Increasing Wayfinding for Long-Term Care Residents with Dementia using Spaced Retrieval Training with External Aids

THESIS

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By

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Abstract

The purpose of this study was to determine the effectiveness of Spaced Retrieval (SR) training in the use of external memory aids to assist long-term care residents with dementia in wayfinding. SR training sessions were analyzed for three individuals with dementia to document the impact of SR training on expected response mastery and generalization of finding his/her room unassisted. Results revealed mastery for one participant out of three (33%) with the given criterion. However, evidence of learning across sessions and generalization outside of training sessions was observed.
Acknowledgments

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Thank you to Dr. Michael Trudeau for participating as a member of my thesis committee. I would not be at this juncture in my academic and clinical experience had I not accepted the opportunities you presented to me as an undergraduate, continuing education, and graduate student.

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Major Field:  Speech and Hearing Science
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Introduction

Persons with dementia experience diminished recall of recent events and decreased ability to organize information for purposes of planning and problem solving. Memory retrieval and executive function deficits can lead to behaviors such as repetitive questioning, loss of information or material possessions, and disorientation within one’s environment. Dementia results from organic changes in the brain which are acquired, progressive, and diffuse. According to the Diagnostic and Statistical Manual of Mental Disorders (DSM-IV; American Psychological Association, 1994), dementia is defined as a disorder characterized by memory impairments in addition to cognitive changes in language, problem solving, or executive function which are severe enough to negatively impact daily function. An obvious decline in daily function for social and occupational activities accompanies memory and cognitive impairments (Bourgeois & Hickey, 2009). These memory and planning deficits can cause spatial disorientation in residents with dementia. This leads to challenges for nursing staff regarding management of problem behaviors in addition to meeting daily healthcare needs of all residents within their case load.

Memory refers to a person’s ability to recall recently learned information, personal experience, and repetitive procedural tasks. Squire identified two different memory processes, declarative and non-declarative, which are characterized by type of
information stored and the steps involved in storage of the information (2004). The brain is thought to be organized in such a way that the two memory processes parallel one another allowing the intact system to compensate for the impaired system. Declarative memory, or explicit memory, is composed of episodic (memory of events) and semantic (word meaning) information. Non-declarative memory, or implicit memory, involves the ability to make associations between concrete and abstract information pertaining to an event. Another form of non-declarative memory, procedural memory involves the storage and retrieval of habitual information, such as how to feed oneself. This is relatively preserved in people with dementia due to repetition priming, motor learning, and classical conditioning which is thought to explain successful implementation of compensatory strategies (Squire, 2004). Overall, people with dementia present with less impairment in non-declarative memory processes (Bourgeois & Hickey, 2009).

Memory impairments cause many problems including loss of information regarding dates or times for future events, names of people or common objects, and use of safety strategies relating to activities of daily living such as ambulation, hygiene, or eating (Bourgeois & Hickey, 2009). Additionally, people with dementia often become confused within familiar and unfamiliar environments which can impact their well being and safety. Perception and comprehension of information in the environment is compromised due to memory and cognitive impairments which may lead to spatial disorientation. Orientation refers to one’s ability to recognize and relate information such as person (self vs. others), place (current location vs. a destination), time (month, day, and year), and space (relationships and references) within the environment. Wayfinding
is a specific term used to represent a person’s ability to find his/her way from one place to another using environmental cues and knowledge from previous experience. It requires perception of surroundings, ability to plan a route, execution of the plan, and problem solving. Decreased ability to recall past experiences and to learn new information by a person with memory impairment limits the person’s ability to orient within the environment (Rainville et al., 2001). The degenerative nature of dementia leads to increased confusion which can result in disruptive behaviors including repetitive questioning and verbal or physical aggression. Decreased abilities result in loss of independence and greater reliance on caregiver assistance within the care facility. Increased demands for time and attention of nursing staff due to disruptive behaviors detract from multiple patient care and administrative responsibilities.

Environmental modifications are often incorporated into the design of nursing homes and dementia care units to ameliorate the behavioral effects of disorientation. Architectural layout was examined by Marquardt and Schmie (2009) revealing that residents with moderate to severe dementia had increased wayfinding difficulty as spatial layout complexity increased. Many facilities post resident room numbers and names on the room door or enclosed in a frame along with pictures and memorabilia to increase recognition of one’s own room (Brush & Calkins, 2008; Nolan, Mathews, & Harrison, 2001). These studies all looked at environmental cues such as room signage with the resident’s name, a personal photograph, and/or use of a shadow box to display personal memorabilia to improve wayfinding skills; however training in the location and use of these cues was not investigated. The use of external memory aids can help the adult with
dementia to orient to their environment as evidenced by research. External aids such as the use of written cue cards, memory books, log books, calendars or planners have been shown to compensate for memory impairment and can be trained using memory intervention techniques such as Spaced Retrieval (Bourgeois et al., 2003).

Spaced Retrieval (SR) is a technique used to assist in training people with dementia to recall tasks or information that are dependent upon procedural memory and to use external memory aids independently. The goal is to assist the memory impaired individual to recall new information across structured time intervals so it is retained for longer periods of time (minutes, hours, days, and weeks). Errorless learning provides the rationale behind training in use of external memory aids through SR and is based on the idea of eliminating incorrect responses by the trainee. In an SR training session, clients practice stating a verbal response to a question at increasing intervals until they are judged to have mastered the response. If the client does not respond immediately to the prompt question, the clinician provides the correct response for the client to repeat. This “errorless” technique is designed to prevent the client from making errors and has been shown to be more efficient than other more errorful techniques, such as cueing hierarchies (Bourgeois et al., 2003). In that study, Bourgeois and colleagues compared Spaced Retrieval to Cueing Hierarchy for training the use of external memory aids by people with dementia. They found that while both provided some gain, SR provided significantly more immediate and long-term gains in trained goals for increased conversation and social interaction, use of safe strategies during activities of daily living, recall of names or common objects, and decreased behaviors such as repetitive
questioning. Several other studies have shown similar positive results with SR training for use of calendars to remember future events, room number, and recall of safety strategies for ambulation or swallowing (Bourgeois & Hickey, 2009; Hopper et al., 2005). This research has shown that repetition and successful practice of salient information support access to procedural memory through non-declarative processes (Brush & Camp, 1998; Bourgeois et. al., 2003). Training in the use of external memory aids through the SR technique can be implemented to assist people with memory loss to maintain independence and to decrease the attentional demands on nursing home staff.

The use of external cues have been shown to decrease problem behaviors including difficulty with wayfinding for dementia residents (Marquardt, 2011). Nolan and colleagues (2001) reported that older adults used environmental cues and external memory aids such as door signage or shadow boxes containing photographs and/or memorabilia to reduce confusion and promote orientation to the environment. Long term care facilities attempt to facilitate successful wayfinding through a variety of environmental cues, but often report continuing problems with certain residents who do not seem to use these cues. It is possible that specific training to notice the cues might be needed to increase the effectiveness of this approach; but, to date there are limited examples of training the residents to use the cues to improve way finding.

The combination of errorless learning of salient, procedural information and training in the use of an external memory aid could improve problem behaviors such as wayfinding difficulty associated with memory impairment. Facility design, signage, staffing procedures, and individual client ability should be taken into account in the
development of external aids to be used in training. The benefit for the person with dementia is increased independence and decreased reliance on care giving staff. Successful training in the use of memory aids may benefit nursing staff by reducing the number of demands placed on them allowing for more efficient care to all residents. The purpose of this proposed research was to determine whether training in the use of external memory aids through SR can improve room finding for people with dementia living in long-term care environments. The specific research questions addressed were:

1. Will persons with dementia who participate in SR training attain goal mastery and demonstrate generalization to successful room finding?

2. Will this behavior maintain over time?
Methods

Setting

The study was conducted in a 36 bed dementia care unit (DCU) of a residential nursing home, located in a suburb of Columbus, Ohio. It is a secured unit serving older adults who demonstrate mild to severe signs and symptoms of dementia. The DCU is composed of three wings, termed cottages at this facility. Each cottage contains 12 resident rooms, a common sitting area, and a dining room. A large common area at the entrance of the unit serves as an activity space and connects the three cottages. Cottages are each identified by a colored symbol (red rose, yellow sun, or blue bird) that is hung approximately 4 1/2 feet from the ground on a wall at the entrance to the cottage wing in order to guide the resident to his or her personal living space. Other signage is placed to one side of the door frame for each single occupancy room. The five inch by seven inch black and white sign displays the colored symbol for the particular cottage, the specific room number, and a personal photograph of the resident.

Participants

Residents demonstrating wayfinding difficulty were identified by nursing staff. Consent forms (Appendix A) and HIPAA Authorization forms (Appendix B) were distributed to their family members or guardians and signed prior to enrollment in the study. The following criteria was used for selection of candidates: Qualified candidates must reside on the DCU, be identified by nursing staff as having difficulty finding his or
her room, and be able to ambulate within the unit independently or with independent use of adaptive equipment. Medical charts of the qualifying candidates were reviewed to confirm a diagnosis of dementia and document demographic information. Table 1 contains the demographic information about the participants. As shown in Table 1, the three participants’ age ranged from 85-91 and there were 2 females and 1 male. Appendix C contains the SR research protocol consisting of demographic forms, screening measures, and data collection forms.

Table 1. Demographics

<table>
<thead>
<tr>
<th>Subject</th>
<th>Gender</th>
<th>Age</th>
<th>Dementia Dx</th>
<th>Race</th>
<th>Primary Language</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCV001</td>
<td>F</td>
<td>88 y.o.</td>
<td>Yes</td>
<td>White</td>
<td>Standard American English</td>
</tr>
<tr>
<td>FCV003</td>
<td>M</td>
<td>85 y.o.</td>
<td>Yes</td>
<td>White</td>
<td>Standard American English</td>
</tr>
<tr>
<td>FCV006</td>
<td>F</td>
<td>91 y.o.</td>
<td>Yes</td>
<td>White</td>
<td>Standard American English</td>
</tr>
</tbody>
</table>

Screening Procedures

The Mini Mental State Exam, MMSE, (Folstein, Folstein, & McHugh, 1975) was administered to each candidate for assessment of cognitive function; a score < 24 out of 30 was required to confirm cognitive impairment. Functional Vision, Hearing, and Communication Screening Measures (Bourgeois et. al., 2001) were collected to determine ability to participate in training. The inclusion criteria was a rating of adequate vision, adequate hearing, and a score > 4 (Phrases, multiword only) on the communication screen. Additionally, the investigator administered the Spaced Retrieval
Screen (Brush & Camp, 1998) to candidates meeting the above criteria; a passing score was demonstrated by stating the correct information after a 1 min interval. Table 2 contains the screening results for each participant. Participant MMSE scores ranged from 0-14 (maximum score = 30) as shown in Table 2.

Table 2. Screening Measures

<table>
<thead>
<tr>
<th>Subject</th>
<th>MMSE Score (Maximum=30)</th>
<th>Vision</th>
<th>Hearing</th>
<th>Communication Rating (1 = no response; 6 = multiple sentences)</th>
<th>SR Screen</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCV001</td>
<td>14</td>
<td>Adequate</td>
<td>Adequate</td>
<td>6</td>
<td>Passed</td>
</tr>
<tr>
<td>FCV003</td>
<td>0</td>
<td>Adequate</td>
<td>Adequate</td>
<td>5</td>
<td>Passed</td>
</tr>
<tr>
<td>FCV006</td>
<td>8</td>
<td>Adequate</td>
<td>Adequate</td>
<td>6</td>
<td>Passed</td>
</tr>
</tbody>
</table>

Design

This study used a multiple baseline, ABA design across subjects to evaluate Spaced Retrieval training with the use of an external memory aid for room finding by individuals with dementia. A total of three participants from a group of eight consenting residents were randomly assigned to the SR training for room finding. Two of the residents were unable to take part in the study. One did not qualify due to a score of zero on the MMSE and a score of one on the communication scale. The second resident met screening criteria and participated in baseline, however the resident died before training was implemented. The study consisted of Baseline, Training, and Generalization; successful independent room finding was the dependent variable for baseline and generalization while correct verbal response paired with a motor component of looking at
the wristband was the dependent variable for training. Performance of trained skills was monitored for evidence of generalization through investigator collected data at the end of the study. All sessions were scheduled to occur before the participants’ lunchtime as recommended by DCU staff. Times varied on occasion; sessions were held after lunch subject to participant availability.

**Baseline Procedures**

Two graduate students served as investigators in this study in order to provide daily training sessions to the participants. This investigator and the second researcher reviewed all data collection, treatment procedures, and established reliability prior to the start of the study.

The baseline phase of the study started after all consenting residents had been screened and randomly assigned to one of the two studies. Investigators collected baseline data once a day over the course of the same week for a minimum of 3 days and to establish a low and stable rate of performance. The investigator located the participant in the DCU and provided an initial verbal stimulus, “Show me your room.” as a request for the participant to physically take the investigator to his/her room. The participants were not provided directional assistance by the investigator and were allotted three minutes to fulfill the request. Baseline data collection by nursing staff from the DCU and by investigators was completed for purposes of reliability and validity. Members of the nursing staff were individually consulted to explain the parameters of the study and the importance of their participation in baseline data collection. A data collection form was provided to staff for tracking the number of times each participant was able or unable to
find his/her room without assistance. These initial data were collected by the nursing staff to establish baseline on each participant for one week. The data collection form listed each participant’s name and included two columns: (1) successful wayfinding attempt within three minutes; (2) unsuccessful wayfinding attempt within three minutes. Data was graphed daily and monitored for stability.

**Treatment Procedures**

The training phase began with the first participant to demonstrate a low and stable baseline. Sessions occurred at least four days per week within the DCU. Training began with an additional participant when a stable, low rate of room finding was observed with the previous participant. The projected time for each training session was 30 minutes; however, actual session duration varied due to participant availability and compliance. Participants were trained to use an external visual aid for room finding within the DCU. The external aid, a coiled key ring, was worn around each participant’s wrist. The key ring displayed a picture of each participant’s cottage symbol and room number for the purpose of matching it to his/her cottage picture and door signage as shown in Figure 1. Extra key rings were constructed and housed in the nursing station in the event a participants’ original ring was misplaced during the course of training.
Each session began with a verbal prompt question and response; example: “When I ask you, “What is your room?” I want you to say, “Bird 14.”” paired with a tactile cue. The tactile cue consisted of the investigator physically turning the participant’s wrist to draw attention to the wristband and to promote a motor memory component to the training. The verbal prompt and response were identified using the preferred vocabulary and phrasing of each participant. An SR Data Sheet (see Appendix D) was used to record participant response accuracy. If the participant immediately produced the correct response following the question prompt the next presentation of the question prompt was delivered after a delayed interval. The time interval increased with each consecutive correct response from the participant. Time interval increments varied between 0 seconds and 30 seconds depending on each participant’s ability. Following the 30 second time interval each proceeding time interval was a doubled (i.e., 60 seconds, 1 minute, 2 minutes, 4 minutes, 8 minutes, and 16 minutes). Participant responses were recorded as correct if they were immediate; all delayed responses were recorded as incorrect. If the participant did not give the correct response immediately the investigator modeled the
expected response, the participant repeated it, and the next trial returned to the time interval of the previously correct response. Unstructured conversation which was not related to training took place between the investigator and the participant during time intervals. At the end of each training session the participant was asked to find his/her room unassisted. The expected training response was considered mastered when the participant was able to provide the correct verbal response after a 24 hour time interval across two consecutive training sessions. Once the expected response was mastered training was discontinued. Additionally, training was discontinued if the participant reached a plateau across time intervals or demonstrated a regression across time intervals over five consecutive training sessions. Each participant was instructed by the investigator to “Show me your room” within three minutes from the end of every training session for the purpose of layering a motor memory component into the training task.

**Generalization Procedures**

Investigators collected post-treatment/generalization data once a day over the course of one week. The investigator located the participant in the DCU and provided an initial verbal stimulus, “Show me your room.” as a request for the participant to physically take the investigator to their room. The participants were not provided any directional assistance from the investigator and given three minutes to fulfill the request.

Members of the nursing staff were individually consulted to re-establish their understanding of the parameters of the study and the need for their participation in maintenance data collection. The members of the nursing staff were provided a data collection form to track the number of times each resident was able or unable to find their
room without assistance. The provided form listed each participant’s name and included two columns: (1) successful wayfinding attempt within three minutes; (2) unsuccessful wayfinding attempt within three minutes. The goal was to have this maintenance data collected for one week. However, the members of the nursing staff were non-compliant and did not record any maintenance data for the study. Data forms were provided to the nursing staff over two consecutive weeks with no results.

**Reliability**

Two investigators participated in the data collection for this study. Each investigator conducted SR training sessions and were trained on the protocol prior to initiating the training sessions with the participants. Each training session took place with only one investigator present. All sessions were recorded using an Olympus digital audio recorder. Audio files were downloaded at The Ohio State University Speech-Language-Hearing Clinic and original files were erased from the audio recorder. Inter-rater reliability was assessed for 20% of all training sessions (12 of 59 total) to ensure appropriate recording of the participants’ responses. The reliability for appropriate response recording was calculated by comparing the marked responses (correct or incorrect (+ or -)) for each trial within a training session. This procedure yielded overall scores above 80% across a total of 59 sessions with a mean of 90.6% agreement and range between 50-100% agreement.
Results

Effects of SR training with external memory aids to assist in wayfinding for long-term care residents with dementia

Figure 2 summarizes participant performance during baseline, training, and generalization sessions. A summary of results are shown in Table 3 for each participant. The table includes number of sessions, trials administered, and mastery of SR training. Tables 4-6 show each individual participant’s SR prompt, expected response, number of sessions, number of trials, number of correct and incorrect responses, as well as the highest successful interval achieved each session. Of the three participants residing in the DCU who were identified as having dementia along with wayfinding difficulty, only one met mastery criteria. The total number of training sessions each participant received varied across participants due to their ability to participate. Participation was dependent upon the participant’s presence in the facility, assent to participate each session, alertness, and agitation level. Although two participants did not reach mastery criteria, evidence of learning and progress was noted across training sessions.
Figure 2. Summary of Participant Performance During Baseline, Training, and Generalization Sessions

Figure 2. N = No (Participant did not independently find room within three minutes.), Y = Yes (Participant did independently find room within three minutes); Participant FCV001’s graph was converted into a logarithmic scale for the y-axis to provide a more accurate visual representation of successful intervals.
Table 3. Summary of SR Sessions and Response Mastery

<table>
<thead>
<tr>
<th>Subject</th>
<th>Number of Sessions</th>
<th>Number of Trials</th>
<th>Mastery Criteria Met</th>
</tr>
</thead>
<tbody>
<tr>
<td>FCV001</td>
<td>8</td>
<td>38</td>
<td>Yes</td>
</tr>
<tr>
<td>FCV003</td>
<td>17</td>
<td>472</td>
<td>No</td>
</tr>
<tr>
<td>FCV006</td>
<td>2</td>
<td>24</td>
<td>No</td>
</tr>
</tbody>
</table>

Subject 1

FCV001 is an 88 year old white female whose primary language is English. She has a diagnosis of Alzheimer’s dementia and received a score of 14 out of 30 on the MMSE. Vision was adequate with the use of glasses, hearing was adequate unaided, and she attained a communication rating of 6 indicating use of multiple sentence responses during conversation. She was able to ambulate independently with adaptive equipment (walker), but the time it took for her to move from one location to the next was longer than the other participants. Investigators controlled for this variable by consistently conducting sessions while the participant was in her dining area or using longer time intervals (between successful four or eight minute trials) to travel toward her dining area. This increased her ability to successfully reach her room within the three minute goal at the end of each session. At baseline, this participant was consistently unable to locate her room for all but one of four data points which is likely a chance event. She participated in SR training for a total of 8 sessions which consisted of 38 trials and met mastery criteria as shown in Table 4. The goal prompt for FCV001 was “What is your room?” paired with a tactile prompt to look at her wristband. The expected trained response was that she
would look at her wristband and say “Rose 2”. The highest training interval attained was 30 minutes which was a result of two training sessions being implemented on the same day. She was able to immediately provide the expected response during two additional visits post training with the time intervals of 24 and 48 hours between correct responses. Generalization data show that FCV001 was able to find her room within three minutes in two out of seven sessions demonstrating inconsistency in her ability to maintain effects of training. However, staff reported that FCV001 was able to respond to the prompt question on at least two occasions by looking at her wristband and saying “Rose 2” outside of the training environment which demonstrates evidence of generalization.

Table 4. SR Training for FCV001

<table>
<thead>
<tr>
<th>Goal Prompt</th>
<th>Goal Response</th>
<th>Session</th>
<th>Trials</th>
<th>Correct Responses</th>
<th>Incorrect Responses</th>
<th>Longest Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>What is your room?</em></td>
<td><em>Rose 2</em></td>
<td>1</td>
<td>10</td>
<td>7</td>
<td>3</td>
<td>4 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>5</td>
<td>3</td>
<td>2</td>
<td>4 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>30 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4</td>
<td>4</td>
<td>2</td>
<td>2</td>
<td>4 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5</td>
<td>11</td>
<td>6</td>
<td>5</td>
<td>4 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>6</td>
<td>4</td>
<td>3</td>
<td>1</td>
<td>8 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>7</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>8 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
<td>8</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>8 minutes</td>
</tr>
</tbody>
</table>
Subject 2

FCV003 is an 85 year old white male whose primary language is English. He has a diagnosis of non-specified dementia and received a score of 0 out of 30 on the MMSE placing him at the lowest level of cognitive performance across the three participants. Vision and hearing were adequate unaided, and he attained a communication rating of 5 indicating use of single sentences during conversation. He ambulated efficiently with an assistive device (walker). Baseline data revealed FCV003’s inability to find his room within three minutes. He participated in SR training for a total of 17 sessions which consisted of 472 trials as shown in Table 5. The high number of trials was a result of this participant’s decreased alertness during the course of the study. His level of alertness was affected by administration of medication to reduce agitation by nursing staff. This participant’s goal prompt and response was created to facilitate his dysarthric speech. He would often appear to struggle in planning or producing the goal response on command or with repetition. The goal prompt for FCV003 was “How do you find your room?” paired with a tactile prompt of looking at his wristband. The expected response for this participant was to look at his wristband and say “key ring.” Investigators chose to implement this prompt/response pattern to pair the participant’s verbal response directly with the tactile prompt because this appeared more concrete with respect to the motor action. The goal response was modified to having the participant look at his wristband and saying “ring.” This was implemented due to the subject experiencing difficulty with motor planning for the initial 2-syllable response “key ring.” The highest interval reached was 2 minutes with the most consistent time interval of 1 minute across sessions. The
participant was discontinued from the study for lack of progress which appeared to be influenced by increased agitation, administration of sedatives, and decreased level of awareness. Mastery was not reached and the participant did not demonstrate objectively that he could find his room given three minutes during generalization. However, staff reported that FCV003’s requests for wayfinding decreased throughout the training period and a simple gesture in the direction of his specific hallway when he asked for assistance finding his room was sufficient for him to proceed to his room.

Table 5. SR Training for FCV003

<table>
<thead>
<tr>
<th>Goal Prompt</th>
<th>Goal Response</th>
<th>Session</th>
<th>Trials</th>
<th>Correct Responses</th>
<th>Incorrect Responses</th>
<th>Longest Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>How do you find</td>
<td>Key Ring</td>
<td>1</td>
<td>11</td>
<td>5</td>
<td>6</td>
<td>20 seconds</td>
</tr>
<tr>
<td>your room?</td>
<td></td>
<td>2</td>
<td>11</td>
<td>4</td>
<td>7</td>
<td>10 seconds</td>
</tr>
<tr>
<td></td>
<td></td>
<td>3</td>
<td>19</td>
<td>8</td>
<td>8</td>
<td>20 seconds</td>
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<td></td>
<td>4</td>
<td>65</td>
<td>32</td>
<td>33</td>
<td>30 seconds</td>
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<tr>
<td></td>
<td>Ring</td>
<td>5</td>
<td>29</td>
<td>13</td>
<td>16</td>
<td>30 seconds</td>
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<td></td>
<td></td>
<td>6</td>
<td>14</td>
<td>4</td>
<td>10</td>
<td>5 seconds</td>
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<td></td>
<td></td>
<td>7</td>
<td>47</td>
<td>18</td>
<td>29</td>
<td>15 seconds</td>
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<td>8</td>
<td>48</td>
<td>25</td>
<td>23</td>
<td>2 minutes</td>
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<td>9</td>
<td>25</td>
<td>12</td>
<td>13</td>
<td>30 seconds</td>
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<tr>
<td></td>
<td></td>
<td>10</td>
<td>28</td>
<td>13</td>
<td>15</td>
<td>1 minute</td>
</tr>
<tr>
<td></td>
<td></td>
<td>11</td>
<td>23</td>
<td>12</td>
<td>11</td>
<td>1 minute</td>
</tr>
</tbody>
</table>
Subject 3

FCV006 is a 91 year old female white female whose primary language is English. She has a diagnosis of vascular dementia and received a score of 8 out of 30 on the MMSE. Vision was adequate with the use of glasses, hearing was adequate unaided, and she attained a communication rating of 6 indicating use of multiple sentences during conversation. She was able to ambulate with a wheelchair by using her feet to propel and maneuver herself. However, she often chose not to do so independently as reported by staff. The participant often asked residents with higher mobility function to take her to her room. This was identified by staff as a problem behavior. Although some other residents were more mobile, their level of wayfinding ability varied which would agitate the participant and lead to disruptive emotional outbursts. It was predicted that SR training for the participant’s cottage symbol and room number would benefit both FCV006 and other residents. Baseline data for FCV006 revealed that she was able to find her room one time out of ten which was likely due to chance. Occasionally, she was able
to state the number of her room “30;” however, she could not identify the specific cottage symbol “Sun” during any baseline session. This participant experienced a fall during baseline data collection which resulted in complaints of chronic pain. She was bedbound for the last few baseline and the two training sessions. However, she was up in her wheelchair and out of her room for some of the generalization sessions. She participated in SR training for a total of 2 sessions which consisted of 24 trials as shown in Table 6. The goal prompt for FCV006 was “What is your room?” with the initial response of looking at her wristband and saying “Sun 30.” Although she was identified by staff as having difficulty with room finding she was able to state her room number alone, “30”, at baseline on a few occasions. The highest interval reached by this participant was 3.5 minutes and she did not demonstrate generalization of the trained response goal.

<table>
<thead>
<tr>
<th>Goal Prompt</th>
<th>Goal Response</th>
<th>Session</th>
<th>Trials</th>
<th>Correct Responses</th>
<th>Incorrect Responses</th>
<th>Longest Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>What is your room?</td>
<td>Sun 30</td>
<td>1</td>
<td>7</td>
<td>3</td>
<td>4</td>
<td>1 minute</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2</td>
<td>17</td>
<td>9</td>
<td>8</td>
<td>3.5 minutes</td>
</tr>
</tbody>
</table>
Discussion

Effects of SR Training

The primary purpose of this research was to determine whether training in the use of external memory aids through SR can improve room finding for people with dementia living in long term care environments. Goal mastery was low (1 out of 3 participants, 33%), however all participants demonstrated evidence of learning across the training period.

Data collected from the current study did not turn out as expected or as reported in previous literature. Prior research has shown that repetition and successful practice of salient information support access to procedural memory through non-declarative processes (Brush & Camp, 1998; Bourgeois et. al., 2003; Hopper et al., 2005). These studies have documented evidence for training the use of external memory aids to assist in use of calendars to remember future events, notebooks to support recall of names, common objects, room number, and cue cards to recall safety strategies for activities of daily living (Bourgeois & Hickey, 2009). Although measures were taken to control extraneous variables during SR training, several unidentified factors placed barriers on training efficacy. Barriers included reliability of data collection by staff, scheduling constraints, facility policy, and availability of participants due to changes in medical status affecting alertness and mood. These barriers limited the implementation of the study protocol and the potential for successful outcomes.
Staff experienced difficulty maintaining data collection guidelines set out at the beginning of the study. Initial baseline data collection from staff was consistent and reliable for the first week of the study. However, staff participation became increasingly unreliable as the study progressed. This was related to facility regulations which limited written reminders as a function of resident privacy and led to less consistent collection of data. The same phenomena occurred at the end of the study during collection of generalization data. It should be noted that DCU staff did make attempts to assist in the implementation of data collection at the later times by suggesting alternatives to visually discernable cues which protected resident privacy. Staff also regularly provided anecdotal reports of training success regarding participants which was noted by investigators. The system that was implemented to meet the needs of staff, residents, and investigators was for data collection reminders to be written on each staff member’s daily assignment sheet. The time it took to agree to this system coincided with final staff data collection at the end of the study and resulted in decreased data as compared to the beginning of the study. Therefore, only investigator collected baseline and generalization data was analyzed in the results section.

Another factor which placed limits on the ability to provide consistent and frequent training to participants was the variable schedules of the graduate student investigators. This was a disadvantage to participants with memory impairment due to gaps in between sessions. Training was not able to be conducted on Tuesdays and Wednesdays leading to a 48 hour lapse in consistent practice of the training response for each participant. This especially made an impact on progress for FCV003 as shown in
Table 5. Training intervals generally trended upward or remained stable when sessions were consecutive. However, when the participant missed one or more consecutive sessions a regression was observed.

Individual participant characteristics and medical needs impacted the opportunity to consistently take part in scheduled training. Variables affecting participants included presence in the facility, alertness, and agitation level. FCV001 would occasionally not be available because she was visiting her spouse in another section of the nursing facility. Additionally, this participant took an extended period of time to ambulate from one location to another. Investigators attempted to consistently train FCV001 in her dining area because her room was the first one in the Rose corridor. At times the participant was not agreeable to ambulating to the Rose dining area due to decreased activity tolerance. On these occasions investigators did not require that she relocate or attempt to find her room at the end of training. Despite these limitations this participant did meet mastery criteria, however she did not consistently maintain the effects of training upon the study’s completion. FCV003 experienced altered mental status at various times throughout study. This resulted in increased agitation which was sometimes treated by administration of sedatives by the shift nurse. His alertness was often compromised during the course of training which led to a high number of trials with short intervals across all sessions as seen in Table 5. Although this participant did not master the SR goal staff reported that FCV003’s requests for room finding decreased throughout the training period. FCV006 experienced difficulty with pain due to a fall which delayed the start of SR training. Training occurred in the participant’s room due to her medical status. During baseline she
was able to remember the specific number of her room on occasion. She showed evidence of learning to state the symbol and number across the two training trials.

**Limitations and Future Research**

Many unplanned variables provided barriers and limitations to the successful evaluation of SR with external aids for improving room finding behaviors in persons with dementia. It is recommended that future research consider modifications to the protocol to address variability in participant availability, consistent implementation of training sessions, and facility policy and procedure for tracking data. Availability of participants was dependent on their physical presence in the facility, alertness, and agitation which had an impact on consistency of training. Future research should account for these variables by allowing additional time for training sessions. Suggestions for accomplishing this include scheduling two time periods per day for training and data collection (i.e. morning and evening) or extending the interval of time each investigator spends training and collecting data (i.e. a three hour period instead of a two hour period). Implementation of a consistent training schedule might increase the opportunity for successful practice of goal response repetitions. This would benefit participants with dementia by increasing the frequency that procedural processes are accessed. It is predicted that improved consistency with the training protocol will result in data which corresponds to evidence reported in previous literature.

Future research should also account for the nursing facility’s policy regarding visibility of research related information. Participant confidentiality is of upmost importance when working with human subjects in research. Nursing facilities are also
responsible for upholding resident rights and confidentiality under HIPAA regulations. During the course of this study investigators and facility staff worked to establish a high level of protection of the participants, however collection of data from facility staff was compromised by inefficient methods and communication. It is suggested that investigators allow for time to survey staff individually during each visit to improve consistency of staff feedback for collection of baseline and generalization data to improve reliability.
Conclusion

Past research documents evidence that SR training in the use of visual aids can benefit the person with dementia who demonstrates wayfinding difficulty in a long-term care setting. Goal mastery for this current study was low with little objective evidence for maintenance and generalization of the SR response, therefore results are inconclusive regarding the effectiveness of SR training for wayfinding. However, nursing staff reported participants experienced increased independence with wayfinding and decreased reliance on care giving staff. Future research is needed to take into account variables such as participant availability and to improve the efficiency and reliability of data collection methods to report objective data by nursing staff.
References


Appendix A: Consent Form
The Ohio State University Consent to Participate in Research

Study Title: Spaced Retrieval Training to Assist in Way finding for Long Term Care Residents With Dementia

Researcher: Michelle S. Bourgeois, Ph.D.

Sponsor: The Ohio State University

- **This is a consent form for research participation.** It contains important information about this study and what to expect if you decide to participate. Please consider the information carefully. Feel free to discuss the study with your friends and family and to ask questions before making your decision whether or not to participate.

- **Your participation is voluntary.** You may refuse to participate in this study. If you decide to take part in the study, you may leave the study at any time. No matter what decision you make, there will be no penalty to you and you will not lose any of your usual benefits. Your decision will not affect your future relationship with The Ohio State University. If you are a student or employee at Ohio State, your decision will not affect your grades or employment status.

- **You may or may not benefit as a result of participating in this study.** Also, as explained below, your participation may or may not result in increased way finding ability.

- **You will be provided with any new information that develops during the study that may affect your decision whether or not to continue to participate.** If you decide to participate, you will be asked to sign this form and will receive a copy of the form. You are being asked to consider participating in this study for the reasons explained below.

1. **Why is this study being done?**

You are being asked to participate in a research project conducted by the OSU Speech-Language-Hearing department, in conjunction with staff of First Community Village. The purpose is to determine if Spaced Retrieval training in the use of external memory aids would increase successful way finding for people with dementia in a long-term care setting.

In this study we wish to determine:

1. Will Spaced Retrieval therapy be effective for teaching individuals with dementia to find their room?
2. Will Spaced Retrieval therapy + external memory aid training be effective for training individuals with dementia to find their room?
Your participation in the project would involve:

1. Receiving either Spaced Retrieval training alone or Spaced Retrieval + external memory aid training to increase your ability to find your room.

2. Allowing a researcher to ask you some questions about your memory and to collect basic demographic information about you (age, gender, ethnicity and race, town and state of residence, cognitive status, diagnoses, town and state of residence, presenting problem(s), co-morbid conditions, and medications currently being taken).

3. Allowing the researcher to document basic information about therapy sessions (number of sessions, length of sessions, reasons for cancellation of sessions or termination, etc.) and report this information to Dr. Michelle Bourgeois at the OSU Speech and Hearing department.

2. How many people will take part in this study?

Up to 6 residents may be participating in this study at a given time.

3. What will happen if I take part in this study?

1. First the researcher will administer the Spaced Retrieval Screen (Brush & Camp, 1998) to tell if the SR technique will work with you. This involves the researcher asking you to remember a fact for 1 min; the researcher will tell you the fact and ask you to say it three times at 10 seconds, 30 seconds, and 1 minute.

2. Then the researcher will ask you where your room is and your room number, and practice having you repeat your room number using the SR technique. Each therapy session is expected to last no longer than 30 minutes. At the end of the session, the researcher will walk with you to your room. The Researcher will use an SR Data sheet and a tape recorder to record your responses.

3. Training will continue until you can find your room right away for three days in a row. Training will end at that point and the researcher will come back 1-week and 4-weeks later to ask you to find your room in order to see if you can remember for that length of time.

4. How long will I be in the study?

You will be in the study a minimum of 2 weeks and a maximum of 4 weeks.

5. Can I stop being in the study?

You may leave the study at any time. If you decide to stop participating in the study, there will be no penalty to you, and you will not lose any benefits to which you are otherwise entitled. Your decision will not affect your future relationship with The Ohio State University.
6. What risks, side effects or discomforts can I expect from being in the study?

The risks of being in the study are minimal. Some people are embarrassed and frustrated by
their memory problems and others get tired during therapy. If either of these things happen
and you want to stop the training, just say so, and the researcher will stop the session. There is
a very small chance that people who are not involved in the study might see your data, but the
researchers will be especially careful to keep your data locked in cabinets in the speech &
hearing department at OSU to avoid that from happening. In addition, all data will be de-
identified which means it will not have your name on it, just a number.

7. What benefits can I expect from being in the study?

It is anticipated that you will learn to find your room easily and consistently with this training
and that this success will improve your quality of life.

Additional potential benefits of the proposed research include broadening the knowledge of
therapy techniques that will work with persons with dementia to increase way finding in long-
term care settings.

8. What other choices do I have if I do not take part in the study?

You may choose not to participate in this study, and you will be offered other types of
training strategies without penalty or loss of benefits to which you are otherwise entitled.

9. Will my study-related information be kept confidential?

Yes, every effort will be made to keep your study-related information confidential. However,
there may be circumstances where this information must be released. For example, personal
information regarding your participation in this study may be disclosed if required by state
law.

Also, your records may be reviewed by the following groups (as applicable to the research):

- Office for Human Research Protections or other federal, state, or international
  regulatory agencies;
- U.S. Food and Drug Administration;
- The Ohio State University Institutional Review Board or Office of Responsible
  Research Practices;
- The sponsor supporting the study, their agents or study monitors.

You may also be asked to sign a separate Health Insurance Portability and Accountability Act
(HIPAA) research authorization form if the study involves the use of your protected health
information.
109 10. What are the costs of taking part in this study?
110 There are no financial costs to participate in this study.
111
112 11. Will I be paid for taking part in this study?
113 No, participants will not receive compensation for participating in this study.
114
115 12. What are the risks to participating in this study?
116 The only minimal risk to participating in this study is loss of confidentiality. To protect
117 confidentiality, all data will be identified by identification numbers only. Data will be stored
118 in locked areas in the OSU Speech & Hearing department. To protect your identity, this data
119 will be destroyed or erased from any storage devices after the scientific usefulness of the
120 information collected is over.
121
122 13. What are my rights if I take part in this study?
123 If you choose to participate in the study, you may discontinue participation at any time
124 without penalty or loss of benefits. By signing this form, you do not give up any personal
125 legal rights you may have as a participant in this study.
126 You will be provided with any new information that develops during the course of the
127 research that may affect your decision whether or not to continue participation in the study.
128 You may refuse to participate in this study without penalty or loss of benefits to which you
129 are otherwise entitled.
130 An Institutional Review Board responsible for human subject’s research at The Ohio State
131 University reviewed this research project and found it to be acceptable, according to
132 applicable state and federal regulations and University policies designed to protect the rights
133 and welfare of participants in research.
134
135 14. Who can answer my questions about the study?
136 For questions, concerns, or complaints about the study you may contact Michelle S.
137 Bourgeois, PhD, Principal Investigator at (614) 292-1742.
138
139 For questions about your rights as a participant in this study or to discuss other study-related
140 concerns or complaints with someone who is not part of the research team, you may contact
141 Fran Welsh, ADC, Life Enrichment Director at First Community Village, 614-486-9511 or
142 Ms. Sandra Meadows in the Office of Responsible Research Practices at 1-800-678-6251.
143
Signing the consent form

I have read (or someone has read to me) this form and I am aware that I am being asked to participate in a research study. I have had the opportunity to ask questions and have had them answered to my satisfaction. I voluntarily agree to participate in this study.

I am not giving up any legal rights by signing this form. I will be given a copy of this form.

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<th>Printed name of subject</th>
<th>Signature of subject</th>
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<th>Signature of person authorized to consent for subject (when applicable)</th>
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<th>Investigator/Research Staff</th>
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<tr>
<td>I have explained the research to the participant or his/her representative before requesting the signature(s) above. There are no blanks in this document. A copy of this form has been given to the participant or his/her representative.</td>
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<tr>
<th>Printed name of person obtaining consent</th>
<th>Signature of person obtaining consent</th>
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Appendix B: HIPAA Authorization Form
Title of the Study:
Spaced Retrieval Training to Assist in Wayfinding for Long Term Care Residents With Dementia
OSU Protocol Number: 2012B0047
Principal Investigator: Michelle Bourgeois, Ph.D.

Subject Name ____________________________

Before researchers use or share any health information about you as part of this study, The Ohio State University is required to obtain your authorization. This helps explain to you how this information will be used or shared with others involved in the study.

• The Ohio State University and its hospitals, clinics, health-care providers and researchers are required to protect the privacy of your health information.

• You should have received a Notice of Privacy Practices when you received health care services here. If not, let us know and a copy will be given to you. Please carefully review this information. Ask if you have any questions or do not understand any parts of this notice.

• If you agree to take part in this study your health information will be used and shared with others involved in this study. Also, any new health information about you that comes from tests or other parts of this study will be shared with those involved in this study.

• Health information about you that will be used or shared with others involved in this study may include your research record and any health care records at the Ohio State University. For example, this may include your medical records, x-ray or laboratory results. Psychotherapy notes in your health records (if any) will not, however, be shared or used. Use of these notes requires a separate, signed authorization.

Please read the information carefully before signing this form. Please ask if you have any questions about this authorization, the University’s Notice of Privacy Practices or the study before signing this form.

Initials/Date: ____________________________

Page 1 of 3

09/25/09
Those Who May Use, Share And Receive Your Information As Part Of This Study

- Researchers and staff at The Ohio State University will use, share and receive your personal health information for this research study. Authorized Ohio State University staff not involved in the study may be aware that you are participating in a research study and have access to your information. If this study is related to your medical care, your study-related information may be placed in your permanent hospital, clinic or physician’s office records.

- Those who oversee the study will have access to your information, including:
  - Members and staff of the Ohio State University’s Institutional Review Boards, including the Western Institutional Review Board
  - The Office for Responsible Research Practices
  - University data safety monitoring committees
  - The Ohio State University Research Foundation

- Your health information may also be shared with federal and state agencies that have oversight of the study or to whom access is required under the law. These may include:
  - The Food and Drug Administration
  - The Office for Human Research Protections
  - The National Institutes of Health
  - The Ohio Department of Human Services

These researchers, companies and/or organization(s) outside of The Ohio State University may also use, share and receive your health information in connection with this study. None

Authorization Period

This authorization will not expire unless you change your mind and revoke it in writing. There is no set date at which your information will be destroyed or no longer used. This is because the information used and created during the study may be analyzed for many years, and it is not possible to know when this will be complete.

Signing the Authorization

- You have the right to refuse to sign this authorization. Your health care outside of the study, payment for your health care, and your health care benefits will not be affected if you choose not to sign this form.

- You will not be able to take part in this study and will not receive any study treatments if you do not sign this form.

Initials/Date__

Page 2 of 3

09/25/09
• If you sign this authorization, you may change your mind at any time. Researchers may continue to use information collected up until the time that you formally changed your mind. If you change your mind, your authorization must be revoked in writing. To revoke your authorization, please write to:

Michelle Bourgeois, Ph.D., Principal Investigator, The Ohio State University, Dept. of Speech & Hearing Science, 1070 Carmack Road, Columbus, OH 43210

• Signing this authorization also means that you will not be able to see or copy your study-related information until the study is completed. This includes any portion of your medical records that describes study treatment.

Contacts for Questions

• If you have any questions relating to your privacy rights, please contact:

Gail Whitelaw, Clinic Director, OSU Speech-Language-Hearing Clinic, 110 Pressey,
1070 Carmack Road, Columbus, OH 43210, 292-6251

• If you have any questions relating to the research, please contact:

Michelle Bourgeois, Ph.D., Principal Investigator, The Ohio State University, Dept. of Speech & Hearing Science, 1070 Carmack Road, Columbus, OH 43210

Signature

I have read (or someone has read to me) this form and have been able to ask questions. All of my questions about this form have been answered to my satisfaction. By signing below, I permit Michelle Bourgeois, PhD, CCC-SLP and the others listed on this form to use and share my personal health information for this study. I will be given a copy of this signed form.

Signature ________________________________
(Subject or Legally Authorized Representative)

Name ____________________________________
(Print name above)
(If legal representative, also print relationship to subject.)

Date ____________ Time ____________ AM / PM
Appendix C: Spaced Retrieval Protocol
Subject #

Training Wayfinding Skills Using Spaced Retrieval for People with Dementia

**Spaced Retrieval Training Protocol** (Data Collection forms and Instruments)

**Demographic Information**

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<th>Date:</th>
<th>Investigator Initials:</th>
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<th>Subject #</th>
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<th>Caregiver Initials:</th>
<th>Relationship:</th>
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<td>Caregiver Address:</td>
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<td>Caregiver Phone:</td>
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**Participant Information:**

**Date of Birth:** (MM/DD/YYYY): / /  
**Age:**

**Diagnoses:**

**Race:**
(1) American Indian and Alaska Native alone
(2) Asian alone
(3) Black or African-American alone
(4) Native Hawaiian and Other Pacific Islander alone
(5) Some other race alone (specify) 
(6) White alone
(7) Two or more Races (specify) 

**Gender:**
(1) Female
(2) Male

**Education Level (highest level completed):**

**Primary Language:**
(1) English
(2) Other (specify)
Screening Measures

A. Functional vision, hearing, and communication screening measures (Bourgeois et al., 2001)

**VISION** (from Minimal Data Set 2.0)

(Ability to see in adequate light and with glasses if used)

0. ADEQUATE – sees fine detail, including regular print in newspapers/books.

1. IMPAIRED – sees large print, but not regular print in newspapers/books.

2. MODERATELY IMPAIRED – limited vision; not able to see newspaper headlines, but can identify objects.

3. HIGHLY IMPAIRED – object identification in question, but eyes appear to follow objects.

4. SEVERELY IMPAIRED – no vision or sees only light, colors, or shapes; eyes do not appear to follow objects.

**VISUAL LIMITATIONS/ DIFFICULTIES**

a. Side vision problems – decreased peripheral vision (e.g., leaves food on side of tray, difficulty traveling, bumps into people and objects, misjudges placement of chair when seating self).

b. Experiences any of following: sees halos or rings around lights; sees flashes of light; sees curtain over eyes.

c. NONE OF ABOVE

**VISUAL APPLIANCES**

Glasses: contact lenses: magnifying glass

0. No 1. Yes

**HEARING**

(With hearing appliance, if used)

0. Hears adequately – normal talk, TV, phone

1. Minimal difficulty – when not in quiet setting

2. Hears in special situations only - speaker has to adjust tonal quality and speak distinctly

3. Highly impaired – absence of useful hearing
COMMUNICATION DEVICES/TECHNIQUES

(Check all that apply during last 7 days)

a. Hearing aid present and used
b. Hearing aid, present and not used regularly
c. Other receptive communication techniques used (e.g., lip reading)
d. None of the above

COMMUNICATION

5 MINUTE CONVERSATION

Set stopwatch for 5 minutes. Prompt at 3.5 and 2.0 minutes approximately. If necessary, use other general prompts ("tell me more" or "what else can you tell me about your life, family, etc.").

1. Tell me about your family.

2. Tell me about your life.

3. Tell me about your day.

Rating of Responses

1. No verbal or vocal response to interviewer.
2. Unintelligible verbal responses, or vocalizing only.
3. Single word responses, includes yes/no responses.
4. Phrases, multword only.
5. Single sentences only.
6. Elaborated conversation; multiple sentence responses; appropriate, normal conversation.
B. MINI – MENTAL STATE EXAMINATION (Folstein, Folstein, & McHugh, 1975)

1. Please tell me today’s date.
   1.1 What month is it? 
   1.2 What date is it? 
   1.3 What year is it? 
   1.4 What day is it? 
   1.5 What season is it? 

   1.6 Score (Maximum score = 5)

2. Please tell me where we are in right now?
   2.1 building 
   2.2 floor 
   2.3 city 
   2.4 county 
   2.5 state 

   2.6 Score (Maximum score = 5)

3. I’m going to name three objects and I’d like you to repeat them after me. 
   (Name three objects, allowing one second to say each one.)
   Apple . . . Table . . . Penny

Give 1 point for each correct answer on the first trial only. Repeat the objects until the patient can name them all (maximum of 6 trials). Stop after 6 unsuccessful trials and enter a 7 for number of trials to indicate that they never learned the succession.

   3.1 # of Trials 
   3.2 Score (Maximum = 3)
4. Use one score. Record the highest score between 4.1 and 4.2

4.1 I'm going to ask you to do some subtraction. Think of the number 7. I want you to subtract 7 from 100. Now subtract 7 from that number and keep going until I stop you.

   (Enter numbers given by respondent below)

4.1.1 ______ (93)
4.1.2 ______ (86)
4.1.3 ______ (79)
4.1.4 ______ (72)
4.1.5 ______ (Stop) (65)

4.1.6 Score (Maximum Score = 5)

4.2 I want you to spell a word forward and then backward. The word is 'WORLD'.

4.2.1 Spell it forward. ______ ______ ______ ______

   (Write exact letters given by respondent in blanks.)

   (If incorrect, stop and record zero for score)

4.2.2 Spell it backward. ______ ______ ______ ______

   (Write exact letters given by respondent in blanks.)

4.2.3 Score (Maximum Score = 5)

5. Do you remember a few minutes ago, I had you repeat some words after me? Tell me what they were? (Give 1 point for each correct answer.)

5.1 ______ ______ ______ ______

   Score (Maximum Score = 3)
6. Please name these for me.
   
   (Show the client a wooden pencil and a watch, preferably worn on the wrist. Score 1 point for each correct answer.)

   6.1 ___________ (pencil)
   6.2 ___________ (watch)

   6.3 Score (Maximum score = 2)

7. I’m going to read a sentence and I want you to repeat it after me. Say exactly what I say.
   (Score 1 point only if every word repeated correctly.)

   NO IFS, ANDS, OR BUTS.

   7.1 Score (Maximum score = 1)

8. Read this card and do what the card tells you to do.
   (Show the card with “Close your eyes” on it. One prompt allowed after initial instructions.)
   (Score 1 point. You may need to tell them to open their eyes.)

   8.1 Score (Maximum score = 1)

9. Now I’m going to ask you to do something for me. I’m only going to say it once, so listen carefully. (Score 1 point for each step.)

   Take this paper in your right hand; __________
   Fold the paper in half with both hands; __________
   And put the paper in your lap. __________

   9.1 Score (Maximum score = 3)
10. **Now, please write a sentence for me on the piece of paper.**  
(Do not dictate a sentence or provide a subject; it must be written spontaneously. The sentence must contain a subject and verb and be sensible. Correct grammar and punctuation not necessary. Score 1 point.)  

10.1 Score (Maximum = 1)

11. **Please copy this design exactly as it is for me.**  
(Hold the card with the design on it in front of the client; do not let the client trace the design. All 10 angles must be present, and 2 must intersect to score 1 point. Tremor and rotation are ignored.)  

11.1 Score (Maximum = 1)

12. **Did the client exhibit any signs of illiteracy, or of physical impairments that would hinder performance on any of the items in this test?**  
(Do not include this score in the MMSE total score.)  

( ) No  

( ) Yes  

If yes, please specify:________________________________________

MMSE TOTAL SCORE (Maximum = 30) __________________________
C. Spaced Retrieval Screen (Brush & Camp, 1998)

1. (NO DELAY) "Today we are going to practice remembering my name. My name is ______________. What is my name?"

   Correct: "That's right. I am glad that you remembered."

2. (SHORT DELAY) "Good. I will give you more opportunities to practice as I am working with you today.

   Let's try again. What is my name?"

   Correct: "That's right. I am glad that you remembered.

3. (LONG DELAY) "You are doing well remembering my name for a longer period of time, and that's the idea. I would like you to always remember my name. I will be practicing this with you during therapy by asking you often. What is my name?"

   Correct: "That's right you are remembering for a longer period of time. You did a great job remembering my name."

If the client is incorrect at any level 3 times in a row, this client is not appropriate for SR training, say: "Thanks for trying so hard. Let's work on something else now."

D. Sample Data Sheet for Wayfinding Behaviors (pre- and post-training)

<table>
<thead>
<tr>
<th>Resident Name:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Date</th>
<th>Wayfinding Attempt Initiated by Resident</th>
<th>Wayfinding Attempt Initiated by Staff/Researcher</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Successful within 3 Min.</td>
<td>Unsuccessful within 3 Min.</td>
</tr>
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<td></td>
</tr>
</tbody>
</table>

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Appendix D: Staff Data Collection Form
### To and from dates

<table>
<thead>
<tr>
<th>6:30-2:30</th>
<th>Monday date</th>
<th>Tuesday date</th>
<th>Wednesday date</th>
<th>Thursday date</th>
<th>Friday date</th>
<th>Saturday date</th>
<th>Sunday date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resident</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
<td>NO</td>
<td>YES</td>
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</tr>
</tbody>
</table>

| 2:30-10:30 | YES       | NO           | YES            | NO           | YES         | NO            | YES         |
|           |           |              |                |              |             |               |             |
|           |           |              |                |              |             |               |             |
|           |           |              |                |              |             |               |             |
|           |           |              |                |              |             |               |             |

**Directions:** Please make a tally mark in the appropriate box when a resident is seeking their room. Place a tally in the **YES** column when the resident is able to successfully find their room without assistance within 3 minutes. Place a tally in the **NO** column when the resident is unable to find their room without assistance within 3 minutes. Thank you for your assistance.
Appendix E: Sample Spaced Retrieval Data Form
E. SPACED RETRIEVAL DATA SHEET

Client ID#

Date: __________________ Session#: __________________

Goal Prompt: ______________________________________

Response: _______________________________________

Executed Strategy: __________________________________________

Goal Modification: _______________________________________

Previous longest interval: __________

<table>
<thead>
<tr>
<th>Trial 1</th>
<th>Trial 2</th>
<th>Trial 3</th>
<th>Trial 4</th>
<th>Trial 5</th>
<th>Trial 6</th>
</tr>
</thead>
<tbody>
<tr>
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<td>sec/min</td>
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<td>sec/min</td>
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<tr>
<td>+ / -</td>
<td>+ / -</td>
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<td>+ / -</td>
<td>+ / -</td>
<td>+ / -</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Trial 7</th>
<th>Trial 8</th>
<th>Trial 9</th>
<th>Trial 10</th>
<th>Trial 11</th>
<th>Trial 12</th>
</tr>
</thead>
<tbody>
<tr>
<td>sec/min</td>
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<td>+ / -</td>
<td>+ / -</td>
</tr>
</tbody>
</table>

Observations: ____________________________________________

_________________________________________________________