Evidenced-Based Interventions for Impairments of Memory

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DISCLOSURES

Rebecca D. Eberle, M.A., CCC-SLP, BC-ANCDS

Has no financial or other interest to disclose

Learning Objectives

- Identify the general guidelines for the use of external memory strategies.
- Define and state the training stages in Memory Notebook procedures.
- Identify types of external memory devices and aids.
- State the procedures for the treatment strategies for severe memory impairment
- Define and state types of metacognitive strategy training for memory impairment.

Outline for the Presentation

- Overview of Memory Systems
- BI-ISIG Recommendations for Memory Impairment
- Determining which Approach to Use: External Compensations or Strategy Training?
- External Compensations
- Strategies for Severe Memory Impairment
- Memory Strategy Training

Components of Memory

Attention → Encoding → Storage → Retrieval

(Sohlberg & Mateer, 2001)

Neuroanatomy of Memory

BRAIN REGION	MEMORY FUNCTION
Frontal Lobes	Retrieval
Subcortical Region (hippocampus, amygdala, striatum)	Declarative memory (facts, events)
Cerebellum, basal ganglia	Procedural memory for motor learning

Stages of Memory Processing

- Registration (sensory memory)
- Short-term memory
  - Immediate memory
  - Working memory
  - Rehearsal
  - Intermediate memory
- Long-term memory
  - Consolidation
  - Learning

(Lezak, 2012)

Registration

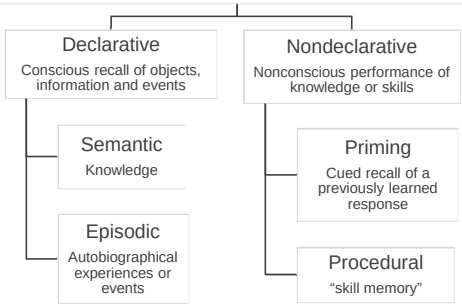
- Holds large mounts of data for seconds
- Modality specific (e.g., visual, auditory)
- Influenced by affect, set (perceptual and response predisposition), and attention-focusing processes

Visual Registration Sample

Short-Term Memory

- Immediate memory
  - Simple immediate span of attention (modality-specific)
  - Working memory: "temporary storage & processing system used for problem solving that take place over a limited period of time"
- Rehearsal
  - Repetitive processes to enhance the level of encoding and duration of a memory
- Intermediate memory?
  - 1-2 days but not "permanent"

Organization of Long-term Memory Systems



Other Types of Memory

- Prospective
  - Part of executive functions
  - Remembering to remember
- Source memory
  - Context in which something was learned

BI-ISIG Recommendations for Treatment of Memory Deficits

Practice Standard

Memory strategy training is recommended for mild memory impairments from TBI, including the use of internalized strategies (e.g., visual imagery) and external memory compensations (e.g., notebooks).

Practice Guideline

Use of external compensations with direct application to functional activities is recommended for people with severe memory deficits after TBI or stroke.

BI-ISIG Recommendations for Treatment of Memory Deficits

Practice Options

- For people with severe memory impairments after TBI, errorless learning techniques may be effective for learning specific skills or knowledge, with limited transfer to novel tasks or reduction in overall functional memory problems.
- Group-based interventions may be considered for remediation of memory deficits after TBI.

Approaches to Rehabilitation Memory

APPROACHES	TECHNIQUES	
EXTERNAL COMPENSATION	Orientation notebook	Errorless learning, spaced retrieval, chaining
	Electronic device	Cell phone, pager, alarms
	Memory notebook	
MEMORY STRATEGY TRAINING	Association Techniques	Visual-verbal association, visual-verbal schematics, visual peg method, Method of Loci
	Organizational & Elaboration Techniques	First letter mnemonics, semantic clustering, PQRST, use of humor, storytelling

Choosing the Right Strategy

Decision Tree for Treatment Planning In Memory Dysfunction

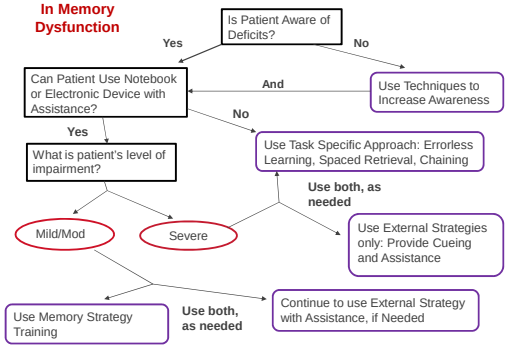
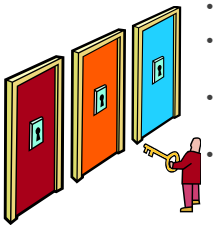


Figure 3.1

Considerations in Choosing a Strategy



- Severity of impairment
- Nature of the information to be remembered
- Functional, personally meaningful tasks
- Patient should understand, have input into goals and strategies- active collaboration.

External Compensations for Memory Impairment

Types of External Devices

- Notebooks
- Other written planning systems
- Electronic planners, PDA's
- Smart cell phones
- Computerized systems
- Auditory or visual systems
- Task-specific aids





Which Type of External Device?

1. The particular task the patient wishes to perform
2. The patient's goals, abilities, disabilities and preferences
3. The physical features (or limitations) of available technology: audio features, digital options, cost, downloadable apps
4. The environment in which technology is going to be used.
5. The familiarity to the patient.

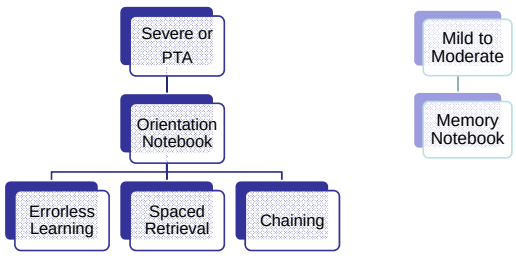
General Guidelines for External Memory Strategies

- Constant and easy access to the external device or notebook.
- Training of all staff and family members in the use of device.
- Errorless learning techniques and use of procedural memory for severely impaired patients.
- Multiple learning & generalization trials.

General Guidelines for External Memory Strategies, cont'd

- Address any executive dysfunction.
- Apply external devices to functional tasks in the daily life of the patient.
- Use cues early in treatment and fade over time
  - Mild impairment: Rapid fading
  - Severe impairment: Gradual fading

Memory Notebook Types



Memory Notebook

- Comprises the core of external memory compensations, along with electronic devices.
- Possible sections:
  - Things to do
  - Memory log
  - Daily schedule
  - Homework
  - History and background
  - Handouts
  - Contacts

Stages in Memory Notebook Training

Acquisition	Application	Adaptation
Goal: To learn the names, purpose, & use of each section	**Goal**: To use notebook on functional tasks in clinic	**Goal**: To use notebook in naturalistic settings
Strategies: Errorless learning, spaced retrieval	**Strategies**: Feedback, cues, repetition	**Strategies**: Feedback, cues, repetition, updating

(Sohlberg & Mateer, 2001)

Acquisition Stage

Level of severity determines which strategies are utilized.

Severe ⟷ Mild

- Errorless Learning
- Spaced Retrieval

- Question & Answer Rehearsal
- Knowledge Questions

Acquisition Stage

Question & Answer Rehearsal Samples

- In what section of your Memory Notebook do you plan evening activities?
- In what section of your Memory Notebook do you record future appointments?

Knowledge Questions

- You should review what you have recorded in the book when _____
- You should write in the Memory Log when _____

Application Stage

- Memory notebook is integrated into various structured activities, with the clinician.
- Tasks are chosen for functionality and relevance for each person
- Cuing is provided for client learning and success

Adaptation Stage

- Applies skills learned to tasks and responsibilities in naturalistic settings – outside the clinic.
- External device is functionally integrated into daily routines to:
  - Document information, activities
  - Support prospective memory
  - Organize tasks

Sample Tasks

- Using device to remember to perform a future action:
  - Bring your iPhone to the next therapy session.
  - Tell your family member 1 thing you did at therapy today.
- Using device to store/retrieve sets of information:
  - Dates of upcoming medical appointments.
  - Names and types of medicine used.
- Using device to report information from events/activities:
  - Reporting activities from a visit or past weekend.
  - Reporting information from a work meeting.

Updating and Cleaning Routine

Develop a designated time for review, updating and cleaning of the notebook.

Sequence of Steps:

- Remove old log sheets and place in file.
- Put in the new sheets - logs
- Double check work
- Check the calendar to add any upcoming events

Scoring and Documentation

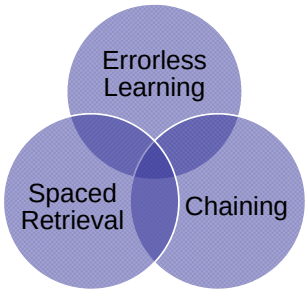
1	• Patient was unable to initiate
2	• Patient needed moderate assistance to record & retrieve information during session
3	• Patient needed minimum assistance to either record or retrieve information during the session
4	• Patient independently recorded & retrieved all relevant activities and information during the session

Strategies for Severe Impairment

Strategies for Severe Memory Impairment: Overview

- Appropriate for clinically important functional skills training, e.g., safe transfers
- Domain specific learning; limited generalization
- Attempts to maximize functioning through recruitment of procedural memory

Effective Strategies for Severe Impairment



Errorless Learning

- Presents information in a way that minimizes the possibility of making mistakes.
- Therapist presents simple information, and requests the patient to immediately repeat.
- More effective when combined with spaced retrieval or with chaining techniques.

Errorless Learning Training Samples

a. "The names of the notebook's sections are the schedule, the memory log, and…. What are the names of the sections of your notebook?"

b. "The schedule section of your notebook is for you to record your appointments for the day. What do you record in the schedule section?"

c. The things to do section of your memory notebook is for you to record things you need or want to do that day. What do you record in the things to do section?"

Orientation Page

- Single sheet with all personal information or clinically-relevant information
- Errorless training used in training
- Patient trained to refer to the book/page to answer her/his OWN questions
- Orientation page/book transitioned into MEMORY book when patient ready

*See Form 3-2, page 50 of the Manual for an errorless learning protocol for basic orientation

Orientation Page - *Sample*

Name:_____ **Date:**_____

My name is _____
I am ____ years old
I was born on _____
My phone number is _____
Right now I am in the city of _____
The date today is_____
Right now I am at a _____
I was injured on _____
The kind of injury that I have is a _____
(Others, as driven by the patient's questions)

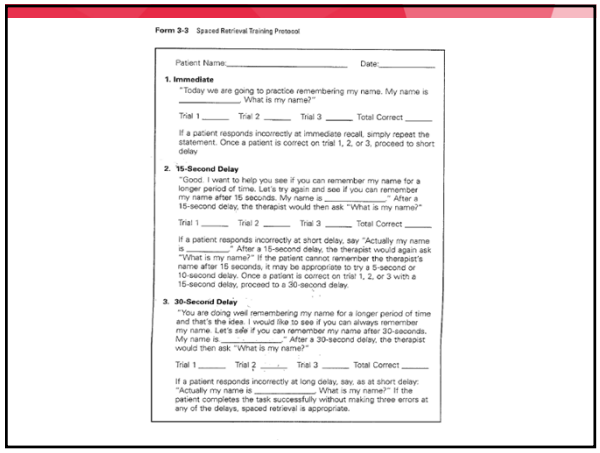
Error Elimination Techniques

- Break down the targeted task into small, discrete steps or units.
- Provide sufficient models before the client is asked to perform the target task.
- Encourage the client to avoid guessing.
- Immediately correct errors.
- Carefully fade prompts.

Spaced Retrieval

- Variation in errorless learning
  - patient asked to retain information over progressively longer periods of time e.g., immediate, 15 sec, 30 sec, etc.
- If errors, reduce time between intervals
- Interval time can be quiet or filled with tasks/conversation
- Can be effective for learning specific information (names, room numbers), or strategies (e.g. memory book strategies)

*See Form 3-3, page 51 of the Manual for a spaced retrieval protocol



Form 3-3 Spaced Retrieval Training Protocol

Patient Name:_____ Date:_____

1. Immediate

"Today we are going to practice remembering my name. My name is _____. What is my name?"

Trial 1 _____ Trial 2 _____ Trial 3 _____ Total Correct _____

If a patient responds incorrectly at immediate recall, simply repeat the statement. Once a patient is correct on trial 1, 2, or 3, proceed to short delay.

2. 15-Second Delay

"Good. I want to help you see if you can remember my name for a longer period of time. Let's try again and see if you can remember my name after 15 seconds. My name is _____." After a 15-second delay, the therapist would then ask "What is my name?"

Trial 1 _____ Trial 2 _____ Trial 3 _____ Total Correct _____

If a patient responds incorrectly at short delay, say "Actually my name is _____." After a 15-second delay, the therapist would again ask "What is my name?" If the patient cannot remember the therapist's name after 15 seconds, it may be appropriate to try a 5-second or 10-second delay. Once a patient is correct on trial 1, 2, or 3 with a 15-second delay, proceed to a 30-second delay.

3. 30-Second Delay

"You are doing well remembering my name for a longer period of time and that's the idea. I would like to see if you can always remember my name. Let's see if you can remember my name after 30-seconds. My name is _____." After a 30-second delay, the therapist would then ask "What is my name?"

Trial 1 _____ Trial 2 _____ Trial 3 _____ Total Correct _____

If a patient responds incorrectly at long delay, say, as at short delay: "Actually my name is _____. What is my name?" If the patient completes the task successfully without making three errors at any of the delays, spaced retrieval is appropriate.

Form 3-4 Spaced Retrieval Record Form

Patient Name:_____ Date:_____

Information being presented: _____

		Delay in: ___Seconds ___Minutes											
Trial	Imm	1	2	3	4	5	6	8	10	12	16	20	24	28	32
1															
2															
3															
4															
5															
6															
7															
8															
9															
10															
11															
12															

The user can indicate if the recall was correct or incorrect for each trial by placing a (+) or (-) in box corresponding to the delay interval. Obviously, the delay interval can be modified according to the patient need.

Spaced Retrieval: Advantages

- Takes advantage of 'distributed practice' by spreading the learning trials over a period of time.
- Can be effective to train people with severe memory impairments to remember specific information.
  - (1) Strategies, e.g., memory notebooks,
  - (2) Simple therapeutic procedures (swallowing, transfers, etc.)
  - (3) Concrete information such as names, of people/places.
  - (4) Locations of importance (e.g. room number, facility name)
- Generalization is not expected.

Spaced Retrieval Resources

- Screening Test – assists with determination of patient's appropriateness for technique
- Training Sheet – Assists with data management for determination of time intervals.
- See: Brush J & Camp C. A Therapy Technique for Improving Memory: Spaced Retrieval. Meyers Research Institute. http://store.myersresearch.org/thteforimmes.html

Chaining Technique

- Method of teaching patients to perform sequences by means of procedural memory.
- Complex tasks analyzed into multiple steps
- Each step is taught as an isolated unit, automatically with errorless learning, and mechanically linked to other steps
- Each step serves as a cue for the next step
- Occurs without conscious or deliberate intent

*See Form 3-5, pages 54 and 55 for protocol using errorless learning

Forward and Backward Chaining

- Forward chaining:
  - Patient begins with the first step in the sequence and is guided in performing it.
  - Once successful, the second step is introduced and patient performs both together, thereby linking them.
  - This continues forward until task is complete.
- Backward Chaining:
  - Patient begins with the last step in the sequence.
  - Once successful, next to last step is introduced, thereby linking them.
  - This continues backward until patient can perform all steps in sequence.

Form 3-5 Chaining Worksheet Using Errorless Learning

Patient Name:_____ Date:_____

Task: _____

Steps involved in the task:

1) _____
2) _____
3) _____
4) _____

INSTRUCTIONS: FORWARD CHAINING (FOR A FOUR-STEP TASK)

(1) Demonstrate all steps in the task sequence and label each step as you do.

Say: "When you need to (perform specified task), you should do steps ___1___, ___2___, ___3___ and ___4___."

Do: Perform the task for the patient.

(2) Teach step one.

Say: "When you need to (perform specified task), you should begin by ___1___. What should you do when you need to (perform specified task)?"

Do: Guide patient, as needed, through performance of step one.

(3) Teach step two.

Say: "After you do ___1___, you should do ___2___. What should you do after you do ___1___?"

Do: Guide patient, as needed, through performance of step one and two together.

(4) Teach step three.

Say: "After you do ___2___, you should do ___3___. What should you do after you do ___2___?"

Do: Guide patient, as needed, through performance of step one, two and three together.

(5) Teach step four.

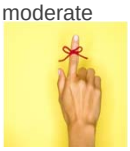
Say: "After you do ___3___, you should do ___4___. What should you do after you do ___3___?"

Do: Guide patient, as needed, through performance of step one, two, three and four together.

Memory Strategy Training

Memory Strategy Training

- Internal, self-instructional strategies for storage and retrieval of declarative information.
  - Verbal or non-verbal
  - Can be facilitated by external strategies
- Most effective for those with mild to moderate memory impairments



Memory Strategy Training

Encoding strategies

Retrieval strategies

Enhance patient's ability to find and retrieve information at the time of recall

Types of Metacognitive Techniques

Association Techniques

Technique	Description
Visual Peg Method	Target items are linked with a standard set of peg words which are already learned in a set sequence.
Method of Loci	Linking information to specific (external) visual reference
Visual Imagery	Linking information to specific (internal) visual reference
Absurdity	Humor and high levels of interaction make associations stronger

Visual Peg Method Sample

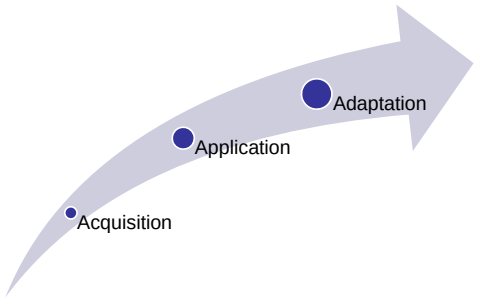
Peg Words	Linked Word	Key Image
1 - Bun	Bread	
2 - Zoo	Hotdog Buns	
3 - Tree	Soda	
4 - Door	Kiwis	

Organizational Strategies

Organizational Techniques

Technique	Description
First Letter Mnemonics	Use the first letter of each of a series of words to form a single word or pseudo-word. **HOMES** = **H**uron **O**ntario **M**ichigan **E**rie **S**uperior
Semantic Clustering	Grouping items in a list into smaller categories
PQRST	Self-instructional technique to learn and recall complex written information **P** review **Q** uestion **R** ead **S** tate **T** est

Stages of Strategy Training



Acquisition Stage

Step 1: Introduction to technique

- Psycho-education
  - Establish how the strategy will improve their overall effectiveness and independence.
  - Use examples of real-life use

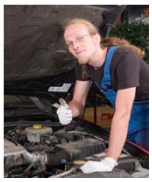
Step 2: Learn the strategy

- Guide patient systematically through use of strategy
- Desired outcome for patients to be able to:
  - Describe the methods
  - Identify tasks and situation for use
  - Be able to recite the steps involved in applying the strategy

Application Stage

- **Practice** in simple 'real-life' or role-play scenarios
- **External support** begins with high levels and fades with success.
- **Recall periods** should gradually increase (24, 48, 72 hours, one week).
- **Levels of complexity/amount** should gradually increase.
- **Self generation** of techniques.
- **Feedback and discussion** from both therapist and patient on performance.

Adaptation Stage



- **Apply techniques** to more complex, functional and everyday tasks, outside the clinic.
- **Generalize** into ecologically valid environments and tasks.
- **Incorporate family** and significant others to facilitate and reinforce generalization.

Application & Adaptation Activities

Activity	Application	Adaptation
Face Name Association	Remembering names of the therapists or other patients	Remembering names of classmates, co-workers
Visual Imagery	Remembering story details recalling locations	Studying for a test, recalling appointments
Verbal mnemonics	Remembering grocery lists, to-do lists, steps involved in functional activities	Remembering grocery list when shopping, to-do list
Organization Strategy	Organizing details from a short article, remembering mock grocery store list	Encode essential details from lectures or textbook, recall items from grocery list by category
PQRST	Remembering newspaper article or job description	Remembering information from lecture or textbook

Summary of Metacognitive Strategies

- Only for those with mild or mild-moderate level of impairment.
- Client must self-initiate strategy use in real-life environments.
- Some strategies may be difficult to generalize in real environments due to slow processing speed or time pressures.
- Often used in combination with external strategies.

Memory Rehabilitation Group

- Model described by Thickpenny and Barker-Collow:
- Didactic teaching about memory and strategies
- Small group activities
- Discussions
- Problem solving
- Active use of strategies
- Curriculum based therapy group (Learning Modules); meets 2x/week for 4 weeks.

TEACH-M

- 'an instructional package that facilitates learning and retention of multi-step procedures for persons with severe memory and executive function impairments'
- Research results support implementation across a wide range of tasks and contexts.
- Produced ecologically valid outcomes in timely fashion.

Ehlhardt et al, 2005; Sohlberg et al, 2005

TEACH-M Components

- Task analysis
- Errorless learning
- Assess performance
- Cumulative review
- High rates of correct practice trials
- Metacognitive strategy training

Ehlhardt et al, 2005; Sohlberg et al, 2005

Summary of TEACH-M features

- Errorless learning
- Task analysis
- Forward chaining
- Focus on 1 task in-depth
- Cumulative review
- Stimulus pre-exposure
- Prediction-reflection (meta-cognitive strategy)
- Instructor model/guided practice
- Multiple practice opportunities
- Spaced retrieval
- Carefully faded prompts
- Varied training examples
- Training to criterion

Ehlhardt et al, 2005; Sohlberg et al, 2005

References

- Brush J & Camp C. A Therapy Technique for Improving Memory: Spaced Retrieval. Meyers Research Institute. http://store.myersresearch.org/thteforimmes.html
- Cicerone KD, Dahlberg C, and Kalmar K. et al. Evidence-based cognitive rehabilitation: Recommendations for clinical practice. Archives of Physical Medicine and Rehabilitation, 81: 1596-1615, 2000.
- Cicerone KD, Dahlberg C, and Malec J, et al. Evidence-based cognitive rehabilitation: Updated review of the literature from 1998 to 2002. Archives of Physical Medicine and Rehabilitation, 86: 1681-1692, 2005.

References

- Cicerone KD, Langenbahn DM, and Braden C. et al. Evidence-based cognitive rehabilitation: Updated review of the literature from 2003 through 2008. Archives of Physical Medicine and Rehabilitation, 9: 519-530, 2011.
- Donaghy S, and Williams W. A new protocol for training severely impaired patients in usage of memory journals. Brain Injury, 12: 1061-1076, 1998.
- Ehlhardt LA, Sohlberg MM, Gland A, & Albin R. TEACH-M: A pilot study evaluating an instructional sequence for persons with impaired memory and executive functions. Brain Injury 19:569-583, 2005.

References

- Evans JJ, Wilson BA, Schuri U, et al. A comparison of errorless and trial-and-error learning methods for teaching individuals with acquired memory deficits. Neuropsychological Rehabilitation 10: 67-101, 2000.
- Kaschel R, Della Sala S., Cantagallo A, et al. Imagery mnemonics for the rehabilitation of memory: A randomised group controlled trial. Neuropsychological Rehabilitation 12: 127-153, 2002.
- Ownsworth T, and McFarland K. Memory remediation in long term acquired brain injury: Two approaches in diary training. Brain Injury, 13: 605-626,1991.

References

- Sohlberg M. and Mateer C. Cognitive Rehabilitation: An Integrative Neuropsychological Approach. New York: The Guilford Press, 2001.
- Sohlberg M, Ehlhardt L, & Kennedy, M. Instructional techniques in cognitive rehabilitation: A preliminary report. Seminars in Speech and Language 26: 268-279, 2005.
- Thickpenny-Davis KL, & Barker-Collow SL. Evaluation of a structured group format memory rehabilitation program for adults following brain injury. Journal of Head Trauma Rehabilitation 22: 303-313, 2007.
- Wilson B. Memory Rehabilitation: Integrating Theory and Practice. New York: Guilford Press, 2009.

Case Study and Discussion: Memory

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Learning Objectives

- Discuss evidenced based options for treating memory deficits.
- Identify examples of behaviors that directly lead to memory intervention selection decisions.
- Provide examples of memory strategies facilitating the adaptation in case studies.

Demographics

- 39 y/o Caucasian Male
- Married with 3 children; all at home initially
- High school graduate, some limited college course work
- Former District Manager for large company in metropolitan area; on disability leave
- Medical History - seemingly good; active athletically, trim; heart murmur as a child

Neuropathology/Rehabilitation

- Cardiac arrest while on vacation.
- Without oxygen for 8 minutes – Severe Anoxia
- Inpatient hospitalization (acute, sub-acute and rehabilitation) = 5 months
- Outpatient therapies (OT/ST) = 5 months
- Home based OT = 4 months
- Referred to University ~ 16 months post onset

Assessment at 1 ½ yr post onset

- **NY evaluation**:
  - revealed profound visual spatial, verbal, geographic, autobiographical memory impairment, moderate impairment in attention and EF, and severe language compromise
  - Lack of progress on re-test after 3 months; discharged with referral for language tx
- **Language assessment (WAB, CADL, ASHA FACS):**
  - Moderate transcortical aphasia
    - Intact syntactic fluency, and repetition
    - Compromised naming, word-finding and auditory comprehension
    - Perseverative verbally
  - Acquired dysgraphia (spelling) & dyscalculia

Functional Impairments and Limitations

- 24 hour supervision – father was primary caregiver – re-tired school teacher.
- Used a magnet board “to-do” list at home with assistance – required cueing
- Unable to provide current autobiographical information; no recollection of day-to-day
- Unable to serve in role as employee, father, home-maker
- Fluent, paraphasic and semantically empty
- Comprehension impairments; required visual prompts and models.
- Very easily confused, lost -> anxious

Strengths and Assets

- FAMILY SUPPORT
- Social Skills
- No physical or visual limitations
- In therapy, and at home on tasks, good sustained attention on activities
- Agreeable, followed lead, and would ask for help
- Positive demeanor
- While compromised, able to talk and write

Client/Family Goals

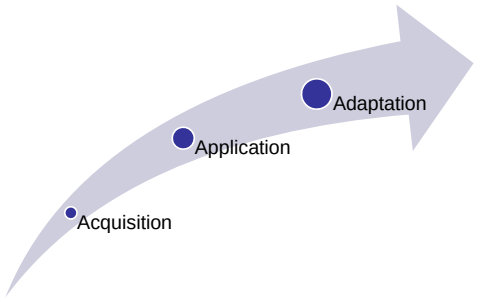
- Remembering and finding right words
- Aspired to:
  - Stay home alone
  - independence with household management – Productive days
  - Drive
  - Parent his children
  - Volunteer with some independence (morphed from a RTW goal)

Individual Therapy – Decision Making

- Language - EB Aphasia therapy
  - Personalized cueing, VNeST, PCA, SFA
  - Aphasia Support Group
- Memory - External Aid using Errorless Learning
  - Had been tried repeatedly in other facilities; client knew enough to "not like" a traditionally made small binder with sections (previous memory book); rejected it.
  - History of loosing book, and "not using"
- **Family Education/Collaboration**

EB therapy = Intervention for Severe Memory Impairment with use of External Memory Aid.

Stages of Strategy Training



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Acquisition	Application	Adaptation
Goal: To learn the names, purpose, & use of each section	**Goal**: To use notebook on functional tasks in clinic	**Goal**: To use notebook in naturalistic settings
Strategies: Errorless learning, spaced retrieval	**Strategies**: Feedback, cues, repetition	**Strategies**: Feedback, cues, repetition, updating

(Sohlberg & Mateer, 2001)

Discussion

- What would be appropriate tasks for this client, using goals and strategies provided?
- Considerations given his initial moderate transcortical sensory aphasia?

Individualized tasks and tactics

Stages	Description of Tactics and tasks
Acquisition	• Choosing, purchasing and setting up personal memory book • Training one section at a time, using errorless learning • Developing a key for the personalized sections; training consistent use.
Application	• Slowly developing and implementing routines in therapy, and then through homework (support from father) for inputting and accessing specific information. • Expanded use for more prospective memory purposes • Controlling highly for errors and high success/reward • Integrated fully into Aphasia Support Group
Adaptation	• Expanding routines at home, through support of father. • Using system on clinic fieldtrips (sport's store, Union Building for sport's wear, golfing..) • Heavily integrated in participation in Aphasia Support Group – very powerful in outcome. • Consistent use at all home and community activities

Examples from KEY

- Your To-Do list tells you all the things that you need to do today.
- *To-Do lists help you to stay organized and to make a plan for your day.
  - *As you check items off, you can keep track of which things you have already finished doing and which things you still need to do.

- Your List of Details is a detailed summary of what you did today.
  - *The extra details help you remember everything that happened today so that you can talk to people about it later.

Outcome

Measure	Status
Final Standardized Testing	• RBANS – <1%tile in immed. & delayed memory, language; visuo-spatial/constructional 63rd %tile; attention 21st %tile • WAB – improved to mild anomic aphasia
Performance in memory and language at clinic & group	• Able to use memory book independently to find and share information, to input information in the correct location and to complete tasks for future need. • Able follow schedule and lists independently • Able to converse pertinent information
Home and community participation	• Obtained driving license; drove with support to other towns; independent in home community. Household shopping, child transportation, errands (with external memory tools) • Able to stay home for ½ days and be independent with basic home-making tasks (lawn-mowing, cleaning..) • Re-assumed partial parenting roles • Volunteering 2 hours at a time

Lessons Learned/Reinforced

- Not enough to choose the right intervention – strategic approach
- Outcomes = more than test score
- Get out of the therapy room!
  - Groups
  - Community based therapy
- FAMILY, FAMILY, FAMILY
  - Education
  - Engaging as co-clinician
  - Imperative in adaptation stage for this case

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