FINDING YOUR WAY HOME: A SHADOW BOX INTERVENTION TO IMPROVE WAYFINDING IN DEMENTIA CARE

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A Shadow Box Intervention to Improve Wayfinding in Dementia Care

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When dementia care residents experience difficulty locating their bedrooms, it creates problems for residents and staff. Previous research suggests that hanging items outside individual bedrooms can help facilitate room finding. This project involved a series of studies designed to (a) investigate what types of self-referent stimuli are recognized best by people with dementia, (b) evaluate whether hanging items outside bedrooms can improve room finding, and (c) explore whether recognition and personal relevance of items featured in shadow boxes facilitate better room finding. Data were collected from three long-term care communities. Participants ($N = 27$) included older adults ($M_{AGE} = 85.89$, $SD_{AGE} = 5.13$) with moderate to severe dementia ($M_{MMSE} = 10.74$, $SD_{MMSE} = 6.54$). Results suggest that recognition of self-referent items was statistically different across stimulus types, and was notably best for printed names, followed by middle and young-adulthood photographs. Current photographs were recognized with the least accuracy. Accuracy and latency to room selection were measured using direct observation, and non-concurrent multiple baseline designs were used to compare *baseline* (i.e., empty shadow box) to either *personalized* (i.e., well-recognized pictures, names, and items) or *landmark* (i.e., distinctive but not self-referent items) experimental conditions. Significant improvements in room finding were observed for 50% of participants across experimental conditions. The results suggest that distinctive landmark properties of shadow boxes are critical in improving room finding, and that landmarks

alone work for some people. Anecdotal evidence suggests that personalization of boxes is preferred by families and staff and is more congruent with person-centered care.

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CHAPTER 1

DEMENTIA AND WAYFINDING CHALLENGES

The population of older adults in the United States is growing rapidly. Currently about 13% of our population is over the age of 65, and it is projected that by the year 2030 more than 20% of Americans will fall within this age range (Kinsella & Velkoff, 2001). This demographic shift is a result of several factors including lower infant mortality rates (United Nations, 2007), medical advances that have increased the average life expectancy (Forstl, 2005), and the aging of the large generation of adults referred to as the "baby boomers" (Meyer, 2001). As the population of older adults increases, so will the number of older adults living with cognitive impairment.

Dementia is a type of cognitive impairment that affects more than five million Americans (Alzheimer's Association, 2013). The word dementia is derived from the Latin terms *de* and *mens* meaning "out of one's mind" (Henderson & Jorm, 2002). This translation depicts the changes people with dementia experience, including a decline in abstract thinking and problem solving abilities, difficulty recalling past experiences, deterioration of language skills, and a change in personality and behavior (Hannay, Howieson, Loring, Fischer, & Lezak, 2004). It is projected that the current number of people with dementia will triple by the middle of the century (Alzheimer's Association).

The *DSM - IV-TR* offers criteria for diagnosing dementia that include an impairment in memory abilities in addition to at least one of the following: aphasia (i.e., impaired language comprehension or production), apraxia (i.e., impaired motor abilities), agnosia (i.e., failure to recognize familiar objects despite intact sensory functioning), or disturbances in executive functioning (e.g., inability to plan, organize, or think abstractly) (American Psychiatric Association, 1994). These cognitive deficits must be severe enough to impair the person's daily functioning, and must represent a clear decline when compared to previous abilities.

The International Classification of Diseases (ICD-10), published by the World Health Organization (2010), proposes similar guidelines for the diagnosis of dementia. These guidelines recommend that a diagnosis of dementia should be reliant on (a) memory impairment that interferes with daily life, (b) decline in executive functioning and planning abilities that challenges independent living, (c) an initial awareness of surroundings in baseline cognitive functioning, and (d) changes in social behavior or a loss of emotional control. Although these diagnostic criteria are comparable, they may produce different prevalence rates when applied to the same population sample. The evidence suggests that the ICD-10 guidelines may be more rigorous and therefore identify fewer cases (Erkinjuntti, Ostbye, Steenhuis, & Hachinski, 1997).

Most recently, the Alzheimer's Association and National Institute on Aging partnered to release updated diagnostic criteria for dementia. These criteria include cognitive or behavioral symptoms which (a) interfere with an individual's ability to function at work or engage in usual activities, (b) represent a decline from a baseline level of abilities, and (c) are not explained by a delirium or major psychiatric disorder.

Additionally, (d) cognitive impairment must be evident through history-taking and verbal report of the patient as well as a knowledgeable informant, in combination with objective neuropsychological measures. Lastly, (e) the patient is required to demonstrate impairment in two of the following domains: the ability to acquire and remember new information, reasoning and management of complex tasks, visuospatial skills, language abilities, or changes in personality and behavior (McKhann et al., 2011).

The risk for developing most types of dementia increases with age (Jorm & Jolley, 1998; U.S. General Accounting Office, 1998) and the resulting deterioration of cognitive skills is a result of neurological damage. The most common causes of dementia are Alzheimer's Disease (AD), followed by vascular dementia, mixed dementia (i.e., separate types of dementia occurring at the same time), Lewy Body Dementia, and fronto-temporal dementia (Henderson & Jorm, 2002). Each type of dementia shows a slightly varied progression, behavioral pattern, and pathology of neurological structure and functioning. For example, Alzheimer's disease is known for a gradual onset and increasing deterioration over a period of years (Henderson & Jorm). Alzheimer's Disease features characteristic neurological changes that include the development of amyloid plaques and neurofibrillary tangles, atrophy of the hippocampus (Henderson & Jorm), reduced synthesis of the neurotransmitter acetylcholine (Clarke & Francis, 2005), and deterioration of neuronal processes within the cerebral cortex (Masters, 2005). These changes result in atrophy of other affected regions, including the temporal and parietal lobes as well as restricted regions within the frontal cortex and cingulate gyrus (Wenk, 2003). As a result, complex cognitive processes such as memory, language, and visuospatial skills deteriorate as the disease pathology progresses.

Behavioral Difficulties in Long-Term Care Settings

Although the specific neuropathology varies across types of dementia, certain clinical cognitive impairments and behavioral difficulties are observed across almost all types. Individuals with dementia lose important functional skills that allow them to communicate their needs and access reinforcers (e.g., escape from demands, social interaction, relief from pain, access to preferred items and activities) and as a result are likely to develop challenging behaviors. Common behavior problems include aggression, irritability, repetitive vocalizations, inappropriate sexual behaviors, and wandering. The evidence suggests that the presence of behavior problems can contribute to caregiver burden (de Vugt, Stevens, Aalten, Lousberg, Jaspers, & Verhey, 2005) and predict early placement in long-term care (e.g., Knopman, Kitto, Deinard, & Heiring, 1988; O'Donnell et al., 1992; Steele, Rovner, Chase, & Folstein, 1990).

Currently, over 3.3 million Americans are living in long-term care facilities (CMMS, 2010) and approximately 42% to 67% (Pandya, 2001; Rovner et al., 1990) of these individuals have dementia. Many of the same behavioral difficulties that precipitated nursing home placement continue and may even worsen when a person with dementia moves into a new and unfamiliar environment. In this new setting, a person does not have a learning history and is surrounded by other residents who may exhibit problematic behavior. Research suggests that between 60-85% of nursing home residents exhibit at least one significant behavior problem (Rover, Kafonek, Filipp, Lucas, & Folstein, 1986; Zimmer, Watson, & Treat, 1984; Zuidema, Derksen, Verhey, & Koopmans, 2007). Managing these difficult behaviors requires an enormous amount of staff resources. Rovner and colleagues found that nursing home staff spent most of their

time tending to difficult behaviors of residents with dementia, as opposed to any other work-related task.

Wayfinding

One common problem exhibited by people with dementia is the inability to find their way to a given destination. According to staff interview, more than two thirds of residents with severe dementia living in long-term care have difficulties with wayfinding (Passini, Pigot, Rainville, & Tetreault, 2000). Cognitively impaired nursing home residents who are independently mobile and have wayfinding difficulties may be at risk for encountering safety hazards, including wandering into dangerous or restricted areas. In addition to endangering themselves, people that wander can pose a threat to other residents (Rosswurm, Zimmerman, Schwartz-Fulton, & Norman, 1986). For example, if an individual wanders into another resident's bedroom and behaves as if it is their own (e.g., rifling through the individual's personal items), the actual resident of the room may respond as if their space and property is being invaded and aggress towards the wanderer. Ineffective wayfinding abilities can negatively affect long-term care staff as well (Everitt, Fields, Soumerai, & Avorn, 1991). A confused resident questions staff repetitively forcing them to stop what they are doing and guide the confused resident to their destination. Determining interventions to effectively promote the wayfinding abilities of long-term care residents may increase the safety and independence of wandering residents, better the lives of residents who do not wander, and decrease burden for staff who care for them.

One of the first scholars to address wayfinding was Tolman (1948) who introduced the construct of cognitive maps. Based on this principle, wayfinding was

conceptualized as the process of identifying one's spatial orientation within a cognitive map and adjusting one's position relative to this image. This is similar to how someone would use a road map to navigate his or her way through an unfamiliar place. Since then, research in this area shifted towards the study of cognitive maps and images, and away from the investigation of spatial behavior and wayfinding (Passini, 1980).

Cognitive maps were studied as if they were individual entities, independent of any underlying conceptual framework. Similar practices have not been conducive to the expansion or effective application of a discipline (Baer, Wolf, & Risley, 1968). Cognitive images were discussed as inherent things often with invariable properties (e.g., to *have* a cognitive map or to *be* spatially oriented), which lead to circular reasoning (i.e., he found his way because he has a good cognitive map, and we know he has a good cognitive map because he found his way). Cognitive maps are difficult to quantify or measure, but perhaps more importantly, they do not provide any information about how to effectively design interventions that promote wayfinding.

Passini (1980) recognized these issues and proposed a new conceptualization of wayfinding that focused on the problem-solving process involved in getting from one place to another. Passini explained that although people may be very effective in navigating complex settings and knowing how to behave in order to reach a destination, they may have no idea where they are in relation to the space surrounding them. That is, people may be able to successfully find their way from one point to another by recognizing and responding appropriately to landmarks and cues without being "spatially oriented" or understanding their whereabouts within a cognitive representation of the building or area. This conceptual shift generated a new research methodology to evaluate

the wayfinding process, and was originally introduced with cognitively intact individuals. The first component was a wayfinding protocol in which participants were asked to go from one destination to another and verbalize their problem-solving process, identify information they relied on, and describe the decisions they made. The second evaluative tool was a post-test interview in which participants would describe their familiarity with the location and report their impressions about the wayfinding task (Passini, 1980). The results of these assessments would provide descriptive information about the various steps involved in the wayfinding process. Passini et al. (2000) used this methodology with nursing home residents with severe dementia. Residents were asked to complete a wayfinding task by going from one location to another within the facility. Residents were prompted throughout the duration of the task to share their thoughts and report any information that affected their decisions. Afterwards, nursing home staff members were interviewed about the environmental and logistical aspects of the facility (e.g., circulation of residents, signage, place identification, policies about restricting resident movement) and how each feature contributed to the wayfinding abilities of the residents. The results suggested that a lack of reference points or landmarks in the environment hindered the wayfinding abilities of residents. Additionally, signage posted throughout the facility was not always helpful as some residents read the sign but were unable to tell if it was important. Long-term care staff suggested that distinguishing the residents' bedrooms with decorative items such as curtains and bed cover might help residents be more effective at recognizing their own space (Passini et al., 2000).

Although this type of observation strategy may yield some interesting information, the verbal report of nursing home staff and residents presents limitations

related to the measurement of the behavioral components that contribute to wayfinding. Resident reporting may be particularly inaccurate as language abilities often suffer with the progression of dementia. More importantly, this methodology does not provide quantifiable information about the best way to rehabilitate patients or optimize their wayfinding abilities. However, a related literature on person-environment fit and the use of effective discriminative stimuli in environmental design offers an alternative approach to intervening with wayfinding difficulties.

Person-Environment Fit and Effective Discriminative Stimuli

Lawton (1986) and Namehow (2000) discuss the general ecological model of aging (also referred to as the person-environment fit model) which suggests that a person's behavior is a result of the functional interaction between individual's competencies, skills, and adaptations with the press or demand of his or her environment. When the demands of the environment fit the competence of the person, it leads to adaptive functioning, ideal performance, and high levels of well-being. When there is a mismatch between the level of demand and the competence of the person, that individual will likely experience distress and maladaptive behavior. This model applies to older adults with dementia in particular because they generally experience progressive decline in competence and require increasing compensation from their environment in order to support adaptive behavior and minimize distress. One method of reducing demands and increasing environment support to promote a better person-environment in dementia care is to modify the design of the environment.

Designing long-term care environments to promote independence and minimize challenging behavior can have therapeutic benefits that promote the quality of life (Brawley, 2001) and improve the level of functioning (Day, Carreon, & Stump, 2000) of residents with dementia. One aspect of designing such environments is creating effective *discriminative stimuli* that signal when certain behavior is appropriate. A discriminative stimulus is a clear cue that a specific behavior will be reinforced. For example, a green light is a discriminative stimulus that signals to the driver that proceeding through the intersection will be safe (i.e., this behavior will be reinforced by progressively closer proximity to the destination), whereas a red light signals that driving forward will not be rewarded and will more likely be punished via an accident or a ticket. Throughout the process of driving a car as well as most other activities, individuals are exposed to many stimuli and have to respond to the meaningful stimuli and inhibit responses in the presence of others. That is, in order to drive successfully individuals have to be able to respond appropriately to a green light, instead of attending to the person walking on the sidewalk, the cars driving the opposite direction, or a dog barking. Older adults with cognitive impairment often lose the ability to discriminate between important and irrelevant stimuli, which can create problems in their day-to-day functioning. Creating environmental cues that are more salient and effective at promoting certain behavior can maintain independence and improve quality of life for long-term care residents (Hussain, 1982).

When considering the impaired cognitive abilities of people with dementia, one important aspect of stimulus salience may be recognition and personal relevance of the item. Researchers have explored what types of stimuli are best recognized by people with

dementia. Gross and colleagues (2004) investigated the accuracy with which 10 nursing home residents could recognize their own printed names and current photographs. Participants had moderate to severe impairment as measured by the Cognitive Performance Scale (Morris et al., 1994) and capacity ratings provided by caregivers. Experimenters displayed three comparable stimuli and asked residents to select the one that was theirs (i.e., "Can you point to your picture/name, [first and last name]?"). The results of the study indicate that on average, the printed name was correctly identified marginally more than the current photograph. Although interesting, these findings were difficult to interpret because the positioning of the stimuli created differential ease of access. Stimuli were presented in a pyramid layout with two items placed on the table in front of the resident, and one item above the others. Side biases (e.g., always selecting the stimulus on the right) and differential response effort (e.g., having to reach further to select the correct stimulus) may affect participant selection without deliberate counterbalancing of the stimuli during assessment.

Hehman, German, and Klein (2005) published a case study in which they examined the ability of one woman with late-stage Alzheimer's disease to recognize herself in photographs taken in various time periods throughout her life. The experimenters gathered two photographs from each decade of her adults years (i.e., 20s, 30s, 40s…80s). In each trial, a photograph was presented by itself, and the participant was asked "Do you recognize this person?" which would potentially be followed by "Who is it?" Participant responses were coded as correct or incorrect identifications. The participant recognized herself in pictures from her 20s and 30s more frequently (7/8 opportunities) than photographs of her in her 40s through 80s (2/20 opportunities). The

application of these findings to wayfinding may be limited as the photograph recognition assessment was conducted by having the participant name the person featured in each individual photograph. The verbal naming cognitive skills required for this task may be different than that required for wayfinding. When pictures are hung throughout the facility to signify individual bedrooms, participants are required to distinguish their own photograph from several other choices as opposed to verbally naming the person featured.

Experimenters have explored the effects of manipulating various environmental cues in order to create more effective discriminative stimuli that specifically target room finding behavior. Namazi, Rosner, and Rechlin (1991) investigated the ability of nursing home residents to identify their bedroom when personal items of long-term significance were displayed in a showcase outside their room. Items were selected based on information provided by the family, and a wide range of personal items were used. Memory aids included photographs, collectibles, medallions, war memorabilia, and leisure items. These items had a reference point of 3 to 50 years from the time of the study. The control condition involved placing nonsignificant items in the showcase (e.g., dried flowers, sea shells). Residents with mild dementia were effective at locating their room when both significant and nonsignificant items were showcased. Researchers report that four of five people with moderate dementia found their rooms better in significant conditions compared to nonsignificant conditions. One resident with advanced dementia participated in the study, and neither significant nor insignificant items were effective at evoking room identification for that person. The results of the study showed that the room finding ability of residents was correlated with the severity of cognitive

impairment, as scored by the Clinical Dementia Rating Scale (Hughes, Berg, Danziger, Coben, & Martin, 1982) such that more severe cognitive impairment was associated with greater difficulty finding rooms. There are several important considerations worthy of note in this study. First, there were no data collected in a baseline condition when showcases were empty. Instead, room finding was compared in significant item versus nonsignificant item conditions. Without information about a baseline level of room finding performance, there are limits to how much researchers can infer about the additional improvements directly caused by the showcased items. Second, researchers report that four people with moderate dementia found their bedrooms more accurately when significant items were showcased. However, these differences were extremely small (e.g., 7 correct identifications versus 6 correct identifications) and were not statistically nor clinically significant for most participants. A closer look at the data reveals that only one of five residents with moderate dementia demonstrated a clinically significant difference in room finding effectiveness when significant items were displayed compared to the nonsignificant item condition. Third, the number of opportunities to measure room finding in each condition were few (10 opportunities) and may not be representative of behavior patterns over longer periods of time. Fourth, researchers controlled for naturally occurring experience with the showcased items by covering the showcases between room finding observations. This methodology is useful to control for in-situ experience and learning over time, however it may not be representative of what happens in the natural environment. Lastly, experimenters never systematically identified which items the participants recognized. Distinctions between

significant and nonsignificant items were made by family caregivers, and the participant's perspective about the significance of items was not measured.

Several experimenters have examined the features of effective textual and photographic discriminative stimuli for older adults with dementia. Hanley (1981) evaluated the effects of signposts containing a printed description of the room's function (e.g., dining room, kitchen, bedroom) on the ability of long-term care residents to locate those rooms. Wayfinding abilities were measured in baseline conditions (no signposts, no training), signpost only conditions (i.e., signposts hung but no training occurred), and signposts plus training conditions (i.e., signs posted and participants were cued to attend to them, state the name of the room, and given feedback on their room finding accuracy). The results indicated that when signs with textual cues were posted outside of various locations in the sign only condition, two of two residents with dementia exhibited small improvements in their ability to locate these areas compared to baseline levels. However, when signposts were combined with training, three of four residents demonstrated notable and clinically significant improvements in room finding. Training was particularly successful when it was executed with signposts present and when experimenters drew attention directly to signposts. Training was less effective when it was administered prior to the implementation of signposts when experimenters drew attention to general aspects of rooms. The results of this study suggest that signposts alone were less effective, however when formal learning opportunities were facilitated in combination with the signs, people with moderate to severe dementia were notably more effective at finding their way. These findings imply that experience with stimuli may be

important and it may not be simply recognition or understanding the meaning of stimuli that facilitates room finding.

Nolan, Mathews, and Harrison (2001) investigated the effects of a written stimulus (i.e., "This is [name]'s room") combined with a photograph on the room finding abilities of three long-term care residents with severe dementia. Portrait-style photographs from early adulthood were used, and the experimenters assessed recognition abilities by having participants select their picture from an array of similar photographs. A correct selection was required to participate in the study. When their picture and printed name were hung outside resident bedrooms all three participants were able to locate their bedroom more frequently. Improvements were clinically significant for all participants. These results indicate that a picture from earlier adulthood in combination with a printed sign hung on a resident's door can be an effective way of improving room finding. Another study by Nolan, Mathews, Truesdell-Todd, and VanDorp (2002) utilized shadow boxes which included two large photographs from earlier in life in combination with memorabilia items. When baseline conditions were compared to experimental conditions in a Multiple Baseline Design, this intervention resulted in a 45% mean increase in room finding across all participants, and notable clinically significant changes in room finding for 2 of 5 participants. These results suggest that early life photographs in combination with memorabilia items can improve room finding for some people. In both studies, authors noted that a short learning curve occurred after the intervention was implemented where participants had to experience the stimuli in order for these stimuli to produce improvements in room finding. Authors also noted that based on the

methodology used in these studies, questions remained related to what specific aspects of the stimulus (e.g., picture or written name) produced improvements in room finding.

This query lead to research by Jay, Feliciano, and LeBlanc (2009) who conducted a stimulus recognition assessment to identify which stimuli (i.e., young adult photographs, middle adult photographs, current photographs, and printed names) were recognized most accurately by people with dementia. A second study explored whether identification in this type of assessment was predictive of room finding improvements when these stimuli were posted outside resident bedrooms. Results suggest that three dementia care residents identified photographs from early in life (e.g., young adult picture, middle adult picture) and printed names more accurately than current photographs. None of the participants were able to meaningfully recognize their current photograph. The notably small sample size of this recognition assessment warrants replication to address issues of external validity. During the wayfinding assessment, direct observation was used to measure room finding during a baseline condition (nothing posted outside bedroom), as well as experimental conditions where the best recognized stimulus and worst recognized stimulus were alternated and hung outside bedrooms. In order to assess whether recognition of stimuli alone was responsible for changes in room finding, experimenters controlled for the participants' experience with stimuli in the natural environment by only posting relevant stimuli during observation periods. Photographs were removed immediately after the room finding observations were complete and returned at the next observation period. The results of this intervention did not yield any improvements in room finding for any participant. A comparison of methodology between this study and previous literature suggests that experience with the

posted stimulus may moderate the effectiveness of the intervention. That is, taking down the posted stimuli from the bedroom doorway between observations and preventing experience with it in the natural environment may inhibit the effectiveness of this intervention.

An intervention that is commonly used in long-term care communities is posting room numbers, names, and photographs outside resident bedrooms. Names are often printed in small font and are difficult to read from afar, and photographs are often small (e.g., Polaroid size) and are frequently taken during the long-term care admission process so they feature the older adult at their current age. Currently, little information is known about what items facilitate room finding most effectively when posted outside bedrooms. Additional research is needed to identify empirically supported guidelines for long-term care communities to help residents who have difficulty finding their bedrooms.

Rationale and Purpose

Wayfinding difficulties can pose a threat to dementia care residents that wander, their neighboring residents, and the staff to whom their care may be burdensome. The literature suggests that posting various stimuli at doorways may assist residents in finding their way. However, little empirical information is known about what properties of stimuli are essential to effectively evoke room finding. More specifically, it is unclear to what extent recognition and personal relevance of posted items contributes to room finding improvements.

The purpose of the current study is to (a) extend the Stimulus Recognition Assessment described in Jay, Feliciano, and LeBlanc (2009), to identify which type of

self-referent stimulus (i.e., young adult photograph, middle adult photograph, current photograph, and printed name) is best recognized in a stimulus array of similar options, (b) extend previous literature suggesting that showcasing items outside individual bedrooms can improve room finding, and (c) to systematically investigate whether recognition and personal relevance of items featured in a shadow box is critical to improve room finding abilities of dementia care residents.

CHAPTER 2

GENERAL METHOD

Participants

Long-term care residents with moderate to severe cognitive impairment participated in the study. In order to participate, guardians had to provide informed consent and supply pictures of the participant at various stages of life. Participants had to be able to follow a spoken command to ensure they had adequate response repertoires to participate in the series of studies. Additional inclusion criteria and participant characteristics are discussed below as relevant to each individual experiment.

Setting

All sessions were conducted in the participants' residences. Three long-term care communities participated in various parts of the study. One dementia special care unit in northern Michigan, Iosco Medical Care Facility, participated in the first experiment. Two other long-term care communities in Colorado Springs participated in all three experiments: the Memory Care community at Palisades at Broadmoor Park and the Assisted Living Memory Care community at Village at Skyline.

Measures

Mini Mental Status Exam. The Mini Mental Status Exam (MMSE) is an 11-item screening instrument designed to screen for gross cognitive impairment (Folstein, Folstein, & McHugh, 1975). The MMSE has been widely used and studied extensively since its release in 1975. Although recent research raises some concerns about its sensitivity to mild cognitive impairment, it has been found to be an appropriate screening tool for more severe forms of cognitive impairment (Tombaugh & McIntyre, 1992). The MMSE was administered to participants upon their inclusion in the study in order to quantify their level of impairment, and again at the conclusion of the study for individuals who participated in Experiment Three. This post-test administration was used to quantify changes in cognitive status.

Pleasant Events Schedule for Alzheimer's Disease Patients (PES-AD). The PES-AD is a 53-item questionnaire that is used to identify preferred activities (Teri & Logsdon, 1991). This measure was used as a discussion tool with family caregivers to identify whether their loved one enjoyed certain activities, either currently or in the past. This measure was administered in person or by telephone prior to Experiment Two, and the information gathered from this assessment was used to select items to be included in the preference assessment. See Appendix A.

Cohen-Mansfield Agitation Inventory. The Cohen-Mansfield Agitation Inventory (CMAI) – Long Form is a 29-item rating scale that is completed by caregivers and used to assess overt demonstrations of agitation in older adults (Cohen-Mansfield, Marx, & Rosenthal, 1989). Each item describes a specific challenging behavior and the

caregiver rates the frequency at which the problem occurs on a 7-point Likert scale ranging from 1 (*never*) to 7 (*several times an hour*). The CMAI was administered to professional caregivers during the baseline condition (i.e., while shadow boxes were empty) in Experiment Three and after data collection was complete in order to see if the intervention impacted caregiver perceptions of challenging behavior. See Appendix B.

Social validity questionnaire. A brief, 4-item questionnaire was administered with professional caregivers at the end of Experiment Three to gather information about staff perceptions and satisfaction with the shadow box intervention. See Appendix C.

CHAPTER 3

EXPERIMENT ONE: STIMULUS RECOGNITION ASSESSMENT

Method

Participants. Long-term care residents ($N = 27$) with cognitive impairment participated in the study after getting informed consent from family members and assent from individual participants. The sample included three men and 24 women, most of whom were in the oldest-old age group ($M_{AGE} = 85.89$, $SD_{AGE} = 5.13$). The majority of participants were European American (96%), and one was African American (4%). Participants had moderate to severe cognitive impairment as measured by the Mini Mental State Examination ($M_{MMSE} = 10.74$, $SD_{MMSE} = 6.54$).

Materials. The experimenter took a current photograph of participants at the time of entry to the study. Young and middle adult photographs were provided by families. The young adult photograph featured the participant between the ages of 18-40 years old. The middle adult photograph featured the participant between the ages of 40-60 years old. Pictures included in different stimulus groups were taken at least 10 years apart. That is, a picture taken at 39 (i.e., young adult photograph), and a picture taken at 41 years old (i.e., middle adult photograph) were not included in the same assessment. All photographs were portrait-style (i.e., shoulders up) pictures that featured the older adult from an anterior view. Pictures were enlarged to 8x10 size and presented in sepia tone

color. The printed first and last name were presented in black, 72-point, bold, Arial font on white paper.

Procedure

The experimenter sat near the participant in a quiet room. Four stimulus groups were included in the Stimulus Recognition Assessment (SRA): (a) current photographs, (b) young adult photographs, (c) middle adult photographs, and (d) printed names. Each stimulus array included three stimuli and was comprised of a target stimulus, (i.e., the photograph or written name of the participant), and two distracter stimuli (presented in the same modality as the target stimulus) of familiar people with comparable demographic characteristics. Familiar people were used as distracter stimuli to increase the likelihood that all stimuli were reasonably familiar to the participant and that correct responding was controlled by self-recognition. For most participants (85%), distracter stimuli were photographs and names of other residents in their facility. However, for some participants, there were not two other research participants in their community that had comparable race and gender matched demographic characteristics. In these cases, pictures and names of celebrities from their generation (e.g., Frank Sinatra, Paul Newman) were included as distracter stimuli.

A trial consisted of placing three stimuli from a group (e.g., three photos of young adults) directly in front of the participant, equally spaced to control for response effort. See Figure 1 for sample stimulus trial presentations. The experimenter made eye contact to initiate the trial but did not address the participant by name. The experimenter asked the primary question, “Are any of these you/yours?” and continued with a potential

Figure 1. Sample stimuli from an array of young adult photographs.

follow-up question based on the participant's response. The experimenter allowed 10 s for a response to each question and collected all primary data. The experimenter responded to a y*es* without physical selection of a photograph with the follow-up query, *which one?* The experimenter responded to a *no*, an *I don't know*, or no response within 10 s by initiating the next trial. The experimenter did not provide differential consequences for correct responding, but reinforced all selections (e.g., smile and say, "Thank you for making a choice,") to promote engagement in the assessment.

The experimenter conducted six trials of each stimulus group, yielding a total of 24 trials with all possible stimulus placements. The presentation of stimuli within groups was counterbalanced to prevent selection based on side bias (e.g., always selecting the stimulus on the right) and remediate complications presented by hemi-neglect (i.e., an attention bias towards stimuli on one side of the visual field caused by brain damage such as stroke).

Dependent measure. The percentage of correct identifications was the primary dependent variable. A trial was scored as correct if the participant touched, pointed to, or

verbally selected (e.g., “the middle one”) the target stimulus (i.e., their photograph or printed name) from an array. A trial was scored as incorrect if the individual selected a distracter stimulus, indicated that none of the stimuli were his/hers, indicated that he/she didn’t know the answer to the question, or made no selection in response to the follow-up question within 10 s. The number of correct identifications was divided by the total number of trials for that array type and multiplied by 100 to yield the percentage accuracy.

Interobserver agreement and procedural integrity. A portion of stimulus recognition sessions was scored by independent observers for interobserver agreement (IOA). The trial-by-trial method was used to calculate IOA (Cooper, Heron, & Heward, 2007). A secondary trained independent observer coded participant responses and his or her data were compared with that of the primary data collector. An agreement was scored if both observers recorded the same outcome (i.e., correct or incorrect) for a trial. The number of agreements was divided by the number of agreements plus disagreements and multiplied by 100 to yield percentage accuracy. For Experiment One, 31% of stimulus recognition assessments were coded for IOA, which is above the recommended standard of 25% of sessions. Mean agreement between observers was 98%.

A portion of stimulus recognition assessments were scored by independent observers for procedural integrity. A trained observer collected data on the experimenter’s behavior. The observer measured whether or not the experimenter (a) counterbalanced the stimuli, (b) placed the stimuli at equal distance from the participant, (c) presented the correct questions, (d) allowed up to 10 s for a response, and (e) responded accurately to the participant’s behavior (e.g., “no” followed by next trial, “yes”

with no selection followed by next question, no differential consequence). A trial was considered to be implemented accurately if each and every step was scored as correct. Procedural integrity was scored by an independent observer during 27% of assessments, and the experimenter's administration of the assessment was scored as correct in 99% of trials.

Hypotheses. Based on previous literature, experimenters hypothesized that people with dementia would recognize their printed names best. It was also hypothesized that recognition abilities would be the most compromised with current photographs.

Data analysis. A one-way repeated measures analysis of variance (ANOVA) was conducted to detect differences in recognition abilities across groups of self-referent stimuli (i.e., printed name, current picture, middle-adult picture, young-adult picture). Significant findings were further analyzed using a least significant difference (LSD) post hoc analysis to identify which stimulus groups were different.

Results

Twenty-six of 27 participants (96%) were able to complete the SRA. The exception was one woman who was not able to emit the selection response required by this assessment, despite being able to perform a selection response during the screening process. Family members of five participants were not able to provide photographs from middle adulthood, resulting in missing values in the middle adulthood condition for these individuals. Participants with missing data were not significantly different from participants with complete data. Cases with missing data were excluded using listwise deletion, leaving 21 cases that were included in the final data analysis. Prior to data

collection, a power analysis suggested that researchers include 28 or more participants in order to detect an effect at an alpha level of .05. This suggests that the current analysis may not yield adequate statistical power.

Of the people who completed the assessment, 95% (20 of 21 participants) recognized at least one type of self-referent stimulus at or above 50% accuracy. Participants demonstrated the highest percentage of recognition accuracy with their printed names (M = 88.90, SD = 28.00), followed by middle adult pictures (M = 79.29, SD = 28.87), and young adult pictures (M = 79.29, SD = 30.75). Current photographs were recognized with the lowest percentage of accuracy (M = 64.29, SD = 39.51). See Figure 2 for a graphic depiction of the data.

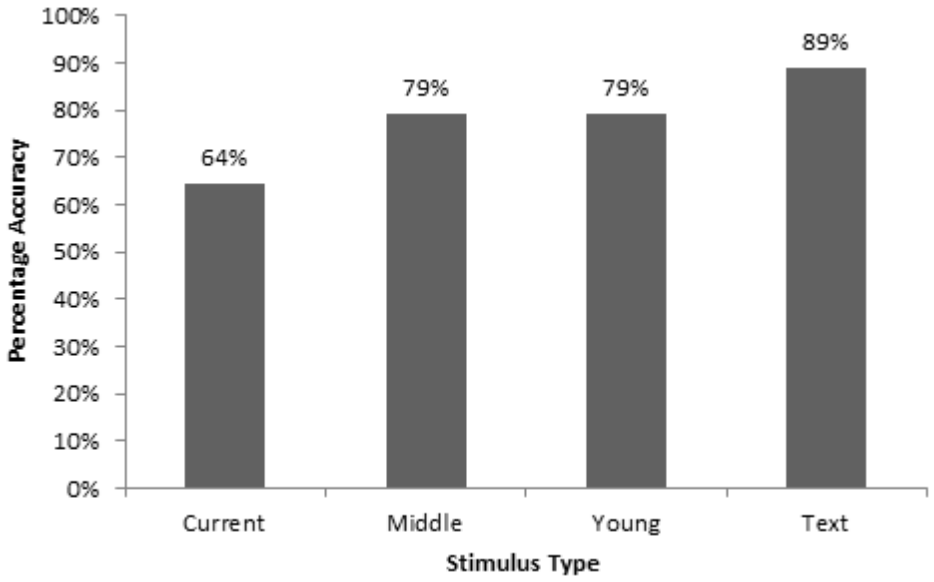


Figure 2. Aggregate stimulus recognition assessment data presented as percentage accuracy across stimulus type.

A one-way repeated measures ANOVA was conducted to compare recognition across stimulus types. Experimenters assessed assumptions of normality and sphericity.

The assumption of normality was assessed using a Kolmogorov-Smirnov test for all self-referent stimulus groups, and was violated in all categories at $p < .05$. The scores for young photographs ranged from 0 to 100 with skewness of -1.36 (*SE* = .50) and kurtosis of 0.74 (*SE* = .97). The scores for middle adult photographs ranged from 0 to 100 with skewness of -1.65 (*SE* = .5) and kurtosis of 2.22 (*SE* = .97). The scores for current photographs ranged from 0 to 100 with skewness of -0.58 (*SE* = .50) and kurtosis of -1.35 (*SE* = .97). The scores for printed names ranged from 0 to 100 with skewness of 2.67 (*SE* = .50) and kurtosis of 6.35 (*SE* = .97). These dependent measures violated the assumption of normality, however it is anticipated that the population of people with moderate to severe dementia is simply not normally distributed. In this case, researchers are able to proceed with caution given that our selected statistical analysis (i.e., repeated measures ANOVA) is generally robust to violations of normality. Mauchly's test indicated that the assumption of sphericity was violated (chi-square = 20.07, $p = .001$), therefore degrees of freedom were corrected using Greenhouse-Geisser estimates of sphericity (epsilon = .60).

There was a significant effect for stimulus type, $F(1.80, 35.97) = 4.51$, $p = .021$, with a large effect size (partial eta squared = .18; Cohen, 1988). Post hoc analyses were conducted using a LSD test of pairwise comparisons, which indicated a statistically significant difference between current photographs and printed names ($p = .012$), as well as a statistically significant difference between middle photographs and printed names ($p = .023$). No other comparisons reached statistical significance. However, several contrasts approached significance including a comparison between current photographs

and middle photographs (p = .094), current photographs and young photographs (p = .069), and young photographs and printed names (p = .088).

Discussion

Findings from the Stimulus Recognition Assessment are consistent with previous research suggesting that printed names are recognized more accurately than current pictures (Gross et al., 2004) and that pictures from early in life are recognized more accurately than current photographs featuring people as older adults (Hehman et al., 2005). While the results of Hehman and colleagues (2005) suggest that pictures are better recognized before age 40, the results of the current investigation suggest that photographs taken before age 60 are most accurately recognized. Further, there does not appear to be a significant difference between recognition of middle adulthood and young adulthood photographs. The slight contrast between these studies may be a result of the following features of the current study: the utilization of a larger sample size, the inclusion of people with differing forms of dementia (i.e., inclusion criteria not limited to Alzheimer's disease), and the differing methodological preparation which involved selecting a photograph from an array of options as opposed to naming the person in a single photograph.

Research suggests that although reading skills decline over time, they decline more slowly than other domains of cognitive and intellectual functioning (Paque & Warrington, 1995) and are often one of the final cognitive skills to be lost in Alzheimer's disease (Cummings, Houlihan, & Hill, 1986). As a result, reading skills are often used to estimate premorbid intellectual functioning during neuropsychological testing. There is

evidence to suggest that reading skills utilize a different neurological structure than facial recognition (Gaillard et al., 2001; Sugiura, Watanabe, Maeda, Matsue, Fukuda, & Kawashima, 2005). The results of this assessment provide evidence that, for the people in our sample, reading skills were better preserved than self-referent facial recognition skills. These findings contributed to the decision to add printed names to the shadow boxes during the *enhanced condition* in experiment three.

Within the area of self-referent photograph recognition, participants recognized pictures from earlier in life better than photographs taken recently. One explanation is that people with dementia have had longer periods of exposure to older photographs. However, if this was the only explanation, we would expect to see a differential impact of young adult photographs being recognized better than middle adult photographs due to longer periods of exposure. This was not the case in this study. Instead, a more appropriate explanation may be retrograde amnesia. This refers to the loss of access to information that happened before the onset of a disease or injury. Research suggests that, particularly with dementia of the Alzheimer's type, people experience retrograde amnesia as the disease progresses and are likely to have greater access to older memories compared to more recent ones (Beatty, Salmon, Butters, Heindel, & Granholm, 1988). Although participants carried diagnoses of dementia within their medical records and scored within the dementia range on our screening measures, we cannot be confident that participants in this study have Alzheimer's disease specifically because confirmatory neuropsychological testing was not completed. It is reasonable to suspect, however, that a majority of the sample experienced dementia of the Alzheimer's type because is the most common cause of dementia (Alzheimer's Association, 2013).

Observations suggest that people with moderate to severe dementia may have an aversion to identifying ones' self as an older adult. When asked to select their photograph, participants frequently made comments related to undesirable physical characteristics of current pictures (e.g., "None of those women are me. They are too old!") or commented that the photographs featured older familial relatives (e.g., "Look at her wrinkles, that must be my mother."). Additionally, some participants commented about strategies they used to select their pictures (e.g., "I have always worn glasses, so this must be me."). Although experimenters tried to limit slight variations across photographs that might serve as contextual variables, this type of identification strategy was still possible for some participants. This has implications for photograph recognition in natural settings, suggesting that choosing photos with unique, personalized, contextual factors may aid in the facilitation of self-recognition. More generally, the results of this assessment have clinical implications: when using photographs in dementia care environments with the goal of facilitating self-recognition (as is commonly practiced in recreational activities such as memory wallets), staff should utilize pictures from earlier in life and supplement them with text (Bourgeois, 1992).

The skill requirement of this assessment necessitated that participants be able to attend to stimuli, understand the assessment question, and respond appropriately to make a selection. One participant was unable to complete the assessment due to her inability to engage in this series of responses. Although she met criteria during the screening phase (i.e., she was able to select a neutral stimulus based on a question presented in one trial), she experienced some fluctuation in her skills that prevented her from engaging in these responses during the assessment, which occurred later the same day. This type of

fluctuation in behavior is not uncommon for this population, and many participants experienced this type of fluctuation related to recognition accuracy within the 10 to 15 min required to complete the assessment. For example, participants often selected themselves correctly out of an array of young adult photographs, but then selected incorrectly when presented with the same photographs in a subsequent trial occurring just a few minutes later. Other notable factors contributing to fluctuations in performance included fatigue and paranoia. For example, one participant was convinced the experimenter was trying to incarcerate him by having him select photographs of himself from a police line-up. The SRA session was terminated due to his distress, but he completed the assessment without concern when approached at a later date. Experimenters terminated portions of the assessment and completed them at a later date with several participants: one due to fatigue, and two due to paranoia.

One additional consideration of this study is relevant largely to female participants who have changed their name over their lifetime, often as a result of marriage. One participant had been married two times and thus had three self-referent names throughout her lifetime, including her maiden name. When discussing the assessment with the family, they mentioned that the participant does not always identify with her current name. To address this, experimenters created stimuli for each of her names, presented her with each of these names in an array, and asked her which one she identified with the most. She selected her first married name, which she used to refer to herself during young and middle adulthood. This was the printed name included in her recognition assessment, which occurred several weeks later. The family of this participant had a solid understanding of the dementia process and was comfortable with

this adaptation. However, when designing environmental modifications to promote recognition of people with dementia, it should not be assumed that family members will support the use of previous names. There may be a need for psychoeducation as well as assessment of family and individual preferences before utilizing this modification.

Limitations to this study include the small sample size and the generally homogenous cultural and gender characteristics of the sample. Replication is needed to enhance the generalizability of findings. Future research should investigate how the type, severity, and profile of cognitive impairment impact self-recognition. Additionally, it would be useful to determine whether all 24 trials are necessary, or whether a shorter version of this assessment may yield the same utility with less fatigue.

CHAPTER 4

EXPERIMENT TWO: PREFERENCE ASSESSMENT

Method

Participants. Participants from Experiment One who recognized at least one type of stimulus at or above 50% accuracy and demonstrated wayfinding difficulties were eligible to move on to Experiment Two. One man and five women participated in this study. Participants had moderate to severe cognitive impairment as measured by the Mini Mental State Examination administered at the start of the study (M_{MMSE} = 7.00, SD_{MMSE} = 5.37) and were generally in the oldest-old age group (M_{AGE} = 89.67, SD_{AGE} = 3.2). A paired stimulus preference assessment was used to minimize the need for an extensive scanning repertoire, and increase the likelihood that participants attended to all stimulus options.

Materials. Six items were chosen based on an interview with the family about personally relevant historical events, occupational and recreational activities, (see Appendix D for sample interview questions) as well as information gathered from the Pleasant Events Schedule for Alzheimer's Disease Patients (PES-AD). Preference assessment materials included three items that were deemed by family members to be significant to the participant's life history and three items that were reported to be insignificant to the person's history and interests.

Procedure

The experimenter sat near the participant to conduct the preference assessment. Immediately preceding the preference assessment, the participant received access to each item individually in order to ensure familiarity with all items. Once the assessment started, a trial involved placing two stimuli directly in front of the participant, equally spaced to control for response effort. The experimenter asked the participant to pick the one they liked best. The experimenter allowed 10 s for a response and collected all primary data. The experimenter responded to a selection by providing the item to the participant. If the participant did not respond, the experimenter presented the question again. If there was still no response for 10 s or if the participant indicated he or she did not like either item, the experimenter collected data on the participant's response, and initiated the next trial by presenting two new items. The experimenter did not provide differential consequences for selection of a significant or non-significant item, but generally rewarded all selections to promote engagement in the assessment (e.g., "Thanks for making a choice,"). The presentation of stimuli was counterbalanced to prevent selection based on side bias and remediate complications presented by hemi-neglect. The order of stimulus presentation was counterbalanced to prevent order effects.

Dependent measures. The percentage of selections was the primary dependent variable. An item was scored as preferred if the participant touched, pointed to, or verbally selected the stimulus (e.g., "the ball"). Items were scored as non-preferred if the individual indicated that they did not like either of the items, indicated that they "don't know" the answer to the question, or made no selection in response to the follow-up question within 10 s. The number of selections for each item was divided by the total

number of opportunities to make a selection and multiplied by 100% to yield the preference percentage. A relative hierarchy of preferences was determined based on the results of this assessment.

Interobserver agreement and procedural integrity. A portion of data collected during stimulus preference assessment sessions were scored by independent observers for IOA and procedural integrity. The trial-by-trial method was used to calculate IOA. A trained independent observer coded participant responses for 100% of preference assessment trials and the observer's data was compared with that of the primary data collector. An agreement was scored if both observers recorded the same outcome (i.e., selection or non-selection) for a trial. The number of agreements was divided by the number of agreements plus disagreements and multiplied by 100 to yield percentage accuracy. The mean agreement was 100%.

A trained observer collected data on the experimenter's behavior to ensure the assessment was administered as designed. The observer measured whether or not the experimenter (1) counterbalanced the stimuli, (2) placed the stimuli at equal distance from the participant, (3) presented the correct questions, (4) allowed up to 10 s for a response, and (5) responded accurately to the participant's behavior (e.g., provides item contingent on selection). A trial was considered to be implemented accurately if each and every step was scored as correct. Procedural integrity was scored for 83% of assessment trials, and the experimenter implemented the procedure as designed in 100% of observed trials.

Hypotheses. It was hypothesized that all participants would be able to identify a relative hierarchy of preferences despite moderate to severe impairment in cognitive functioning.

Data analysis. The proportion of selections was compared across items for each individual to reveal a relative hierarchy of ranked preference choices. The most frequently selected items were considered the most preferred options, and the least selected items were considered the least preferred options. The results of this assessment were used to guide the design of shadow boxes in Experiment Three.

Results

All six participants who participated in the preference assessment were able to identify highly preferred and non-preferred items. A relative hierarchy of preferences was created for each participant based on their percentage of selections for each item. Fictional names are utilized here for protection of participant confidentiality, and recommendations about preferred items made by family caregivers are indicated on the graph. See Figure 3 for a graphic depiction of the data.

Ms. Karen chose church items (chosen in 80% of opportunities) and Shirley Temple pictures (80% of opportunities) as her top preferred items, followed by classic English novels (60% of opportunities), word searches (40% of opportunities), painting (40% of opportunities), and basketball (0% of opportunities). Because Ms. Karen was randomly assigned to the *personalized shadow box* condition, experimenters used preferred items (i.e., church items) to design her shadow box. Church items were selected over Shirley Temple photographs based on participant preference in a direct comparison

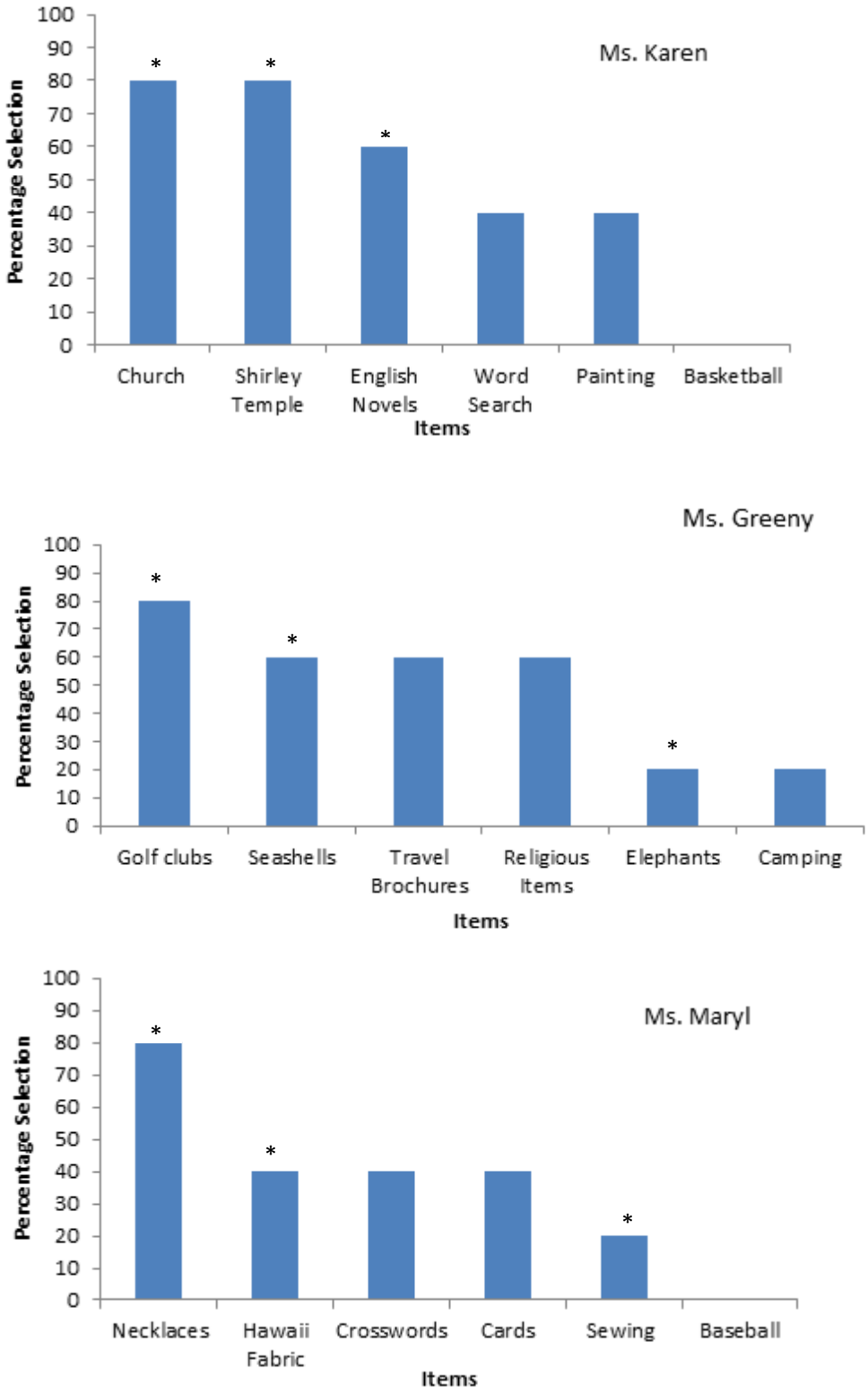
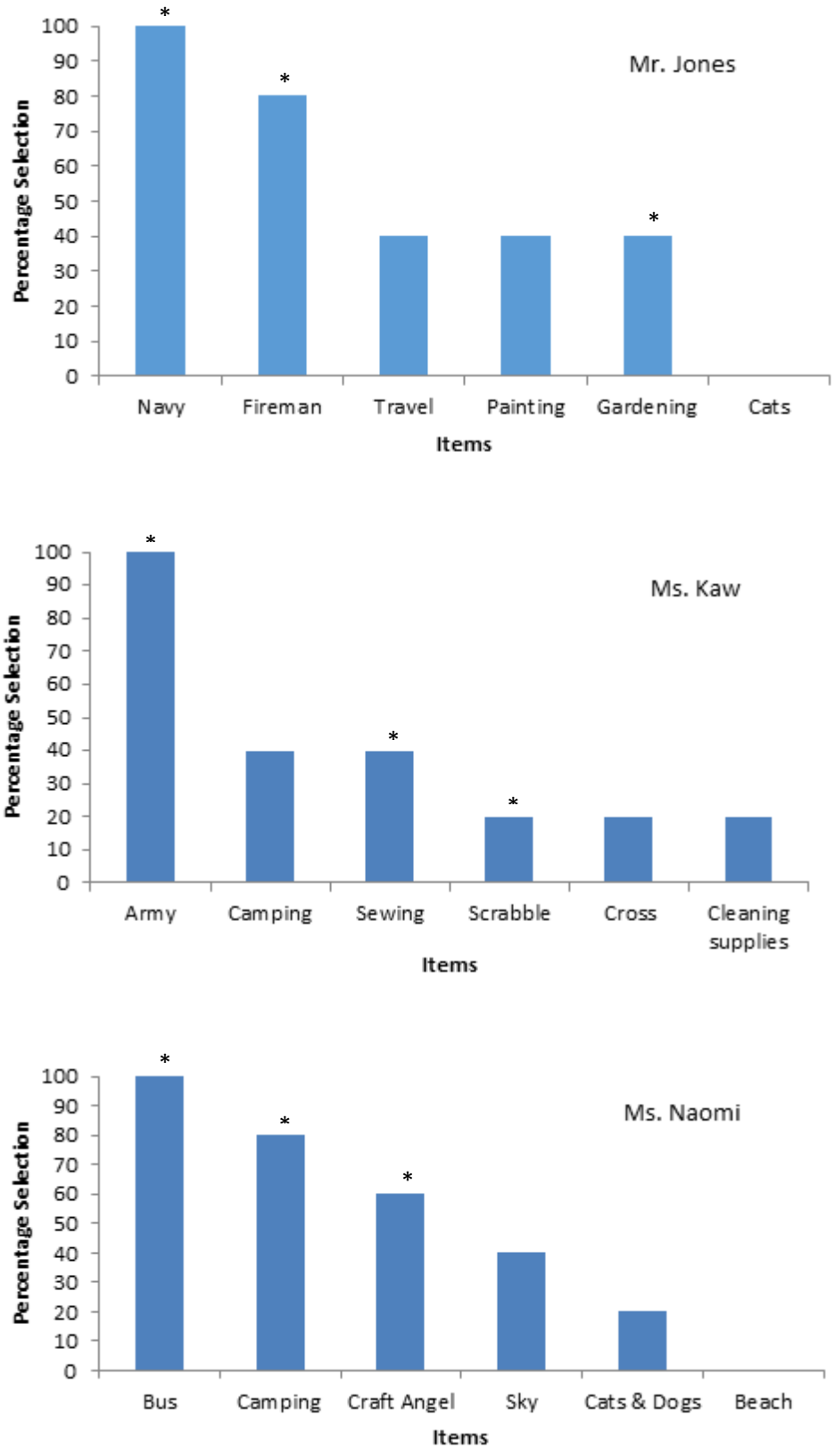


Figure 3. Preference Assessment results presented as percentage selection per item, * represents recommendation of preferred items.

Figure 3 (Continued)



trial of the two items. Her young adult picture was also included in her shadow box. This young-adult photograph was tied for best recognized (along with her printed name) during the SRA and Ms. Karen selected it as her favorite when presented with a choice between them.

Ms. Greeny completed a preliminary preference assessment that included some items with text (e.g., travel brochures) and others without textual stimuli (e.g., golf clubs, elephants). Experimenters observed that Ms. Greeny would orient towards text quickly and read all text aloud, which impacted her pattern of selection during the preference assessment. For example, she would say, "Travel to France" upon first sight of the travel brochure before considering any other item. This type of textually-prompted language was consistent with patterns of interaction occurring in the natural environment as well. Upon this realization, experimenters created new preference assessment stimuli that consisted of a photograph and supplemental text naming each individual item. The assessment was repeated with the new stimuli, and Ms. Greeny's choices appeared to be more thoughtful and conceivably more representative of her actual preferences. She chose golf clubs as her top preferred item (chosen in 80% of opportunities), followed by seashells (60% of opportunities), travel brochures (60% of opportunities), religious items (60% of opportunities), elephants (20% of opportunities), and camping items (20% of opportunities). Because Ms. Greeny was randomly assigned to the *personalized shadow box* condition, experimenters used preferred items (i.e., golf items) to design her shadow box. Her printed name was also included in her shadow box because it was the best recognized stimulus in the SRA.

Ms. Maryl chose shell necklaces as her top preferred item (chosen in 80% of opportunities), followed by Hawaiian fabric (40% of opportunities), crossword puzzles (40% of opportunities), playing cards (40% of opportunities), sewing materials (20% of opportunities), and baseball items (0% of opportunities). Because Ms. Maryl was randomly assigned to the *personalized shadow box* condition, experimenters used preferred items (shell necklaces and Hawaiian fabric) to design her shadow box. Her current picture was also included in her shadow box because she recognized it best in the SRA.

Mr. Jones chose Navy regalia as his top preferred item (chosen in 100% of opportunities), followed by his firefighter badge (80% of opportunities), travel books and passport (40% of opportunities), painting supplies (40% of opportunities), gardening tools (40% of opportunities), and cats (0% of opportunities). Because Mr. Jones was randomly assigned to the *personalized shadow box* condition, experimenters used Navy regalia to design his shadow box. His young adult picture was also included in his shadow box because it was tied for the best recognized stimulus with all other stimuli (i.e., he recognized all stimuli at 100% accuracy) and he chose that photograph when asked to select his favorite in a direct comparison with other stimuli.

Ms. Kaw chose Army items as her most preferred (chosen in 100% of opportunities), followed by camping items (40% of opportunities), sewing items (40% of opportunities), religious items (20% of opportunities), cleaning supplies (20% of opportunities), and scrabble board game materials (20% of opportunities). Because Ms. Kaw was randomly assigned to the *landmark shadow box* condition, experimenters used non-preferred scrabble board game items to design her shadow box. No personally

relevant pictures or names were included in her shadow box during the landmark condition. Her printed name was later added in the *enhanced condition*.

Ms. Naomi chose school bus items as her most preferred (chosen in 100% of opportunities), followed by camping items (80% of opportunities), an angel she crafted years before (60% of opportunities), pictures of the sky (40% of opportunities), cats and dogs (20% of opportunities), and beach items (0% of opportunities). Because Ms. Naomi was randomly assigned to the *landmark shadow box* condition, experimenters used non-preferred beach items to design her shadow box. No personally relevant pictures or names were included in her shadow box during the landmark condition. Her printed name was later added in the enhanced condition.

Discussion

This study suggests that people with severely impaired cognitive abilities are able to communicate their preferences for items when concrete examples of items are present and presented in a paired choice format. This is congruent with previous research which suggests that preference assessments are effective with older adults with cognitive impairment (Feliciano, Steers, Elite-Marcandonatou, McLane, & Areán, 2009; LeBlanc, Raetz, Baker, Strobel, & Feeney, 2008)

Future research should investigate the correspondence between preferences for leisure items and decorative items to determine whether results from this type of assessment can be used to design activity programming in addition to decorating shadow boxes. Research should explore whether direct care staff and caregivers can be taught to utilize this type of assessment, and their perceptions regarding its utility. Additionally,

other more efficient preference assessments methodologies (e.g., multiple stimulus without replacement, free operant) should be validated with older adults to experimentally determine the appropriateness for this population given the suspected impact of the limited scanning repertoires that often accompany cognitive impairment. Finally, researchers should evaluate the stability of preferences with people with dementia, as well as investigate how participant preferences correspond with caregiver report.

CHAPTER 5

EXPERIMENT THREE: WAYFINDING ANALYSIS

Method

Participants. Participation in experiment three was based on participants' correspondence with the following selection criteria. First, staff or volunteers identified participants as having a history of difficulty finding their room as evidenced by presence in another resident's bedroom while behaving as if it is their own, or showing indications of confusion (e.g., repeatedly asking for directions). Second, participants demonstrated a clear hierarchy of preferences (i.e., at least one top item, and at least one bottom item) in the preference assessment. Third, participants were able to emit a selection response contingent on experimenter request (i.e., selecting a neutral object out of an array of several options). This criterion was included to ensure that participants were able to choose an item based on a verbal instruction, which is the response requirement for this study. Fourth, participants had to be independently mobile (either walking independently or with use of assistive devices such as a walker) or able to self-propel in a wheelchair.

One man and five women participated in the wayfinding analysis. Participants had moderate to severe cognitive impairment as measured by the MMSE administered at the start of the study (M_{MMSE} = 7, SD_{MMSE} = 5.37) and were generally in the oldest-old age group (M_{AGE} = 89.67, SD_{AGE} = 3.20). Four participants were independently mobile and

two were wheelchair-bound, but were able to self-propel or move with limited assistance. Mean length of stay in the memory care community was 18.5 months prior to the start of data collection (SD_{STAY} = 25.6 months) and ranged from 3 weeks to 5.75 years.

Setting. All sessions were conducted in the participants' residences. Two long-term care memory communities in Colorado Springs participated in the study: Palisades at Broadmoor Park and Village at Skyline. The Palisades at Broadmoor Park contains a locked memory care area with a commons area (e.g., dining room, living room) in the center, and two hallways extending in opposite directions from the commons area. These hallways form separate, but connected wings and are lined with resident bedrooms. See Figure 4 for a map of the Palisades at Broadmoor Park. The Village at Skyline contains a memory care unit that has a commons area in the center, and resident bedrooms lining the perimeter of the circle. Doors to the facility were not locked, but individuals who were at risk for wandering wore a wander guard (i.e., a sensor that triggered an alarm upon exiting the doors). See Figure 5 for a map of Village at Skyline. Participants from both facilities resided in rooms that include a bed, dresser, television, and an attached bathroom.

Experimental design. Two non-concurrent multiple baseline across participants designs were used to evaluate small name, baseline, and shadow box conditions (i.e., personalized or landmark shadow box). One participant started with a small name condition prior to baseline data collection based on an intervention his family had designed to help him find his room. Other participants began with a traditional baseline condition. All participants were randomly assigned to either a *personalized shadow box*

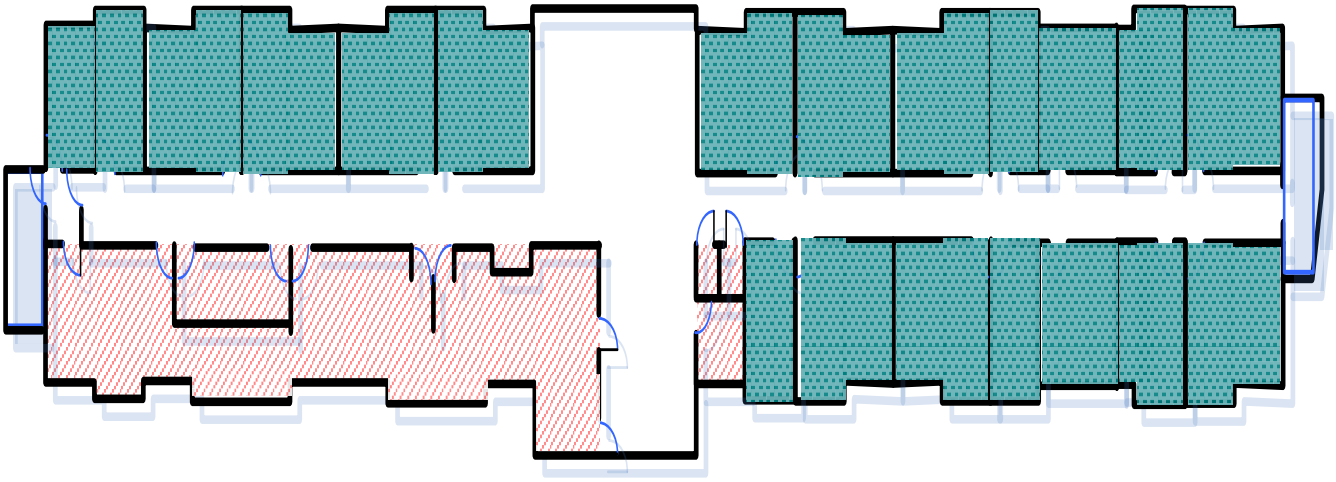


Figure 4. Map of Palisades at Broadmoor Park Memory Care

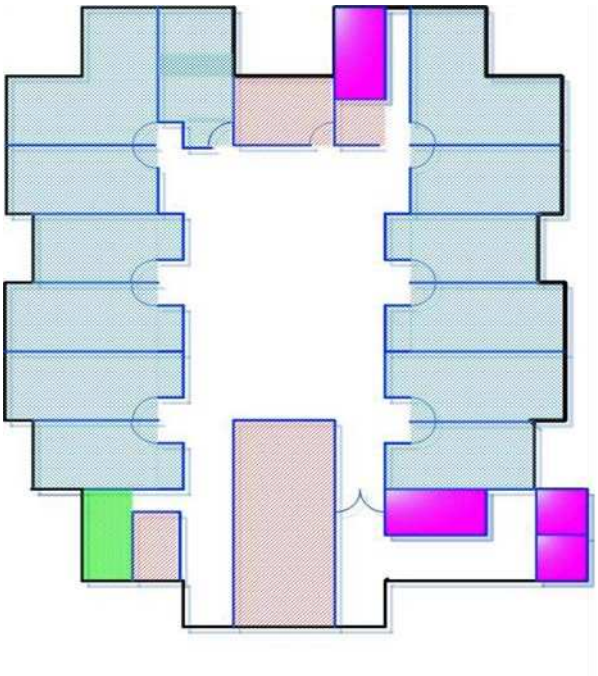


Figure 5. Map of Village at Skyline Memory Care

condition, or a *landmark shadow box condition*. An *enhanced condition* was implemented for participants in the landmark condition after experimenters observed stability in their data.

Small name. The participant's name was printed in 18 point font and hung above the empty shadow box. This intervention was initiated by his family prior to their involvement with the research, and is common in long-term care settings.

Baseline. An empty shadow box was hung outside the resident's bedroom. All shadow boxes were hung at the same height, and were positioned such that they were clearly visible to people who walk independently and well as those with assistive devices (e.g., walkers, wheelchairs).

Personalized shadow box. The stimulus from Experiment One that produced the highest level of recognition at or above 50% was hung in a shadow box in addition to a theme that included the top 1 to 2 relevant items from Experiment Two. If two stimuli tied for best recognized in Experiment One, the participant was given a choice about which one he or she preferred, and the preferred stimulus was utilized. See Figure 6 for a sample of a personalized shadow box.

Landmark shadow box. A neutral photograph based on the non-preferred stimuli identified in Experiment Two was posted in the shadow box. It was distinctly different from other shadow boxes, but was not self-referent in any way. For example, one resident had a shadow box with a Scrabble board game theme. There was a photograph of the scrabble logo, a picture of the game board, and scrabble pieces spelling "Scrabble" throughout the box.

Figure 6. An example of a *personalized shadow box.*

Enhanced shadow box. Once experimenters observed stability of data trends in the landmark condition, shadow boxes were enhanced by adding the participant's printed name.

Following a multiple baseline experimental design, the intervention was initiated for one person after steady state responding (e.g., consistency across level, trend, and/or variability) occurred in the baseline condition for that participant. When the intervention was initiated for this participant, other participants remained in the baseline condition. When stable responding occurred in the intervention condition for the first participant, the intervention was then implemented with the second participant while holding the remaining participants in baseline, and so on, such that the intervention was introduced in a staggered fashion. However, as often occurs in applied research, other factors influenced the implementation of the intervention in this study including pressure from long-term care administrators to fill the empty shadow boxes. Experimenters attempted to balance the requirements of the experimental design with the needs of the memory care communities.

Procedure

The researcher approached the participant when he or she was in a commons area (i.e., farther than 7 m from target room, doorway not in direct line of sight). The experimenter interacted with the participant briefly to make him or her comfortable and then asked, “Will you show me your room?” If assent was provided, the experimenter began the session when the participant began forward movement. The experimenter walked beside and slightly behind to ensure that he or she was not leading the participant. The observation continued until: (a) the participant identified a bedroom, (b) 3 min had elapsed and the participant was headed away from the target bedroom, or (c) 3 min had elapsed and the participant passed his or her bedroom. That is, if the participant was heading towards his or her bedroom when 3 min elapsed, the observation continued until

he or she passed the target bedroom. The experimenter ended the observation by thanking the participant for the walk and offering the choice to stay there, or return to the commons area. The experimenter did not provide differential consequences for room finding to decrease the possibility that subsequent trials were influenced by the participant's socially mediated reinforcement history. One to two wayfinding opportunities were provided each day for most days of the week, and observations spanned both morning and afternoon time periods.

Procedural modifications. During the study, one individual in a wheelchair lost her ability to independently ambulate during the baseline condition. During observations, the experimenter asked which direction the participant wanted to go in, and pushed her wheelchair in the direction she chose. Her chair was pushed in the middle of the hallway at a slow pace. No other information was provided to the participant unless she directly asked, "What were we looking for?" in which case she was reminded that we were looking for her bedroom.

On occasion, a participant would ask the experimenter to do something for them during the room finding task (e.g., pointing to a room and saying, "Open that door and see if that room is mine,"). In these situations, the experimenter clarified as needed, and complied with the request. When the experimenter carried out the participant's request, the room chosen was scored as the participant's selection. That is, the experimenter was considered an extension of the participant by complying with his or her request.

Another modification to the wayfinding observation procedure occurred because one resident would agree to show the experimenter her room, stand from a seated

position, take two or three steps forward, and then "stall" and stand in the same location for the remainder of the observation period. For this participant, a special prompting procedure was implemented if she stood still for 5 to 7 s without displaying search behaviors. In this case she would be reminded, "You were going to show me your room," Observations were ended based on the previously described criteria.

Memory care staff were discouraged from interacting with participants during the observation period. However, staff and residents interrupted sessions on occasion. If a brief social greeting occurred between the resident and another person and no feedback or contextual information was provided about the location of their room, the observation was continued. The assessment question was not restated unless the participant specifically asked what he or she was looking for. However, if staff talked with the participant for an extended period of time, provided information about the location of their room, or gave contextual information pertinent to the task (e.g., "Mrs. Jones! I just got the laundry out of your room," after walking out of the target doorway), the session was terminated and the observation was excluded from the data set.

Dependent measures. There were three primary dependent variables measured in this experiment: accuracy of room identification, latency to room selection, and social validity.

Accurate room identification. A *correct* room identification was scored if the participant identified his or her bedroom verbally (e.g., "Here it is," or "This one is mine,"), gesturally (e.g., pointing), or by crossing the threshold of the doorway. An *incorrect* room identification was scored if a participant identified a room other than the

target room or did not identify a room within the observation period. The first room selected was the one that was scored, even if the resident self-corrected after getting visual feedback from opening the door or entering the room.

Latency to room selection. A timer was started once the participant reached a standing position, or began forward motion in their wheelchair after the experimenter provided the assessment question (i.e., "Will you show me your room?"). The timer was stopped when the participant identified his or her room correctly, identified another's room as their own, passed the target bedroom after 3 min of observation, or walked away from the target bedroom after 3 min of observation. If the participant refused, or did not provide assent in response to the question, "Will you show me your room?" the trial was terminated. Latency to room selection was calculated for all participants in all conditions. If a participant did not select a bedroom by the end of the 3 min observation, a latency of 180 s was entered for that value. It is worthy of note that this may be an underestimate of time spent searching, as some individuals continued search behaviors even after the observation was complete.

Social validity. Staff perception of the impact of the intervention was measured in two ways. First, changes in staff perception of challenging behavior were measured through pre-test/post-test administration of the CMAI. Five questions related to wandering, or the effects of wandering, were examined. Staff were asked to rate how frequently the following behaviors occurred: (a) pace, aimless wandering, (b) constant unwarranted request for attention or help, (c) repetitive sentences or questioning, (d) trying to get to a difference place (e.g., out of the room, building), and (e) general restlessness.

Second, staff completed a brief social validity questionnaire at the end of the study that examined their satisfaction with the intervention as well as their perception of the impact of the intervention.

Interobserver agreement and procedural integrity. All IOA and procedural integrity data were collected from live observations interspersed throughout all conditions and all participants. Two independent trained observers simultaneously scored 34% of room identification trials for IOA. The trial-by-trial method was used to calculate IOA on accuracy of room finding trials. That is, the number of agreements was divided by the number of agreements plus disagreements and multiplied by 100 in order to obtain a percentage. This comparison yielded an accuracy rate of 100%.

A trained observer scored 34% of room trials for procedural integrity by collecting data on the experimenter's behavior. The observer measured whether (1) the appropriate stimuli were posted outside the resident's bedroom, (2) the experimenter approached the resident when they were at least seven m from their room and could not see their bedroom, (3) the experimenter provided the instruction, (4) walked beside and slightly behind the resident, (5) observed the individual for the duration of the trial, and (6) provided a general statement (e.g. "Thank you for the walk") at the completion of the trial with no differential consequence for accuracy. A trial was considered implemented accurately if each and every step is scored as correct. Procedural integrity for was 100%, indicating that the experimenter implemented the procedure as designed in all observed trials.

Data analysis. Data were analyzed as follows:

Accuracy. Data on room finding accuracy were collected until visual inspection of the graphically depicted data revealed stability in the trend, level, and/or variability of the data path. The level, trend, and variability of the data paths were compared under baseline and intervention conditions. The latency to change after introduction of the intervention was also examined. In order for experimental control to be demonstrated, an intervention has to produce change in behavior for one participant (as evidenced by visual change in level, trend, or variability of data path), while the behavior of others remains unchanged. The strength of the intervention is demonstrated with each successive replication of the effects across each participant.

Latency. Data on latency to room selections were averaged across conditions and analyzed using percentage change scores across conditions.

Social validity data. The CMAI was used to evaluate changes in staff perspectives about challenging behaviors. Change scores in frequency of each item were calculated based on pre-test/post-test ratings provided by individual caregivers. Staff surveys were analyzed by looking at the proportion of staff who endorsed each question as true, as well as by identifying qualitative themes that emerged from open-ended questions.

Results

Figures 7 and 8 show the participants' room finding behavior plotted as a dichotomous variable in two non-concurrent multiple baseline across participants designs. Aggregate baseline levels of room finding were low (M = 23%) across participants. The shadow box intervention improved the mean level of room finding to

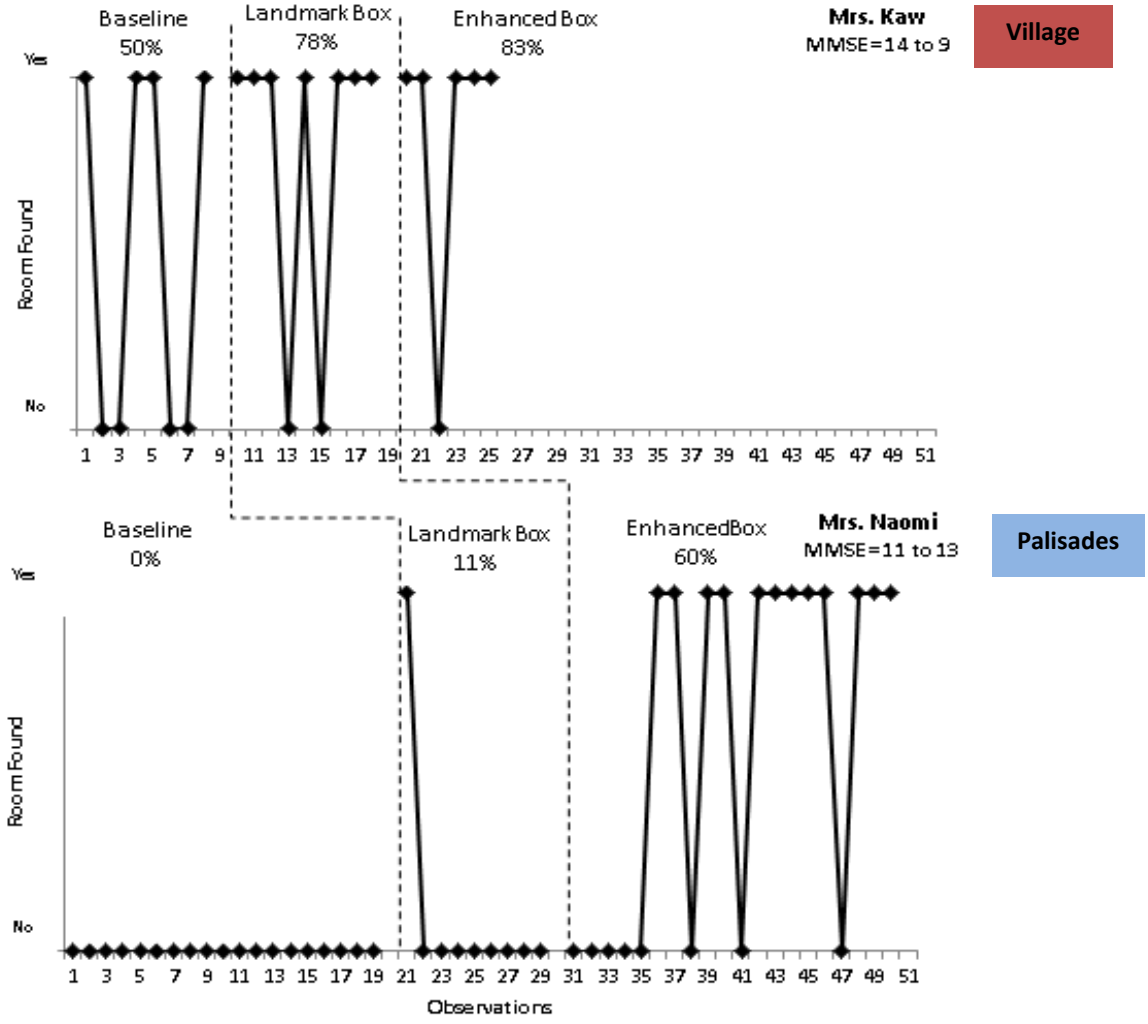


Figure 7. Room finding results presented as accuracy of room finding across baseline, landmark, and enhanced shadow box conditions.

46% during experimental conditions. Three of six participants demonstrated considerable and clinically significant improvements in room finding as a result of the shadow boxes.

Personalized boxes. When compared to baseline conditions, room finding performance improved considerably for one of four (25%) participants who were

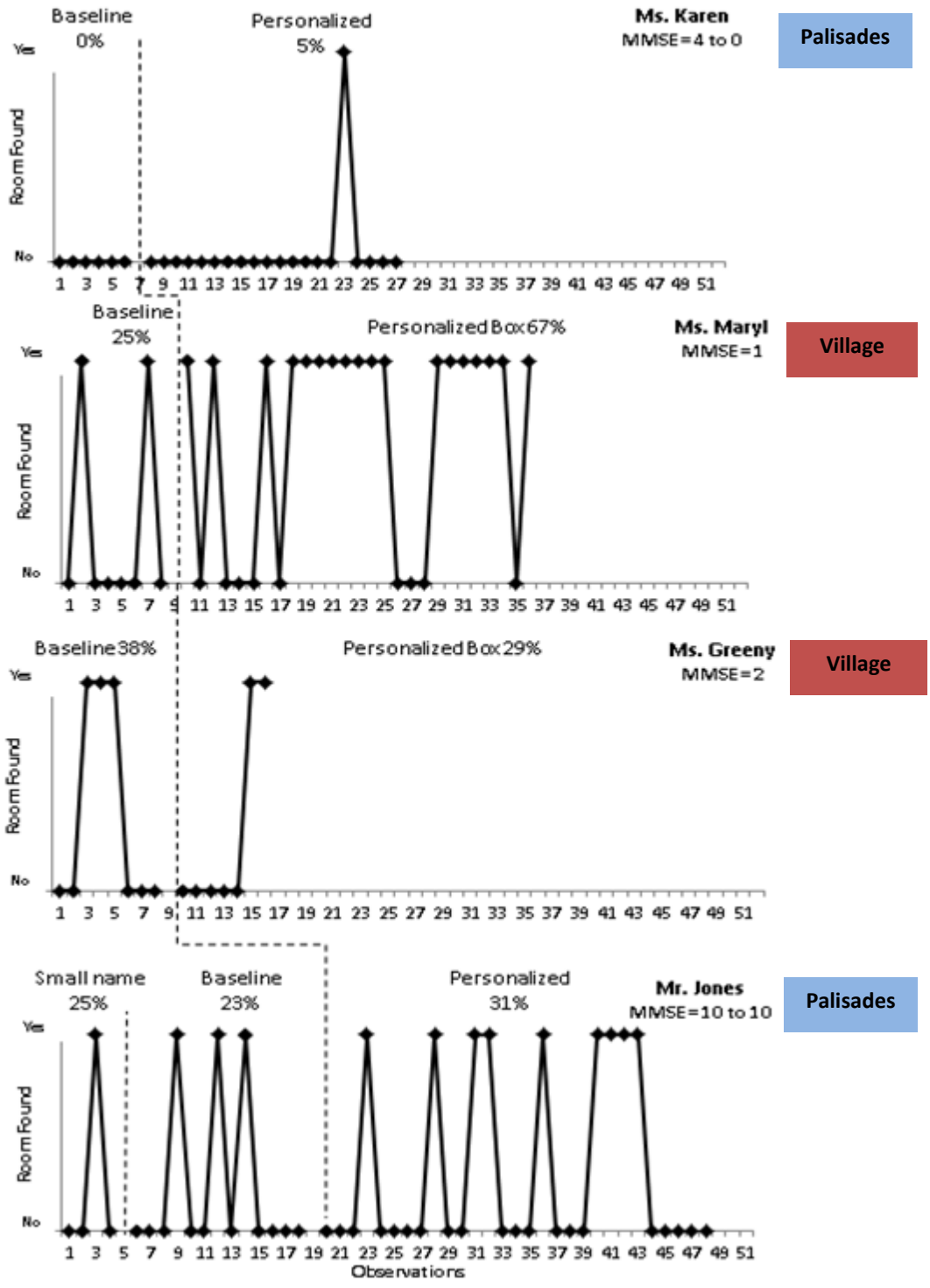


Figure 8. Room finding results presented as accuracy of room finding across baseline and personalized shadow box conditions.

randomized to the personalized shadow box condition. Overall, there was a 12% mean increase in room finding accuracy for individuals who received a personalized shadow box. The average amount of time before room selection across individuals decreased by 36% from baseline (172.18 s) to personalized box conditions (109.74 s).

Landmark boxes. When compared to baseline conditions, room finding performance noticeably improved for one of two (50%) participants who were randomized to the landmark box condition. Once personalized information was added in the enhanced condition, room finding improved for the remaining participant. Overall, there was a 20% mean increase in room finding accuracy for individuals from baseline to landmark conditions, and a 27% mean increase when shadow boxes were enhanced and printed names were added. The average amount of time before room selection decreased by 24% from baseline (122.43 s) to landmark box conditions (92.67 s).

Enhanced boxes. When compared to landmark conditions, room finding performance improved considerably for one of two (50%) of participants when printed names were added in the enhanced condition. The participant who demonstrated notable improvement, Mrs. Naomi, improved her room finding accuracy by 49% from landmark (11%) to enhanced (60%) conditions. The remaining participant, Mrs. Kaw, demonstrated some modest improvement (5%) in room finding accuracy from landmark (78%) to enhanced (83%) conditions, but data collection was discontinued before experimenters could determine whether this represented a meaningful difference. On average, there was a 27% mean increase in room finding accuracy from landmark (45%) to enhanced (71%) conditions for individuals who received an enhanced shadow box, and a 46% increase from baseline (25%) to enhanced (71%) conditions. The average amount

of time before room selection decreased by 11% from landmark (92.67 s) to enhanced box conditions (82.4 s), and decreased by 27% from baseline (112.43 s) to enhanced conditions (82.4 s).

Individual participant results. Mrs. Karen found her room in 5% of opportunities in the personalized shadow box condition (5% increase from baseline to personalized condition). She identified her room in only one observation session, which was the only time she ever made a room selection throughout the course of the study. During this observation, she noted that the photograph in her shadow box looked familiar and she thought it might be her mother. The average amount of time she spent before room selection decreased by 44% for observations in baseline (300.5 s) compared to personalized shadow box conditions (169.3 s). Data collection was discontinued with Mrs. Karen because she experienced cognitive decline and progressing end-of-life issues that prevented her from responding to invitations to show experimenters her bedroom. Her cognitive status decreased by four points from the start of the study (MMSE = 4) to the end of data collection with her, which was a period of approximately seven months. At the time of termination, she had a MMSE score of 0 indicating a profound effect of cognitive impairment.

Mrs. Maryl found her room in 25% of opportunities in the baseline condition and 67% of opportunities in the personalized shadow box condition (42% increase). This change occurred gradually for Mrs. Maryl and did not become socially meaningful until 15 days (9 observation sessions) after the intervention was implemented. The average amount of time she spent searching for her room before making a selection decreased by 29% from baseline (131.12 s) to personalized shadow box conditions (93.26). A

procedural modification was introduced with Mrs. Maryl (see Methods section) because she would "stall" during the observation and stand still after agreeing to show the experimenter her room. Researchers provided a prompt to her (i.e., "You were going to show me your room,") if she was stagnant for 5 to 7 s. Data collection was prematurely discontinued with Mrs. Maryl because of an emergency hospitalization resulting from a stroke. This hospitalization also prevented a post-test MMSE to quantify the change in her cognitive status. Her level of cognitive impairment was quantified as severe at the beginning of the study (MMSE = 1).

Mrs. Greeny found her room in 29% of opportunities in the personalized shadow box condition (9% decrease from baseline to personalized condition). The average amount of time before room selection decreased by 35% from baseline (146.25 s) to personalized shadow box conditions (94.86 s). Mrs. Greeny had a chronic health condition that caused her increasing levels of pain in her feet and legs. Data collection was prematurely discontinued with her secondary to a fall that resulted in a traumatic brain injury and diminished her ability to ambulate independently. It is unknown how the pain she experienced impacted her room finding during the study. She refused to participate in a post-test MMSE, thus experimenters were unable to quantify any changes in her level of cognitive impairment. Her cognitive impairment was quantified as severe at the beginning of the study (MMSE = 2).

Mr. Jones found his room in 25% of opportunities in the small name condition, and performed comparably in the baseline condition during which time his small printed name was removed from the doorway. He found his room in 23% of opportunities in baseline (2% decrease from small name to baseline). He found his room in 31% of

opportunities in the personalized shadow box condition (8% increase from baseline to personalized condition). The amount of time he spent searching before making a room selection decreased by 90% from the small name condition (1112.75 s) to baseline condition (110.85 s). When the personalized shadow box was implemented, the amount of time before room selection decreased by 26% (81.52 s) compared to the baseline condition. Data collection was discontinued with Mr. Jones because there was stability in the level and variability of his data path. His cognitive status remained stable (MMSE = 10) through his participation in the study, which lasted approximately three months.

Mrs. Kaw found her room in 50% of opportunities in the baseline condition. She accurately identified her room in 78% of opportunities in the landmark shadow box condition (28% increase from baseline to landmark). This change happened rapidly for Mrs. Kaw and was noticeable within two days of the intervention being implemented (i.e., the first observation in landmark condition). Mrs. Kaw found her room in 83% of opportunities in the enhanced condition (5% increase from landmark to enhanced condition). Latency to room selection data suggest that, on average, Mrs. Kaw took 20% more time to select a room in the landmark condition (52.56 s) compared to baseline (43.75 s). That is, she was less efficient in the landmark condition. When her printed name was added to her shadow box, she selected a room with comparable efficiency in this enhanced condition (42.17 s) as she did in the baseline condition. This represents a 20% decrease in time spent before room selection in the enhanced condition compared to the landmark condition. Data collection was prematurely discontinued with Mrs. Kaw because maintenance staff took down shadow boxes to paint the walls in the facility. Interestingly, when neighboring boxes were removed from the walls, Mrs. Kaw showed

signs of disorientation even while her box was still hanging. Her cognitive status decreased by five points from the start of the study (MMSE = 14) to the termination of data collection (MMSE = 9), thus representing a shift from moderate to severe impairment.

Mrs. Naomi found her room in 0% of opportunities in the baseline condition and 11% of opportunities in the landmark condition (represents an 11% increase). Although Mrs. Naomi recognized her room on the first observation in the landmark condition, her room finding resorted back to baseline levels and did not improve in a stable manner until personal information was added. She selected her room in 60 % of opportunities in the enhanced condition (49% increase from landmark to enhanced condition). This change happened slowly and was not noticeable until six days (six observation sessions) after personal information was added to her box. On average, Mrs. Naomi selected a bedroom 34% more quickly during observations in the landmark condition (132.78 s) compared to baseline (201.11 s). When her name was added to her shadow box in the enhanced condition (122.63 s), she spent 8% less time searching for her room compared to the landmark condition. Her cognitive status improved slightly (two points) from the start of the study (MMSE = 11) to the termination of data collection (MMSE = 13), which represented a time period of approximately three months.

Setting differences. There were site differences in aggregate room finding in both baseline and experimental conditions. Average levels of room finding in baseline conditions were higher at Village at Skyline (38%) compared to Palisades (7%). When the intervention was implemented (i.e., either landmark, personalized, or enhanced conditions), differences across sites continued. Aggregate room finding performance at

Village at Skyline was 59% after the boxes were filled and only 24% at Palisades. When intrasubject comparisons are considered, differences between sites remain. One of four participants (25%) from Palisades showed meaningful improvement in room finding abilities, whereas two of three participants (66%) from Village at Skyline showed improvements in room finding, despite generally lower cognitive functioning. See Table 1 for demographic characteristics of wayfinding participants broken down by site. At Village at Skyline, the average amount of time participants spent before selecting a room decreased by 34% from baseline (107.04 s) to experimental conditions (70.71 s). The results from Palisades were comparable. The average latency to room selection at Palisades decreased by 38% in experimental conditions (126.56 s) compared to baseline (204.15 s).

Table 1

Demographic Information about Participants in Experiment Three

Participant	Age	Gender	Site	MMSE (Pre)	MMSE (Post)	Exp. Condition	Length of Residence
Ms. Maryl	93	Female	Village	1	--	Personalized	69 months
Ms. Kaw	89	Female	Village	14	9	Landmark	10 months
Ms. Greeny	91	Female	Village	2	--	Personalized	12 months
Ms. Karen	84	Female	Palisades	4	0	Personalized	18 months
Ms. Naomi	89	Female	Palisades	11	13	Landmark	3 weeks
Mr. Jones	92	Male	Palisades	10	10	Personalized	2 months

Social validity. Experimenters attempted to administer CMAI data as a pre-test/post-test measure in order to collect information on changes in staff perceptions of challenging behavior over time. Only one site agreed to participate in this portion of data collection, and the CMAI was administered pre/post intervention. However, high turnover rates in direct care staff prevented consistency in raters. That is, the staff members who completed the pre-test measure had terminated employment with the

agency when it was time to administer the post-test measure. An examination of CMAI data indicated drastic differences in ratings across the questions at both time points. For example, Staff 1 and Staff 2 rated question #16 related to the frequency with which the participant tried to get to a different place as 1 and 5 respectively during pretest administration indicating that the behavior in question both "never" occurred and occurred "once to twice a day" simultaneously, therefore invalidating the measure. No usable data are available on this measure.

Staff at both facilities completed a brief survey to assess the social validity of the intervention. Overall, 69% of staff who completed the survey felt the intervention was useful in helping residents find their room, and 62% indicated that the shadow boxes changed the amount of time they spent guiding the residents to their rooms. More than two-thirds (69%) of staff who completed the survey reported that the shadow boxes influenced their overall workload.

There were themes that emerged from answers to open-ended questions. The first theme was that *shadow boxes helped residents find their bedrooms*. One example was a staff member's comment that the shadow boxes, "ensure extra confidence that they are in the right place." Staff also talked frequently about the particular usefulness of personalized boxes. Some staff said that residents would, "look for their photographs" or "see pictures of themselves and know it's their room." One staff person commented that the shadow boxes were "helpful for some, especially when they see their photographs." Other staff commented on their own benefit that resulted from the boxes. For example, "They help me find their rooms easier. And I learned about residents' hobbies and passions." Another staff commented, "They do give us a better understanding of the

residents' pasts and preferences. They allow us to know details of their lives that build stronger trust." Although the boxes were not necessarily designed for this purpose, several staff reported that they used the boxes for orientation purposes. Staff indicated that, "it helps with residents who don't think they live here – so we spend less time convincing them of it." There were some negative comments about the landmark boxes such that, some staff commented about the lack of identifying information in landmark boxes. Staff members commented, "They don't have names and they really need to" and, "I think they would be helpful if shadow box reflected more of who they are – pictures of them, their family, what they love – for example German Shepherd dogs."

Discussion

In our sample, shadow boxes meaningfully improved room finding for three of six participants. This evidence lends support to research suggesting that some people with dementia find their bedrooms more readily when items are showcased outside their bedroom (Namazi, Rosner, & Rechlin 1991; Nolan, Mathews, & Harrison, 2001; Nolan, Mathews, Truesdell-Todd, & VanDorp, 2002). Despite notable and progressive deterioration of cognitive functioning, some participants in this study demonstrated procedural learning based on their experience with salient environmental cues. It is notable that improvements in room finding did not happen immediately, but rather required a short period of time (range 2 days to 2 weeks) during which the participants presumably experienced naturally occurring discrimination training. That is, while searching for their bedrooms during day to day routines, participants likely experienced consequences contingent on the accuracy of their room selections. Participants were likely to experience reinforcement (i.e., the presence of their own belongings, a reduction

in anxiety related to the identification of the correct bedroom, praise from staff) when entering a room in the presence of their specific shadow box, and either the absence of reinforcement (e.g., someone else's belongings, continued anxiety) or punishment (e.g., a stranger sleeping in bed, increased anxiety, conflict with the room occupant) when entering a bedroom in the absence of their specific shadow box. This pattern of a latency to treatment effects supports previous hypotheses suggesting that it may not be recognition of shadow box items alone that is responsible for improvements in room finding, but rather an interaction between the stimulus and the individual's experience with it in their environment (Jay et al., 2009; Nolan et al., 2001). This evidence contradicts the common belief that people with dementia cannot learn, and provides support for theories of operant and procedural learning in dementia.

The evidence from this study was mixed regarding whether or not personalization of shadow box items was necessary to improve room finding. One individual, Mrs. Kaw, demonstrated improvement in room finding when a large and distinctive landmark shadow box was hung outside her bedroom. There was greater accuracy and less variability in her responses in the landmark condition compared to the baseline condition. However, another participant who was referred to as Mrs. Naomi needed personalized information for the intervention to produce a clinically significant improvement. She demonstrated a small improvement in room finding during the landmark condition compared to baseline, but remained unable to locate her bedroom in the majority of observations (89% of opportunities). When her printed name was added in the enhanced condition, there were notable improvements in the level of accuracy with which she found her room. As mentioned previously, this change occurred after a period of 6 days

(and 6 observations) following the addition of personalized information, suggesting that she needed experience with the personalized information in her box for this to become effective at evoking successful room finding. In contrast to these improvements, there were several participants randomized to the personalized condition who did not demonstrate meaningful improvement in room finding. This suggests that there may be other factors that impact the success of this intervention other than personal relevance of items inside the shadow box. A discussion of these factors, as well as notable considerations and implications of this study will follow.

Three participants did not demonstrate clinically significant improvement in room finding when shadow boxes were hung outside their bedroom. It is possible that shadow boxes alone are not effective for some people with dementia. The characteristics that predict non-responders, as well as alternative interventions, should be explored for this sub-population. It is also possible that other variables may have impacted room finding in this study. For example, the level of attrition related to progressive health decline was high in this sample. Data collection was discontinued for 33% of the sample due to significant adverse events (e.g., stroke, traumatic brain injury, hospitalization), and several other participants experienced chronic pain conditions that may have impacted mobility and motivation. Additionally, the conservative manner in which the direct observations were coded may have impacted interpretation of the data. For example, when asked to find his room Mr. Jones (Palisades participant) frequently opened up several other doors, looked inside, and decided that these rooms belonged to other residents before eventually locating his own bedroom. These instances were coded as inaccurate selections based on our initial coding scheme (i.e., he selected a room that did

not belong to him). See Figure 9. However, when these same data were re-coded according to a more lenient and unrestricted scheme where Mr. Jones was allowed an unlimited amount of time to find his room and unlimited errors (incorrect selections) prior to selecting his room, his room finding performance looks drastically different (see Figure 10). He accurately found his room in 75% of observations in the small name condition, 38% of observation in the baseline condition, and 72% of observations in the personalized box condition. These data suggest that Mr. Jones found his room more effectively when any visual cue was posted outside of his bedroom, whether it was his name printed in small font or a large personalized shadow box. There does not appear to be significant differences in accuracy of room finding between small name and personalized shadow box conditions for this participant. However, further research is necessary to look at generalization of this finding to other people with dementia. Anecdotal observations suggest that memory care residents with good vision and intact, active search repertoires may benefit from smaller, more subtle cues. However, others with visual impairment or poor scanning repertoires may require larger, more salient cues that are visible from a distance.

There were notable differences between participants at each site which may have differentially impacted room finding performance. Participants at Village at Skyline had generally more severe cognitive impairment compared with those at Palisades, but had higher levels of room finding accuracy in baseline conditions. On average, Village at Skyline residents found their room in 37% of opportunities in baseline conditions compared with Palisades participants who found their room accurately in only 7% of

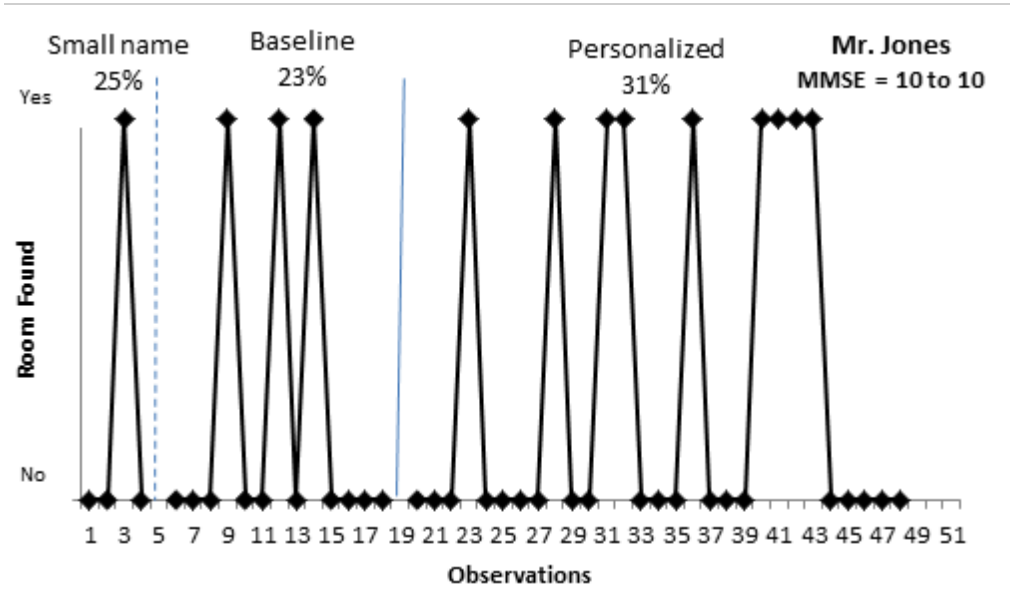


Figure 9. Mr. Jones' room finding accuracy data coded with stringent scheme (i.e., 3 min observation, and first room selection coded).

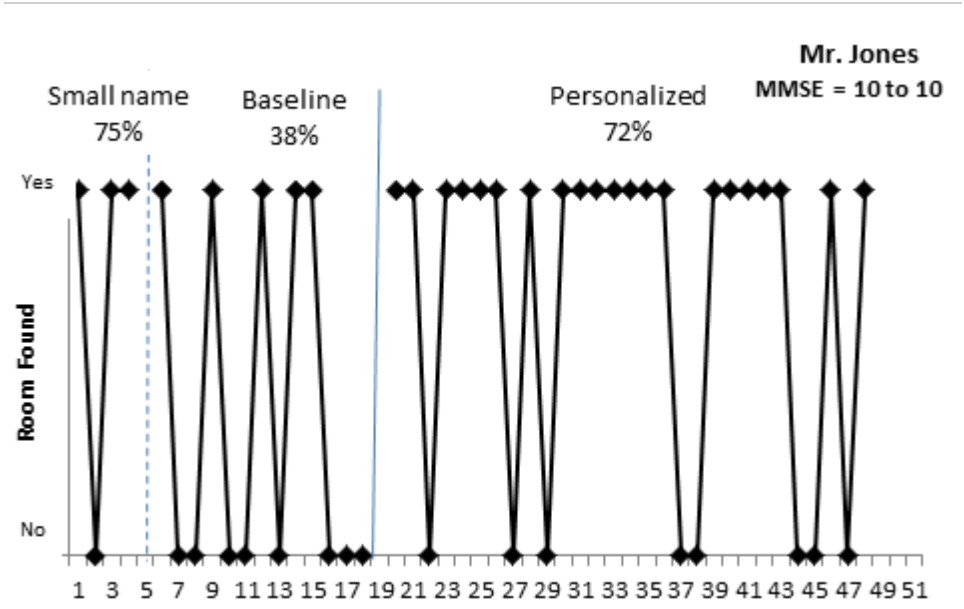


Figure 10. Mr. Jones' room finding accuracy data, coded with an unrestricted scheme that allowed for unlimited time and errors.

opportunities. These participant differences may contribute to discrepancies in outcomes across sites.

Factors unique to each facility layout and design may have differentially impacted room finding performance as well. There were several notable differences between research sites. First, there were differing amounts of visual feedback available when looking for bedrooms in each facility. For example, Mr. Jones's relied on visual feedback from room finding errors, as previously mentioned. This strategy was functionally adaptive, strategic, and appeared critical in helping him accurately identify his room. Because of the way the Palisades was laid out, Mr. Jones had to open the door to get visual feedback. In contrast, bedrooms in Village at Skyline had windows that allowed immediate visual access into the living area of the bedroom without requiring the door to be opened. This allowed participants to access visual feedback without opening the door, which may have given Village at Skyline participants an advantage in our room finding assessments. Second, the layout influenced the number of opportunities a resident had to come into contact with their shadow box, particularly those individuals with limited search repertoires. For example, the Palisades had two residential wings that branched from a commons area where participants usually gathered. In this community, participants were less likely to come into contact with their shadow box (especially if they started walking in the wrong direction) compared to residents living in the circular memory care community at Village at Skyline. This differential impact of the layout was especially impactful for residents who had limited search repertoires and those who experienced pain or fatigue while traveling longer distances. As a result, Village at Skyline residents may have had an advantage because of the layout of their circular

community, which allowed them to come into contact with their shadow box and bedroom without excessive movement or persistence. Third, Village at Skyline had fewer rooms (13) compared to Palisades (19) so there was a higher probability that residents would contact their room in the smaller facility compared to the larger one. Fourth, the color contrast between the wall and the shadow box was remarkably different at each facility. At the Palisades the wall was a solid, cream color and the shadow box frame was mahogany. Together, these colors created a stark and noticeable contrast between the wall and the shadow box, and drew one's eye to the box. In contrast, the wall at Village at Skyline was a busy, floral, multi-colored pastel wallpaper with white trim. The shadow box frame was also white, and blended in with the wall paper. Together, the color contrast of the wall and shadow box was subdued at this facility and did not naturally create a focal point on the shadow box. It is unknown how much the color contrast between the shadow box and the wall impacts visual perception of the shadow boxes, but previous research has demonstrated that higher contrast colors may promote greater visual acuity for people with dementia (Gilmore & Levy, 1991; Lakshminarayanan, Lagrave, Kean, Dick, & Shankle, 1996) so this variable is worthy of note. Lastly, the location where residents spent their free time as well as their general level of engagement was different at each facility. At Palisades, residents frequently gathered in commons areas, and there were regular and ongoing activities throughout the day. At Village at Skyline, residents spent a good amount of time in their rooms, and there were notably fewer activities and less staff interaction during the day. This pattern of activity engagement and utilization of commons area space has implications for the number of

opportunities people have to find their bedrooms throughout day-to-day routines, as well as during research observations.

These unique aspects of the memory care communities may have created a differential person-environment fit and directly impacted whether or not an individual benefitted from the shadow boxes. The majority (66%) of Village at Skyline residents demonstrated improvements in room findings accuracy. In contrast, only 33% of residents from Palisades demonstrated notable improvement in room finding accuracy during our observations. These results suggest that nuances of the facility design may impact person-environment fit and thus promote the adaptive behavior of room finding. This implies there may be mediation or moderation effect of the facility layout on the success of shadow box interventions. The research design used in this study was not designed to delineate mediation or moderation effects, but future research may investigate this phenomenon further.

Another factor that may impact our interpretation of the results is the functional versus topographical utility of the boxes. That is, although a shadow box may be filled with personalized items, environmental design nuances may prevent visual access for residents, and force them to rely on other landmarks in the environment. This was the case for Ms. Maryl, a Village at Skyline participant who was randomly assigned to the personalized condition. Due to the manner in which her box was positioned, it was not visually accessible unless she was exiting her bedroom. When approaching her room from any direction in the commons area, the only shadow box in sight was that of her neighbor, who did not participate in the study. Ms. Maryl's neighbor had a shadow box which included the neighbor's first and last name, as well as pictures she had drawn. The

neighbor's box was filled at the same time as Ms. Maryl's. Despite this methodological anomaly, Ms. Maryl demonstrated significant improvement in her room finding performance after approximately two weeks. There are several explanations for her improvement: either her performance improved as a result of practice effects, or she was using other landmarks in the environment (i.e., her neighbor's shadow box) to differentiate the location of her bedroom. Observations with other participants lend support to the landmark hypothesis. For example, data collection was discontinued with Ms. Kaw because maintenance staff at Village at Skyline took down shadow boxes on the opposing side of the commons area to paint the wall. At this time, Ms. Kaw's shadow box was still hanging and experimenters did one final probe with her to determine the impact of these missing landmarks on the other side of the living space. During the observation, she became distressed and disoriented as a result of the missing landmarks, was unable to find her room, and tried to exit the facility. This datum point was subsequently excluded from the analysis due to the vast differences in the environment. However, it provides additional support for notion that residents use shadow boxes that belong to others residents as landmarks in the process of finding their own bedroom.

The results of the wayfinding analysis suggest that personalization of shadow box items may not be critical to improve room finding for all people. This is important for facilities which do not have the resources to spend on personalization as this process requires more intensive resources (e.g., gathering relevant history and photographs from family members). However, our observations suggest that personalization of shadow boxes may have several important benefits. Anecdotal observations suggest that personalized shadow boxes provide opportunities for conversation between residents and

staff. Staff were frequently observed talking with residents about items in their shadow box. Additionally, personal items and photographs from early in life appeared to help staff develop compassion for the residents' histories, interests, and pre-morbid sense of personhood. Many staff commented on this phenomenon in the social validity survey, as well as expressed distaste for impersonal landmark boxes. Additionally, during intake interviews family members expressed a strong preference for personalized boxes. Personalized boxes were clearly more preferred by family and staff, and are more consistent with a person-centered approach to dementia care. Thus, although personalization of items may not be the only active mechanism that determines the success of shadow box interventions, it adds a human component that increases the social acceptance of the intervention, promotes personhood when cognitive impairment threatens to dismantle it, and creates an opportunities for engagement and orientation. Future research should explore possible therapeutic benefits for family members as a result of the shadow box planning and personalization process. Anecdotal evidence suggests that some family members may enjoy and perhaps benefit from the process of reminiscing about a loved one's history, telling their stories, sorting through photographs, and contributing to an action-oriented intervention that may help their loved one.

Our findings suggest that in addition to helping residents find their own bedroom, shadow boxes may aid participants in locating other residents' bedrooms as well. For example, Mr. Jones frequently visited his neighbor, Ms. Bradley, who spent the majority of her time in her bedroom where she visited with her full time one-on-one companion. Additionally, Ms. Bradley had a table near the room entrance that had snacks on it. During many room finding observations, Mr. Jones would go into Mrs. Bradley's room

and help himself to a snack while chatting with her companion and then reemerge from her bedroom and proceed down the hallway to his own room. When a personalized shadow box was hung outside Ms. Bradley's room, Mr. Jones entered her room more frequently. See Figure 11. Mr. Jones entered Mrs. Bradley's room in 14% of observations when Mrs. Bradley's shadow box was empty (i.e., baseline), and in 51% of observations when her shadow box was filled with personalized items (i.e., her young adult photograph and pins from her favorite political party). The social and tangible reinforcers Mr. Jones received upon entering Mrs. Bradley's room likely supported his pattern of behavior, and Mrs. Bradley's shadow box likely served as a discriminative stimulus that signaled the location and availability of these preferred snacks and social interactions more effectively.

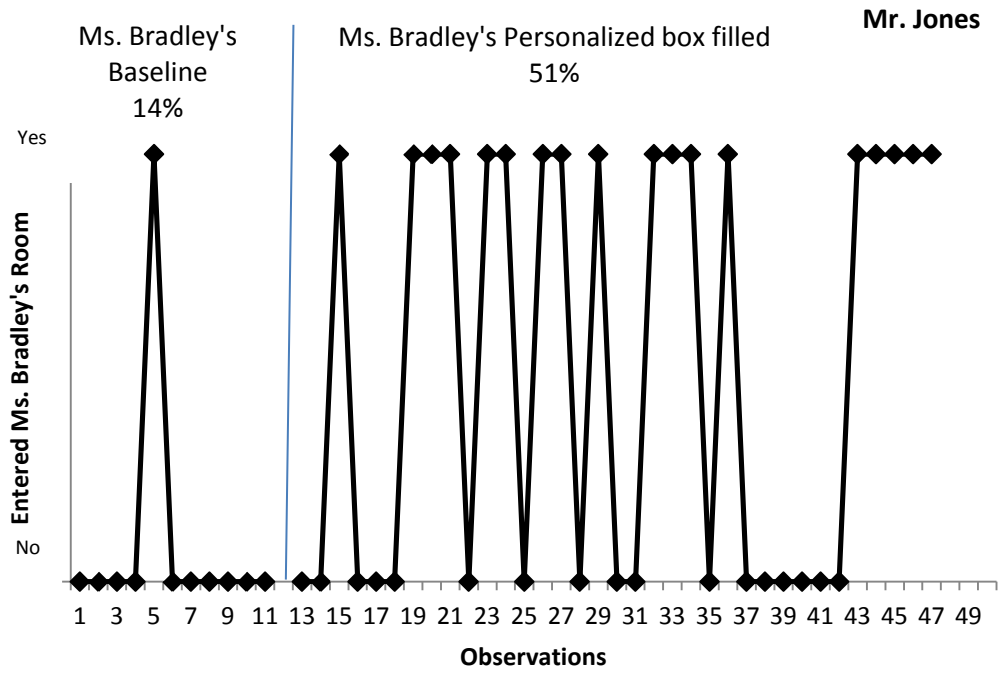


Figure 11. Data on Mr. Jones' entrances to Ms. Bradley's room when Ms. Bradley's shadow box was empty (baseline condition) and filled (personalized condition).

Guidelines. One goal of this study was to provide empirically-based recommendations for long-term care communities to promote room finding for residents with cognitive impairment, and relieve some burden from professional caregivers. Recommendations include showcasing large, easily visible items that are distinctive and unique from other things in the environment. When possible, items should be personally tailored to the resident's history and interests in order to promote person-centered care and to create opportunities for social engagement. Other, more general landmarks may be included in the environment to help residents discriminate between different areas (e.g., color coding wings, distinctive plants and foliage in certain areas). Printed names should be presented in large font (i.e., 72 point) and high contrast colors. Pictures should be enlarged (i.e., at least 8 x 10) to promote visibility. When possible, photographs should feature the resident in earlier stages of their life (i.e., between 18 to 60 years old) and include unique personal features (e.g., distinctive pair of glasses, favorite hat). Attention should be drawn to landmarks that are indicative of wayfinding (whether or not they are personally relevant) during in situ room finding opportunities to increase the salience and discriminative properties of the items. As feasibility allows, the resident's room should remain consistent and should not be moved unless absolutely necessary, as this may distort the existing learning history, increase wandering and disorientation, intensify anxiety, and foster opportunities for room intrusions and resident conflict.

Considerations. There are several considerations related to the direct observation assessment methodology that should be noted, including: (a) the language requirement necessary for participation in the assessment observation, (b) gender considerations associated with the assessment question, (c) the requirement that participants remember

they live in that facility and in fact have a room there, (d) factors that limit naturally occurring experience with the shadow boxes, and (e) the challenges associated with the baseline condition. These will be discussed below.

One consideration is that the assessment procedure may be inadequate for assessing wayfinding for all participants. Individuals with very impaired language may not be able to respond to the question, "Will you show me your room?" though they still might be able to perform in the natural environment when the relevant motivating operations are present (Michael, 1982). That is, participants may be able to locate their bedroom if they are tired and looking for their bed, or if they are cold and looking for a sweater, but be unable to locate their bedroom if they are asked to do so. Experimenters attempted to capture motivational operations whenever feasible during observations, although this was not always possible and was difficult to observe. The difference in repertoires required to locate one's room may vary depending on the antecedents and/or motivational variables present, as well as the level of cognitive impairment. Jay and colleagues (2009) noted this discrepancy when one participant with profound cognitive impairment (MMSE=0) was not able to find her bedroom when asked by an experimenter, but turned around and walked directly into her bedroom once the observation was complete and social interaction was terminated. The implications of language requirements should be noted when interpreting data from this study, and future research should consider other methods of observation that do not rely on language (e.g., video recording, direct observation of naturally occurring opportunities, using sensor technology to measure room finding and resident mobility patterns).

Another consideration of this assessment procedure is the gender considerations associated with the assessment question (i.e., "Will you show me your room?"). Although attempts were made to match the gender of the participant and the experimenter in this study, that was not always possible. The assessment question appeared to have a sexually-charged connotation for some participants. For example, one male resident interpreted the assessment question as a sexual advance by the experimenter, and tried to pursue sexual contact with a female research assistant after successfully showing her where his bedroom was located. This type of behavior is not uncommon for people with dementia (Tsai, Hwang, Yang, Liu, & Lirng, 1999; Tsatali, Tsolaki, Christodoulou, & Papaliagkas, 2011) and presents a unique challenge in clinical and research settings. A shadow box was designed for this participant and he was excluded from the analysis, as he was able to find his room during observations, and researchers determined he was not an appropriate candidate for this study due to safety hazard that resulted from his behavior.

Another unanticipated challenge encountered by researchers occurred when participants denied they lived in the facility, or insisted they were just visiting. This is not uncommon and is thought to be the result of disorientation and poor memory. When the participant denied that he or she lived in the facility, it nullified the reasonable progression of conversation that would include the assessment question. Some participants were amenable to redirection, and then several minutes later would agree that they did in fact live there and agree to show the experimenter their bedroom. Others would persist in stating that they did not live there, and as a result observations were terminated so as not to cause distress. When completing the social validity survey, some

staff indicated that one potential use of the shadow boxes was to help convince residents they lived in the facility. This was not anticipated in the original design of the intervention, and future research should investigate the impact of using shadow boxes in this way, and in particular the impact on resident's level of anxiety, orientation, and quality of life.

Some participants did not demonstrate pre-requisite skills such as active visual scanning and attending to stimuli. Observations suggest search repertories may weaken as a product of deteriorating cognitive skills and living in an environment where few natural opportunities occur to independently locate a bedroom. Well-meaning staff may begin guiding residents to their bedroom when they begin to have difficulties finding their way and the lack of opportunities to locate their bedroom independently may contribute to excess disability. Although no formal data were collected in this study, the experimenters noted that staff typically guided clients directly to their rooms and created few opportunities for independent room finding.

Lastly, it was noted that baseline conditions which involved hanging empty shadow boxes (and keeping them empty for a period of time) were difficult for memory care communities. There are ethical considerations associated with delaying a potentially helpful intervention and allowing residents to continue to have difficulty finding their bedrooms. This has implications for resident anxiety, challenging behavior such as wandering and repetitive questioning about room location, as well as increased staff burden. Additionally, administrative staff at both facilities had reservations about the appearance of empty boxes when visiting families and potential future residents toured. These issues associated with baseline conditions should be taken seriously, and future

research should consider options to minimize the length of time that shadow boxes are empty.

Limitations and future research. There are several limitations of this study. First, the observation method used in this study was time and resource intensive. Researchers did not interrupt ongoing activities to collect data and as a result spent a lot of time waiting for opportunities to complete room finding probes. This provided many opportunities for the researchers to participate in recreational activities and develop relationships with participants. However, it also meant that researchers spent a lot of time on-site waiting for opportunities to collect data. In order to obtain all the data required by this study, there were two trained researchers on-site (necessary for interobserver agreement and procedural integrity measurement) for 3 to 6 hours per day for a period of approximately 8 to 10 months at each individual dementia care community. The resource requirements of this approach may have implications for research replication. Future research should explore the utilization of direct care staff, or other on-site professionals to obtain room finding data. Additionally, technology such as motion sensors or movement-activated video may present more efficient means of measuring room finding.

The single subject experimental methodology utilized in this study allows researchers to get rich and abundant idiographic information about individual people and factors that create variability in their responses. As research identifies factors responsible for intrasubject variability, this information can be incorporated into future investigations and the chances of successful interventions increase. As Sidman (1960) said, “Experience has taught us that precision of control leads to more extensive generalizability of data.”

(p.152) That being said, the small sample size used in single subject methodology presents limitations to the external validity of the findings, and replication is warranted. Future research should replicate this study to determine the boundaries and parameters of generalizability.

One additional limitation is the questionable clinical utility of the latency to room selection data. Measuring the time it takes for people to select a bedroom is only meaningful if they are selecting the *correct* bedroom. That is, latency to room finding data should only be considered contingent on improvements in room finding accuracy. Latency data are less meaningful if individuals select the wrong room, which happened during at least one observation in all conditions for the majority of participants in this study. Identifying other residents' bedrooms as your own more quickly does not represent a clinical improvement. Future research should consider these measurements issues and investigate other methods of quantifying room finding efficiency.

Future research should replicate this study with individuals with various types and levels of cognitive impairment, and should examine the relationship between neuropsychological predictors and responsiveness to the shadow box interventions. Researchers should replicate this intervention across a variety of memory care environments, and explore the impact of formal procedural discrimination training (i.e., prompting search behaviors, directing the participant's attention to salient characteristics of the shadow box, providing multisensory feedback on accuracy of room selection) to determine the parameters of room finding acquisition when feedback and training opportunities are facilitated. Various training approaches (e.g., Errorless Learning, Backwards Chaining) have shown to be promising in preliminary studies with people

with mild (McEvoy & Patterson, 1986; Provencher & Audet, 2008) and moderate (McCilton, Rivera, & Dawson, 2003; Hanley, 1981) dementia, but further replication is warranted to determine the utility of training in combination with shadow boxes and other visual cues. A more in-depth assessment of shadow box item characteristics (e.g., two dimensional versus three dimensional, color contrast) may be helpful in furthering guidelines for long-term care environments. Additional extensions of this research may include the application of this intervention with other populations (e.g., people with developmental disabilities) and in other care settings (e.g., community living settings, assisted living, skilled nursing). Lastly, future research on multi-sensory methods of prompting and feedback provision should be investigated to expand preliminary research on tactile devices that promote wayfinding (Grierson, Zelek, Lam, Black, & Carnahan, 2011), olfactory stimulation which may be a distinctive feedback option for individuals with notable visual impairment (Cohen-Mansfield & Werner, 1998; Staal, Pinkney, & Roane, 2003), as well as other assistive non-pharmacological interventions that may facilitate improvements in wayfinding in this unique and vulnerable population.

In summary, individuals with dementia appear to recognize printed names and photographs from earlier in life more readily than recent photographs. They are often able to demonstrate preferences through structured and concrete choice making opportunities, even when language and cognitive skills are compromised. Showcasing items outside individual bedrooms may help some residents find their rooms more accurately and efficiently, although design characteristics and personal variables impact the utility of this intervention. Further research is needed to distinguish the variables that are critical to promoting effective wayfinding for older adults with severe dementia.

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APPENDIX A

Pleasant Events Schedule – Alzheimer's Disease Patients (PES-AD)

This schedule contains a list of events of activities that people sometimes enjoy. It is designed to find out about things the patient has enjoyed during the past month. Please rate each item three times. The first time, rate each item on how many times it happened n the past month (frequency); the second time, rate how available it has been (availability); and the third time, rate each event on how pleasant it has been (enjoyability), either now or in the past.

Because this list contains events or activities that might happen to a wide variety of people, you may find that many of the items have not happened to the patient in the past month. It is not expected that anyone will have done all of these things in one month. There are no right or wrong answers.

Frequency Directions

How often have these events happened in the patient's life in the past month? Please answer each item by putting an X in the appropriate column according to how often the item has occurred.

Not at all - This has NOT HAPPENED for the patient in the past month

A few times - This has HAPPENED A FEW TIMES (1 to 6 times) in the past month

Often - This has HAPPENED OFTEN (7 or more times) in the past month.

Availability Directions

How available are these events to the patient? Please answer each item by putting an X in the appropriate column according to how available the item is.

Not at all - This item has NOT BEEN AVAILABLE during the past month

A few times - This item has been AVAILABLE A FEW TIMES (1 to 6 times) during the past month

Often - This item has been AVAILABLE OFTEN (7 or more times) during the past month

Enjoyability directions

How enjoyable are these events to the patient? Please rate each item by putting an X in the appropriate column/s (one or both if they both apply) according to how enjoyable the item is.

Now enjoys - The patient has enjoyed doing this item IN THE LAST MONTH

Enjoyed in the past - The patient has enjoyed doing this item in the PAST (in the last 5 years)

Response Options

Frequency - Not at all, A few times, Often

Availability - Not at all, A few times, Often

Enjoyability - Now enjoys, Enjoyed in the past

Items

1. Being outside (sitting outside, being in the country)
2. Meeting someone new or making new friends
3. Planning trips or vacations, looking at travel brochures, traveling
4. Shopping, buying things (for self or others)
5. Being at the beach
6. Reading or listening to stories, novels, plays, or poems
7. Listening to music (radio, stereo)
8. Watching tv
9. Camping
10. Thinking about something good in the future
11. Completing a difficult task
12. Laughing
13. Doing jigsaw puzzles, crosswords, and word games
14. Having meals with friends or family (at home or out, special occasions)
15. Taking a shower or bath
16. Being with animals or pets
17. Listening to non-music radio programs (talk shows)
18. Making or eating snacks
19. Helping others, helping around the house, dusting, cleaning, setting the table, cooking
20. Combing or brushing my hair
21. Taking a nap
22. Being with my family (children, grandchildren, siblings, others)
23. Watching animals or birds (in a zoo or the yard)
24. Wearing certain clothes (such as new, informal, formal, or favorite clothes)
25. Listening to the sounds of nature (birdsong, wind, surf)
26. Having friends come to visit

27. Getting/sending letters, cards, or notes
28. Watching the clouds, sky, or a storm
29. Gong on outings (to the park, picnic, a barbeque, etc.)
30. Reading, watching, or listening to the news
31. Watching people
32. Having coffee, tea, a soda, etc. with friends
33. Being complimented or told I have done something well
34. Being told I am loved
35. Having family members or friends tell me something that makes me proud of them
36. Seeing or speaking with old friends (in person or on the telephone)
37. Looking at the stars or moon
38. Playing cards or games
39. Doing handwork (crocheting, woodworking, crafts, knitting, painting, drawing, ceramics, clay work, others)
40. Exercising (walking, aerobics, swimming, dancing, other)
41. Indoor gardening or related activities (tending plants)
42. Outdoor gardening or related activities (mowing the lawn, taking leaves, watering plants, doing yard work)
43. Going to museums, art exhibits, or related cultural activities
44. Looking at photo albums and photos
45. Stamp collecting, or other collections
46. Sorting out drawers or closets
47. Going for a ride in the car
48. Going to church, attending religious ceremonies
49. Singing
50. Grooming self (wearing makeup, having hair done)
51. Going to movies
52. Recalling and discussing past events
53. Participating or watching sports (golf, baseball, football, etc)

APPENDIX B

Cohen-Mansfield Agitation Inventory – Long Version

	Never	Less than once per wk	Several times per wk	1-2 per wk	once or twice per day	several times per day	several times per hour
Activity	**1**	**2**	**3**	**4**	**5**	**6**	**7**
1. Pace, aimless wandering							
2. Inappropriate dress or disrobing							
3. Spitting (include at meals)							
4. Cursing or verbal aggression							
5. Constant unwarranted request for attention or help							
6. Repetitive sentence or questions							
7. Hitting (include self)							
8. Kicking							
9. Grabbing onto people							
10. Pushing							
11. Throwing things							
12. Strange noises (weird laughter or crying)							
13. Screaming							
14. Biting							
15. Scratching							
16. Trying to get to a different place (e.g., out of the room, building)							
17. Intentional falling							
18. Complaining							
19. Negativism							
20. Eating/drinking inappropriate substances							
21. Hurt self or other (cigarette, hot water etc)							
22. Handling things inappropriately							
23. Hiding things							
24. Hoarding things							
25. Tearing things or destroying property							
26. Performing repetitious mannerisms							
27. Making verbal sexually advances							
28. Making physical sexual advances							
29. General restlessness							

APPENDIX C

Staff Survey
Shadow Box

1.) Rate how easy the shadow box intervention was to do.

1 --------- 2 --------- 3 --------- 4 --------- 5

Very Easy Very Difficult

2.) Have the shadow boxes been useful in helping residents find their room?

If so, how?

3.) Have the shadow boxes changed the amount of time you spend guiding residents to their bedrooms?

If so, how?

4.) Have the shadow boxes influenced your overall work load?

If so, how?

5.) Were there any unexpected consequences from the shadow boxes?

APPENDIX D

Family Interview

1. What was your loved one's occupation?

2. What were some of his/her hobbies?

3. What were some important events that happened in his/her life?

4. Are there any items or objects that are particularly relevant to your loved one's life?