found that elderly residents with organic brain syndrome spent 71% of their time in non-secluded areas, such as the nurses' station, halls and lounge.

In sum, the results of this study clearly contradict the assumption in the gerontological literature that wandering is a manifestation of agitation. Furthermore, while agitated and aggressive behaviors were rarely observed, stimulation seeking behaviors were relatively prominent. Thus, while the data do not provide unequivocal support for the understimulation hypothesis, the results are generally supportive of the notion that wanderers are seeking stimulation.

Stimulus seeking behaviors were also examined on an individual basis to determine whether there was variation in

terms of the kind of stimulus seeking behaviors residents exhibited. The data revealed that there was variation between residents in both facilities. One possible explanation for this finding is that the wanderers selected for this study do not represent a homogeneous group. Residents selected for this study had diagnoses consistent with probable AD, no history of other major neurological diseases, and no major acute or chronic illness that would affect cognition. However, there was some variation in the level of dementia, drugs taken, as well as length of stay in the facilities, all of which conceivably could affect the amount and type of stimulation required. Consistent with this possibility that wanderers do not represent a homogeneous group in terms of stimulation required, Algase (1992) found in his study of nursing home residents that wanderers were more variable in their performance on cognitive tasks than non-wanderers. This finding is consistent with the research in the ADHD literature that indicates hyperactive children exhibit more variable performance on tasks involving sustained attention than non-hyperactive children (Weyents, 1989). One explanation for the wanderer's greater variability in performance is that it may fluctuate as a function of the need for stimulation while performing that task. When residents require more stimulation than what they are receiving while performing a cognitive task, they may be distracted and perform more

poorly than when they are not understimulated.

Limitations

Unfortunately, the extent of support these data provide is limited by the fact that there was no observation of a control group of non-wanderers, and thus no baseline measures of stimulus seeking are available. Future research in which a control group is included would allow for a comparison between the amount and type of stimulus seeking behaviors exhibited by wanderers and non-wanderers.

In addition, it is likely that level of cognitive functioning could affect the amount and kinds of stimulus seeking behaviors residents engage in, with higher functioning residents engaging in more cognitively demanding activities, such as social interaction and lower functioning residents engaging in more "basic" kinds of stimulation, such as tactile exploration. Unfortunately, this study is not able to address this issue further because the range of cognitive functioning in this sample is restricted to the lower levels. In fact, most residents were unable to perform the mental status examination and those who could performed poorly.

Conclusions

The results of this study provide preliminary support for the stimulus seeking hypothesis of wandering. Furthermore, the finding that wandering was rarely accompanied by behavioral indices of agitation or aggression

is discordant with the views of several investigators of this behavior. This discrepancy is not surprising, considering that very few studies of wandering use on-line behavior recording techniques rather than retrospective reports of caregivers. As a result of this trend in methodology, researchers like Albert (1992) argue that little is known about the content of wandering behavior in demented patients. Therefore, it is necessary that researchers in this area make greater use of systematic behavioral observation and recording techniques to better understand the nature of wandering.

Future research is required to delineate further the kinds of stimulation seeking behaviors Alzheimer's residents engage in and whether the behaviors change as the disease progresses. Additional questions that need to be addressed include whether providing residents with appropriate sensory stimulation activities can decrease wandering, and whether strategic placement of appropriate stimuli within the long term care setting can influence where wanderers ambulate. Answers to these questions could lead to fundamental changes in therapeutic interventions and how they are conceptualized for wanderers with Alzheimer's disease. Currently, the empirically untested overstimulation hypothesis of wandering is widespread, and most interventions are directed toward decreasing stimulation as a means of managing wandering. In fact, entire units

directed toward reducing environmental stimulation have been developed for demented residents exhibiting disruptive behaviors such as wandering (Cleary, Clamon, Price, & Shullaw, 1988). Only a few researchers have suggested increasing stimulation as a method of managing behavioral [illegible]s in dementia, including wandering (Loew, [illegible]stone, 1971; Rosswurm, Zimmerman, Schwartz-Fulton, & Norman, 1986). Unfortunately, studies advocating intensified stimulation have not been guided by any coherent theoretical bases. As a result, the meaningfulness of many of the stimulation activities suggested for demented residents is questionable. This study is unique in that it contains a theoretical basis for why wanderers may be exhibit stimulation seeking behaviors and why the stimulation they require may be different than the stimulation required by individuals not suffering from Alzheimer's disease.

Footnotes

1.This resident was not observed for two reasons. When she befriended the new resident she was often unobservable, making it difficult to obtain meaningful data. Second, this new friendship attracted much attention from the nursing staff who did not approve of the relationship. Thus, the resident's behavior was often interrupted by the nursing staff in an attempt to thwart the activities between the two residents.

2. An alternative would have been to video tape the behaviors and code the taped recordings several times with different coding schemes. This was not feasible for the current project: wanderers covered too much space, the expense of multiple cameras and recorders was prohibitive, and the staff objected to being recorded.

3.It is important to note that elimination of these residents from the agitation/aggression tabulations did not create a superficial decrease in these behaviors because none of the three residents were observed exhibiting agitated or aggressive behaviors.

References

Albert, S. M. (1992). The nature of wandering in dementia: A Guttman scaling analysis of an empirical classification scheme. International Journal of Psychiatry, 7, 783-787.

Algase, D. L. (1992, March/April). Cognitive discriminants of wandering among nursing home residents. Nursing Research, 78-81.

American Psychiatric Association. (1987). Diagnostic and statistical manual of mental disorders (3rd ed. rev.). Washington, DC: Author.

Barkley, R. A. (1990). Attention-Deficit Hyperactivity Disorder: A handbook for diagnosis and treatment. New York: Guilford.

Blasch, B. B. 1988. Wandering: The problem. RESNA-International Conference of the Association for the Advancement of Rehabilitation Technology (Eds.), Proceedings of the International Conference of the Association for the Advancement of Rehabilitation Technology. Ottawa: Tri-graphic Printing.

Boucugnani, L., & Jones, R. (1989). Behaviors analogous to frontal lobe dysfunction in children with attention deficit hyperactivity disorder. Archives of Clinical Neuropsychology, 4(2), 161-173.

Burns, A., R. Jacoby, and R. Levy. (1990). Psychiatric phenomena in Alzheimer's disease. IV: Disorders of behaviour. British Journal of Psychiatry, 157, 86-94.

Churton, M. (1989). Hyperkinesis: A review of literature. Adapted Physical Activity Quarterly, 6, 313-327.

Cleary, T. A., Clamon, C., Price, M., & Shullaw, G. (1988). A Reduced Stimulat Unit: Effects on patients with Alzheimer's disease and related disorders. Gerontologist, 28(4), 511-514.

Cohen, J. (1960). A coefficient of agreement for nominal scales. Educational and Psychological Measurement, 20, 37-46.

Cohen-Mansfield, J. (1986). Agitated behaviors in the elderly II: Preliminary results in the cognitively deteriorated. Journal of the American Geriatrics Society, 34, 722-727.

Cohen-Mansfield & Billig (1986). Agitated behaviors in the elderly I: A conceptual review. Journal of the American Geriatrics Society, 34, 711-721.

Cohen-Mansfield, J., Marx, M. S., & Rosenthal, A. S. (1989). A description of agitation in a nursing home. Journal of Geriatric Medicine, 44, M77-82.

Folstein, M. F. & Folstein, S. E. (1975). "Mini-mental state": A practical method for grading the cognitive state of patients for the clinician. Journal of Psychiatric Research, 12, 189-198.

Cohen-Mansfield, J., Marx, M. S., & Werner, P. (1992). Observational data on time use and behavior problems in the nursing home. Journal of Applied Gerontology, 11, 111-121.

Cohen-Mansfield, J., Werner, P., Marx, M. S., & Freedman, L. (1991). Two studies of pacing in the nursing home. Journal of Gerontology, 46(3), M77-83.

Curl, A. (1989). Agitation and the older adult. Journal of Psychosocial Nursing, 27(12), 12-14.

Dawson, P., & Reid, D. W. (1987). Behavioral dimensions of patients at risk of wandering. The Gerontologist, 27, 104-107.

Dewberry, R. et al. (1986). Lateralized response to cortical injury in the rat: Interhemispheric interaction. Behavioral Neuroscience, 100(4), 556-562.

Dobbs, A. R., & Rule, B. G. (1992). Behavior and use of space by residents of special care and integrated nursing home units. In G. M. Gutman (Ed.), Shelter and care of persons with dementia (pp. 115-132). Vancouver, Canada: Simon Fraser University.

Evans, L. K. (1991). Nursing care and management of behavioral problems in the elderly. In M. S. Harper (Ed.), Management and care of the elderly: Psychosocial perspectives (pp. 191-206). London: Sage.

Fisher, J. & Carstensen, L. (1990). Behavior management of the dementias. Clinical Psychology Review, 10, 611-629.

Goldman, J., & Côté, L. (1991). Aging of the brain: Dementia of the Alzheimer's type. In E. R. Kandel, J. H. Schwartz, & T. M. Jessell (Eds.), Principles of neural science (3rd ed.). New York: Elsevier.

Grossberg, G., Hassan, R., Szwabo, P., & Morley, J. (1990). Psychiatric problems in the nursing home: St. Louise University geriatric grand rounds. Journal of the American Geriatrics Society, 38, 910-921.

Gwyther, L. P., & George, L. K. (1986). Caregivers for dementia patients: Complex determinants of well-being and burden. The Gerontologist, 26, 245-247.

Haenlen, M., & Caul, W. (1987). Attention deficit disorder with hyperactivity: A specific hypothesis of reward dysfunction. Journal of the American Academy of Child and Adolescent Psychiatry, 26(3), 356-362.

Hall, G. R., & Buckwalter, K. C. (1987). Progressively lowered stress threshold: A conceptual model for care of adults with Alzheimer's disease. Archives of Psychiatric Nursing, 1(6), 399-406.

Hall, G., Kirschling, M., & Todd, S. (1986, May/June). Sheltered freedom: An Alzheimer's unit in an ICF. Geriatric Nursing, 132-137.

Hardy, J., Adolfsson, R., Alafuzoff, J., Bucht, G., Marcusson, J., Nyberg, P., Perdahl, E., Webster, P., and Winblad, B. (1985). Transmitter deficits in Alzheimer's disease. Neurochemical Interactions, 7, 545-563.

Heilman, K., Voeller, K., & Nadeau, S. (1991). A possible pathophysiologic substrate of attention deficit hyperactivity disorder. Journal of Child Neurology, 6, S76-81.

Helson, H. (1964). Adaptational level theory: An experimental and systematic approach to behavior. New York: Harper and Row.

Henker, B. & Whalen, C. (1989). Hyperactivity and attention deficits. American Psychologist, 44(2), 216-223.

Hepburn, Severance, Gates, & Christensen (1989, March/April). Institutional care of dementia patients: A state-wide survey of long-term care facilities and special care units. American Journal of Alzheimer's Care and Related Disorders and Research, 19-23.

Hiatt, L. G. (1988). Wandering phenomena: The problems and some solutions. RESNA-International Conference of the Association for the Advancement of Rehabilitation Technology (Eds.), Proceedings of the International Conference of the Association for the Advancement of Rehabilitation Technology, (pp. 636-637). Ottawa: Tri-Graphic Printing.

Hope, R. A., & Fairburn, C. G. (1990). The nature of wandering in dementia: A community-based study. International Journal of Geriatric Psychiatry, 5, 239-245.

Hope, R. A., Patel, V., & Series, H. (1991). Dexamphetamine may reduce hyperactivity in dementia: A case study using direct observation. International Journal of Geriatric Psychiatry, 6, 165-169.

Hussian, R. A. (1982). Stimulus control in the modification of problematic behavior in elderly institutionalized patients. International Journal of Behavioral Geriatrics, 1, 33-42.

Hussian, R. A. (1987). Wandering and disorientation. In L. L. Carstensen & B. A. Edelstein (Eds.), Handbook of clinical gerontology (pp. 177-189). New York: Pergamon Press.

Hussian, R. A., & Davis, R. L. (1985). Responsive care: Behavioural intervention with elderly persons. Champaign, IL: Research Press.

Hussian, R. A., & Hill, S. D. (1980). Stereotyped behavior in elderly patients with chronic mental disorder. Journal of Gerontology, 32, 573-577.

Jackson, M., Drugovich, M., Fretwell, M., Spector, W., Sternberg, J., & Rosenstein, R. (1989). Prevalence and correlates of disruptive behavior in the nursing home. Journal of Aging and Health, 1, 349-369.

Jorm, A. F., Korten, A. E., & Hendersen, A. S. (1987). The prevalence of dementia: A quantitative integration of the literature. Acta Psychiatrica Scandinavia, 78, 465-479.

Knopman & Sawywer-DeMaris (1990). Practical approach to managing behavioral problems in dementia patients. Geriatrics, 45(4), 27-35.

Lawton, M. P. (1981). Sensory deprivation and the effect of the environment on management of the patient with senile dementia. In N. Miller & G. Cohen (Eds.), Clinical aspects of Alzheimer's disease and senile dementia (pp. 227-251). New York: Raven.

Lipsey, J., & Robinson, R. (1986). Sex dependent behavioral response to frontal cortical suction lesions in the rat. Life Sciences, 38(24), 2185-2192.

Loew, C., & Silverstone, B. (1971). A program of intensified stimulation and response facilitation for the senile aged. Gerontologist, 341-347.

Mace, N. (1987). Programs and services which specialize in the care of persons with dementing illnesses - issues and options. American Journal of Alzheimer's Care and Research, 2(3), 10-17.

Mann, A. H., Graham, N., & Ashby, D. (1984). Psychiatric illness in residential homes for the elderly: A survey in one London borough. Age and Ageing, 13, 257-265.

Martino-Saltzman, M., Blasch, B. B., Morris, R. D., McNeal, L. W. (1991) Travel behavior of nursing home residents perceived as wanderers and nonwanderers. Gerontologist, 31(5), 666-672.

Mayers, K. & Griffen, M. (1990). The play project: Use of stimulus objects with demented patients. Journal of Gerontological Nursing, 16, 32-37.

McGrowder-Lin, R., Bhatt, A. (1988). A wanderer's lounge program for nursing home residents with Alzheimer's disease. Gerontologist, 28(5), 607-609.

Meents, C. K. (1989). Attention deficit disorder: A review of the literature. Psychology in the Schools. 26, 168-178.

Monsour, N. & Robb, S. (1982, September). Wandering behavior in old age: a psychosocial study. Social Work, 411-415.

Namazi, K. H., Rosner, T. T., & Calkins, M. (1989). Visual barriers to prevent ambulatory Alzheimer's patients from exiting through an emergency door. Gerontologist, 29(5), 699-702.

National Advisory Council on Aging (1989). 1989 and beyond: Challenges of an aging Canadian society (Cat. No. H71-3 10-1989). Ottawa: Supply and Services Canada.

Peppard, N. (1986). Special nursing home units for residents with primary degenerative dementia: Alzheimer's disease. Journal of Gerontological Social Work, 9, 5-18.

Peppard, N. R. (1991). Setting up a special needs dementia unit in a long-term care setting. In M. S. Harper (Ed.), Management and care of the elderly: Psychosocial perspectives (pp. 237-245). London: Sage.

Rader, J., Doan, J. & Schwab, M. (1985, July/August). How to decrease wandering, a form of agenda behavior. Geriatric Nursing, 196-199.

Rader, J., & Hoeffer, B. (1991). Caring for persons with Alzheimer's disease in long-term care facilities. In M. S. Harper (Ed.), Management and care of the elderly: Psychosocial perspectives (pp. 237-245). London: Sage.

Risse, S. C., & Barnes, R. (1986). Pharmacologic treatment of agitation associated with dementia. Journal of the American Geriatrics Society, 34, 368-376.

Rosin, A. J. (1977). The physical and behavioral complex of dementia. Gerontology, 23, 37-46.

Rosser, M. N., Iversen, L. L., Reynolds, G. P., Mountjoy, C. Q., and Roth, M. (1984). Neurochemical characteristics of early and late onset types of Alzheimer's disease. British Medical Journal, 288, 961-964.

Rosswurm, M., Zimmerman, S., Schwartz-Fulton, J., & Norman, G. (1986, Fall). Can we manage wandering behavior? Journal of Long-Term Care Administration, 5-8.

Sagvolden, T., Metzger, M., Schiorebeck, H., Rugland, A., Spinnangr, I., & Sagvolden, G. (1992). The spontaneously hypertensive rat (SHR) as an animal model of childhood hyperactivity (ADHD): Changed reactivity to reinforcers and to psychomotor stimulants. Behavioral and Neural Biology, 58(2), 103-112.

Schwab, M., Rader, J., & Doan, J. (1985). Relieving the anxiety and fear in dementia. Journal of Gerontological Nursing, 11, 8-15.

Sinha, D., Zelman, F., Nelson, S., Bienenfeld, D., Thienhaus, O., Ramaswamy, G., & Hamilton, S. (1992). A new scale for assessing behavioral agitation in dementia. Psychiatry Research, 41, 73-88.

Snyder, L., Rupprecht, H. P., Pyrek, J., Brekhus, S., & Moss, T. (1978). Wandering. The Gerontologist, 18, 272-280.

Stokes, G. (1987). Managing the wanderer: First find out why. Geriatric Medicine, 17, 36-41.

Struble, L. M., & Siversten, L. (1987). Agitation behaviors in confused elderly patients. Journal of Gerontological Nursing, 13, 40-44.

Taft, L. B. (1989). Conceptual analysis of agitation in the confused elderly. Archives of Psychiatric Nursing, 3, 102-107.

Wagner, L. (1987, April). Nursing homes develop special Alzheimer's units. Modern Healthcare, 40-46.

Ware, C. J., Fairburn, C. G., & Hope, R. A. (1990). A community-based study of aggressive behaviour in dementia. International Journal of Geriatric Psychiatry, 5, 337-342.

Werner, P., Cohen-Mansfield, J. Braun, J., & Marx, M. S. (1989). Physical restraints and agitation in nursing home residents. Journal of the American Geriatrics Society, 37, 1122-1126.

Zentall, S. (1975). Optimal stimulation as a theoretical basis of hyperactivity. American Journal of Orthopsychiatry, 45, 549-653.

Zentall, S. (1986). Effects of color stimulation on performance and activity of hyperactive and nonhyperactive children. Journal of Educational Psychology, 78, 159-165.

Zuckerman, M. (1991). The psychobiology of personality. New York: Cambridge University Press.

Appendix A

Residents' Wandering Behaviors - Nurses' Rating Form

First of all, I'd like to thank you for taking time out to help me with this. As you know, I'm going to be observing the wandering behaviors of some of the residents on this unit. Before I begin this study, however, I need your help in helping me decide whom I should include in the study. That's why I'm asking you to fill out this short form which contains a few questions about the walking patterns of each resident on this unit. I would like to stress that this is not a test of your rating skills. I simply need ratings from caregivers who know the residents' behaviors so that I can have some starting point for deciding which residents to include in my study. In fact, I would like you refrain from putting your names on these sheets. I must also emphasize that it is very important that I get three **independent** ratings, so please do not consult with each other while we go through this form. I really am just interested in your best judgement.

Now, if you look at the sheet you can see that we'll consider each resident one at a time. For each person, I'd like you to tell me if he/she can walk without assistance and if not, what type of assistance he/she requires. Then I'd like you to indicate what percent of his/her waking time you would say he/she spends walking, and when he/she walks.

I will then use your information to get an average rating of each person, so no one form will be singled out.

Do you have any questions at this point? Ok, then, let's begin.

Staff Ratings of Residents' Wandering Behaviors

Resident Name	Can walk without assistance? YES	NO	Percent of waking time spent walking: <10	10	20	30	40	50	60	70	80	90	100
1.	—	—	—	—	—	—	—	—	—	—	—	—	—
2.	—	—	—	—	—	—	—	—	—	—	—	—	—
3.	—	—	—	—	—	—	—	—	—	—	—	—	—
4.	—	—	—	—	—	—	—	—	—	—	—	—	—
5.	—	—	—	—	—	—	—	—	—	—	—	—	—
6.	—	—	—	—	—	—	—	—	—	—	—	—	—
7.	—	—	—	—	—	—	—	—	—	—	—	—	—
8.	—	—	—	—	—	—	—	—	—	—	—	—	—
9.	—	—	—	—	—	—	—	—	—	—	—	—	—
10.	—	—	—	—	—	—	—	—	—	—	—	—	—
11.	—	—	—	—	—	—	—	—	—	—	—	—	—
12.	—	—	—	—	—	—	—	—	—	—	—	—	—
13.	—	—	—	—	—	—	—	—	—	—	—	—	—
14.	—	—	—	—	—	—	—	—	—	—	—	—	—
15.	—	—	—	—	—	—	—	—	—	—	—	—	—

Staff Ratings of 8B Residents' Wandering Behaviors

Resident Name	When does the resident walk? MORNING	AFTERNOON	EVENING	NIGHT	MEALTIMES	Comments
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
11.						
12.						
13.						
14.						
15.						

Resident Name	Is there a particular time of day this person tends to walk?	Does this person tend to walk during mealtimes?
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		
11.		
12.		
13.		
14.		
15.		

Appendix B

Coding Scheme for Continuous Scans

1. Ethogram Rationale

1) The goal of this study is to determine whether overstimulation/agitation and understimulation exist as two possible sources of wandering.

2) To accomplish this goal, the ethogram was designed to record the ambulation patterns and concurrent behaviors of wandering residing in a geriatric facility.

3) Of particular interest are the two categories developed to document behavioral manifestations of agitation/aggression and stimulus seeking. These two categories, along with the mobility category, allow us to observe whether there is a) a subgroup of wanderers for which agitated behaviors occur during episodes of wandering with a relative absence of stimulus seeking behaviors and b) a subgroup of wanderers for which stimulus seeking behaviors occur during episodes of wandering with a relative absence of agitated behaviors.

4) In addition, location will be recorded to determine whether agitation/aggression and stimulus seeking behaviors occur in particular functional areas of the unit.

2. Behavioral Catalogue Characteristics

1) Codes have been defined operationally to ensure a high level of interobserver reliability.

2) The list of codes is exhaustive within each category. That is, all possible behaviors of interest to this study can be classified into one of the behavior codes.

3) Codes within the location and mobility categories are mutually exclusive. Therefore, only one code can be selected for each of these categories per line of data.

4) Codes within the agitation/aggression and stimulus seeking categories are not mutually exclusive, and therefore the observer is required to enter as many appropriate codes as apply within each of these two categories.

5) Although codes <u>within</u> the agitation and stimulus seeking categories are not mutually exclusive, mutual exclusivity does exist <u>between</u> these categories. Thus, a behavior may be coded as an instance of agitation/aggression or stimulus seeking, but never both.

6) For some stimulus seeking behaviors more than one type of stimulus seeking code may apply for the same behavior. For example, if a resident is interacting with another resident he

may also be attending to him visually and auditorily. In these instances, the coder should code only the primary behavior, and when it is not evident which behavior is primary the coder should code all of the behaviors that apply.

3. Data Collection and Coding Procedures

1) The behavioral coder should not enter a closed room. The only exception to this rule is at the beginning of a coding session when necessary to determine if the resident is in the closed room. If the resident is found in the room, the coder should then indicate the resident's location and for all other behavior categories the resident must be considered and coded as unobservable by entering "Not Available". Even if it is likely that the resident will remain unobservable for the entire observation session, the coder must continue coding for the duration of that session.

2) If the location of the resident is not found within five minutes from when an observation session began, then begin the session at this time and code the resident's location as "Not Available" and his behavior as "Not Available". The coder should check the resident sign out sheet and/or ask the staff where the resident is.

4. Sample Line of Data

LOC	MOBIL	AGIT	SS	COMMENT
--	----	----	-	

5. Ethogram

Note that the letters and/or numbers preceding each item in this ethogram correspond to the letters and/or numbers on the computer keyboard.

I. Location - The following list represents a division of the floor plan of 8B into functional areas.

F1) resident's own bedroom
F2) other resident's bedroom
F3) resident's own toilet
F4) other resident's toilet
F5) dining area
F6) sitting room
F7) kitchen
F8) elevator area - the resident is located within the boundary outlined for this area, which extends from the elevator doors to the point halfway between the nursing desk and the elevator doors (see map). Note that the resident must be oriented toward or touching the elevators in order for the coder to select this location code.
F9) nurses' station front - the resident is located within the boundary outlined for this area, which extends from the the front of the nursing desk to the point halfway between the nursing desk and the elevator doors (see map). Note that the resident must be oriented toward or touching the nursing station in order for the coder to select this location code.
F10) nurses' station back - note that the resident is behind the nursing station, but not in any of the rooms that are located behind the station.
') not available - not found
1) south end - the resident is within two feet of and oriented toward the fire alarm panel, vents, and/or stairwell door at the extreme end of the south hall.
2) south lounge
3) south hall - part 1
4) south hall - part 2
5) middle hall - the resident is located at some point between the nursing desk and the elevator doors (see map). Note that the resident must be oriented toward the north or south hall and not the elevators or the nursing desk in order for the coder to select this location code.
6) north end - the resident is within two feet of and oriented toward the vent, fire alarm panel, firehose and/or stairwell door at the extreme end of the north hall.
7) north lounge - the resident is within one foot of the lounge and is oriented toward or touching the north lounge door or counter that separates the north lounge from the north hall.
8) north hall - part 1
9) north hall - part 2
0) other location (restricted) - includes med room, stairwells, elevators, unpermitted exit from 8B.

-) other location (unrestricted) - includes conference room, haircare room, utility room, bath hall, bath area, wheelchair shower area, utility area, recreation office, permitted exit from 8B.

II. Mobility

Note that the coder is required to make a comment when the resident is travelling (or simulating travel) at an unusually fast pace. However, because residents typically travel (or simulate travel) at an unsually slow pace, no comment is required to note when this occurs.

Note also that to maintain the manageability of the coding scheme when the resident vacillates between a stationary position and mobile behavior, the coder should not indicate that the resident has stopped the mobility behavior until this behavior has ceased for at least three seconds.

Q = Not Available = The resident is out of the coder's visual contact and therefore no decision can be made regarding "mobility".

W = Stand/Lean = The resident is stationary and upright on his feet. He is maintaining this stance either without assistance with his weight centrally distributed around his mass, or he is leaning against a wall, walker, etc. In either case, the stance has a steady and reliable quality. Take this into account.

E = Sit = The resident is stationary and his body rests upright on the buttocks. His weight is more or less centrally distributed around his mass. This category includes sitting in a chair, but not lying down in a bed.

R = Solo Walk = The resident is traversing a distance by himself in either a typical upright manner or he is using his hands or feet to locomote in a wheelchair. **Note that the coder should make a comment if the resident is travelling at an unusually fast pace.**

T = Walk-in-Place = The resident is simulating ambulation or wheelchair locomotion. This is <u>simulated</u> locomotion because the resident does not actually traverse from one point to another. However, he is making the motions of walking in a typical upright manner or of locomoting in a wheelchair using his feet or hands. **Note that the coder should make a comment if the resident is engaging in simulated locomotion at an unusually fast pace.**

Y = Group Walk (Physical Proximity) - The resident is within two feet of one or more persons and is more or less maintaining that distance while the group walkers locomote in

either a typical upright manner or using their hands or feet to locomote in a wheelchair. Note that the coder should make a comment if the resident is travelling at an unusually fast pace.

U = Group Walk (Physical Contact) - The resident is in physical contact with one or more persons and maintaining that contact while locomoting in either a typical upright manner or using his hands or feet to locomote in a wheelchair. Note that the coder should make a comment if the resident is travelling at an unusually fast pace.

I = Other Mobility - A distinct form of mobility or immobility not specified in the above codes that may require further description, in which case the coder should make a comment. Some examples of other types of mobility and immobility include lying down, falls or near falls, and an atypical walk (such as festination, shuffling, or limping).

III. Agitation/Aggression

A = Not Available - The resident is out of the coder's visual contact and therefore no decision can be made regarding "agitation/aggression".

N = No Agitation/Aggression - The resident is not engaged in any agitated or aggressive behaviors, or there is no clear indication as to whether the resident's behavior should be coded as an agitated behavior.

V = Verbal/Vocal Agitation - The resident is exhibiting agitated, but not hostile, verbalizations or vocalizations. These non-hostile behaviors are not directed toward anyone and, therefore, do not have the potential to cause physical or mental harm to another person. In this category agitated behaviors include words or vocalizations that are expressions of emotional disturbance (such as anxiety, tension, or irritability), and/or words or vocalizations that would have had the potential to result in physical or mental harm had they been directed toward someone. Because these behaviors were not directed toward another person they are coded as instances of verbal/vocal agitation rather than verbal aggression. Examples include swearing and screaming, provided that the resident does not direct these behaviors at anyone, as well as moaning, groaning and crying.

P = Physical Agitation - The resident is expressing emotional disturbance (such as anxiety, tension, or irritability) through non-hostile behaviors. This category includes fidgeting behaviors, defined as motoric restlessness or an assortment of small scale body movements that may be repetitive. To distinguish physically agitated behaviors from stimulus seeking behaviors, the resident must also appear to be either experiencing mental or physical discomfort, or he

must be executing the behaviors with an unusually high intensity or vigour to be considered physical agitation. Mental or physical discomfort is indicated by one or more of the following characteristics: 1) facial expression indicative of negative affect, such as sadness, anger, or fear, 2) tense body posturing, or 3) negative vocalizations, such as moaning, groaning, or crying. Note that if mental or physical discomfort is indicated by negative vocalizations, the coder would select both the "verbal/vocal agitation" key and the "physical agitation" key. Crying while rocking back and forth, and kicking the table with an angry expression are examples of physical agitation.

G = Verbal Aggression - The resident is exhibiting provoked or unprovoked hostile <u>verbal</u> behavior which is aggressive behavior directed toward another person and has the potential to result in physical or mental harm. Note that the decision to code a behavior as an instance of verbal aggression should be based upon the behavior of the subject rather than on the response of the recipient. A necessary component of these behaviors is that they are directed toward another person; if they are not, they should be coded as verbal/vocal agitation. Examples include swearing, screaming or making hostile sexual remarks at another person.

H = Physical Aggression - The resident is exhibiting provoked or unprovoked hostile <u>nonverbal</u> behavior which is aggressive behavior directed toward another person and has the potential to result in physical or mental harm. Note that the decision to code a behavior as an instance of physical aggression should be based upon the behavior of the subject rather than on the response of the recipient. Examples include striking, tripping, spitting at, or directing hostile sexual behavior toward another person.

J = Other Agitation/Aggression - The resident is exhibiting distinct agitated or aggressive behavior not specified above that may require further description, in which case the coder should make a comment. In addition, the resident must either appear to be experiencing mental or physical discomfort, or he must be executing the behavior with an unusually high intensity or vigour to be coded as instance of "other agitation". Mental or physical discomfort is indicated by one or more of the following characteristics: 1) facial expression indicative of negative affect, such as sadness, anger, or fear, 2) tense body posturing, or 3) negative vocalizations, such as moaning, groaning, or crying. Note that if mental or physical discomfort is indicated by negative vocalizations, the coder would select both the "verbal/vocal agitation" key and the "other agitation/aggression" key. Attempting to leave the unit is included in this category.

IV. Stimulus Seeking

Note that for some of the following stimulus seeking categories the behaviors must be of at least three seconds duration in order to be recorded. To maintain the manageability of the coding scheme when the resident vacillates between engaging and not engaging in these stimulus seeking behaviors, the coder should not indicate that the resident has stopped the stimulus seeking behavior until this behavior has ceased for at least three seconds.

Z = Not Available = The resident is out of the coder's visual contact and therefore no decision can be made regarding "stimulus seeking".

X = No Stimulus Seeking Behaviors - The resident is not engaged in any stimulus seeking behaviors, or there is no clear indication as to whether the resident's behavior should be coded as a stimulus seeking behavior.

C= Self-Oriented Tactile Stimulation Seeking - The resident is feeling one part of the body with another part of the body, presumably resulting in proprioceptive stimulation. Note that behaviors in this category must be of at least three seconds duration. This category includes, but is not limited to, repetitive behaviors such as rubbing one's own arm, hand clapping, or finger snapping.

V = Other Oriented Tactile Stimulation Seeking - The resident is in continuous physical contact with or is repeatedly touching something in the environment for at least three seconds, presumably resulting in proprioceptive stimulation. Note that if the resident is continuously touching some surface he must be manipulating it in some way, rather than simply touching it. This category includes stroking another person, finger tapping, running a hand over a handrail or window sill, and manipulating clothing that is not pressed against his skin.

B = Motor Stimulation not Identified with a Functional Instrumental Act - The resident is engaged in motor movements that do not appear to be miming any recognizable instrumental activity pattern, and are presumed to result in kinaesthetic stimulation. These motor movements must persist for at least three seconds. Examples include shaking a foot, rocking back and forth, and distorting one's face without any indication that this behavior is an expression of an emotion.

N = Motor Stimulation Identified with a Non-Functional or Imaginary Instrumental Act - The resident is engaged in motor movements that appear to be miming or mimicking a recognizable pattern of activity or involve performing a non-functional act. The resident must engage in these motor movements for at least three seconds. Examples include miming and mimicking activites such as sewing, washing a table with or without a cloth when there are no spills or crumbs on the table, and

attempting to unscrew screws from a wall, as well as performing non-functional activities such as moving furniture or pushing a laundry cart when there is no recognizable purpose to performing these activities.

M = Visual Stimulation Seeking - The resident is obviously orienting to a visual stimulus in his environment for at least three seconds duration. Examples include looking at a flashing control panel or watching a verbal interaction between two other people while not actually participating in the interaction.

< = Auditory Stimulation Seeking - The resident is obviously orienting to auditory stimulation for at least three seconds duration. For example, a resident may stop walking and cock his head toward a speaker while a message is being presented over the intercom system. Listening to music as part of an organized activity would be included in this category as well.

> = Social Interaction - The resident is interacting with or attempting to interact with one or more persons. The interaction may include one or more of the following behaviors: touching (but not stroking) one or more persons, visually attending or listening to someone who is communicating with him, verbalizing, vocalizing or gesturing to someone, or cooperating in a community activity such as a group sing-a-long. This category would not be selected if the resident appears to be listening to a conversation between two or more people who are not acknowledging the resident (ie. they are orienting away from him). Instead, the coder should select "auditory stimulation seeking" and/or "visual stimulation seeking". In addition, if someone is attempting to interact with the resident and there are no signs that the resident is acknowledging the initiator of the interaction (ie. the resident does not orient toward the person and does not respond to the person's questions), this would not be coded as an instance of social interaction. In some cases, the resident may make a delayed response, indicating that he was attending to the person. In this case the coders should make a comment that this occurred. **Note that the coder should make a comment if the resident is interacting with someone who is "novel" (such as a visitor).**

? = Other Stimulus Seeking Behaviors- The resident is exhibiting other forms of stimulus seeking not included in the above categories, such as singing to himself.

6. Required Comments

The coder should make a comment in the following instances:

1) When a code for which the computer automatically demands a comment has been enterred for any of the behavior categories.

attempting to unscrew screws from a wall, as well as performing non-functional activities such as moving furniture or pushing a laundry cart when there is no recognizable purpose to performing these activities.

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? = Other Stimulus Seeking Behaviors- The resident is exhibiting other forms of stimulus seeking not included in the above categories, such as singing to himself.

6. Required Comments

The coder should make a comment in the following instances:

1) When a code for which the computer automatically demands a comment has been enterred for any of the behavior categories.

Appendix C

Consent Form

Title: Neurocognitive Research Program
Investigator: Dr. Allen R. Dobbs

Explanation

We are doing research to better understand why some residents show excessive amounts of pacing whereas others do not. We are interested in what causes the pacing and ways to reduce it. In oder to accomplish this, we will carefully observe and record the public behaviour of selected residents. The observer is always at a distance and non intrusive. No observations will occur when the resident is engaged in private activities (dressing, bathing). Sometimes materials will be made available for the person to touch and manually explore.

Consent

I agree to my relatives' participation in the research project. I understand that the results are confidential, to be used for research reporting, and that no information by which the person can be identified will be published. The results can be used for treatment and care by the medical team. I understand that no one is required to enter this study and that if I agree to the participation of my relative, it will be a voluntary decision. I understand that I am free to withdraw his/her participation at any time without prejudice to ongoing care and treatment. I understand that the public activities will be recorded but that the observations will not interfere with scheduled activities of the unit.

I understand that if any knowledge gained from this study is obtained that could influence my decision to continue, I will be promptly informed. I will receive a copy of this form.

_____ _____
Signature of patient Signature of relative or guardian

_____
Date

_____
Signature of witness

If you have any questions concerning the project or procedures, please call Dr. A. Dobbs at 492-5854 (University of Alberta) or at 482-8624 (Edmonton General Hospital).

Appendix D

Coding Schedule for a 4-day Series[1]

	Day 1	Day 2	Day 3	Day 4
11:00	A(R)[2]	B(R)	C(R)	D(R)
11:30	B	C	D	A
1:00	C	D	A	B
1:30	D	A	B	C
2:00	A(R)	B(R)	C(R)	D(R)
2:30	B	C	D	A
3:00	C	D	A	B
3:30	D	A	B	C

[1] A, B, C, and D denote four separate participants.

[2] Two coders will simultaneously record the behavior of the individual at times marked with (R) to provide reliability checks for 25% of the sessions.