

Cognitive Rehabilitation

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Quratulain Khan, PhD, HSPP

Clinical Neuropsychologist, Dept. of Rehabilitation Neuropsychology,
Rehabilitation Hospital of Indiana;

Clinical Assistant Professor, Dept. of Physical Medicine and Rehabilitation,
Indiana University School of Medicine

Learning Objectives

- Describe the goals of cognitive rehabilitation
- Describe evidence-based options for treatment of attention, memory, and executive functions
- Describe the role of emotional factors in cognitive rehabilitation
- Describe barriers to cognitive rehabilitation

Experienced any of these in the last week?

- Going into a room and forgetting why you went there.
- Losing the thread of what you were saying when you became distracted.
- Forgetting an appointment or something else you should have done.
- Finding it hard to do two things at the same time, e.g., talking on the phone and paying at the cash register at Target.
- Following a brain injury these difficulties become more pronounced.

What is Cognitive Rehabilitation?

- “*a systematic, functionally oriented service of therapeutic cognitive activities, based on an assessment and understanding of the person’s brain-behavior deficits. Services are directed to achieve functional changes by (1) reinforcing, strengthening, or reestablishing previously learned patterns of behavior, or (2) establishing new patterns of cognitive activity or compensatory mechanisms for impaired neurological systems*”
(Harley et al. 1992).

Models of Cognitive Rehabilitation

- Restore
 - Direct training
- Compensate
 - External aids (e.g., memory notebook, smart phone reminders)
 - Internal (metacognitive) strategies (e.g., mnemonics)

Goals of Cognitive Rehabilitation

- The overall goal of cognitive rehabilitation is **functional improvement** ideally in a way that is **meaningful and relevant** as defined by the patient. This may include improvement in safety, independence, day-to-day functioning, and overall quality of life post-injury.
- Achieved in a step-wise manner
 - Problem orientation, awareness, and goal setting
 - Compensation
 - Internalization/Automaticity
 - Generalization

Problem Orientation, awareness and goal setting

- Recognizing specific problem(s) that require intervention
- Collaborating to establish meaningful short- and long-term goals
- Awareness and goal setting is a major therapeutic priority; foundation for most intervention

Compensation

- Providing clients with the necessary tools
- Positively impacts functioning despite persistent or chronic impairments
- Often the end goal for cognitive rehabilitation
- Examples:
 - External memory aids
 - Mnemonic techniques

Internalization/Automaticity

- The clinical process of gradually increasing the automaticity of practiced strategies which facilitates independence through the use of compensatory strategies and tools.

Generalization

- Application of appropriate strategies for managing deficits in personally relevant areas of everyday functioning

Stages of Cognitive Rehabilitation

Sohlberg & Mateer, 2001

TREATMENT STAGE	GOALS	STRATEGIES
Acquisition	<p>Help build patient awareness and acceptance of deficits and benefits of treatment</p> <p>Teach purpose and procedures of treatment model</p>	External
Application	<ol style="list-style-type: none">1) Improve effectiveness and independence in compensating2) Promote internalization of strategies	<ol style="list-style-type: none">1) External2) Internal
Adaptation	<p>Promote transfer of training</p> <p>Promote generalization of skills</p>	External and Internal

Treatment Planning and Goal Writing

How to select best BI-ISIG recommended strategy to address the client's cognitive/functional impairment

Essential Ingredients to consider:

- Hierarchy of deficits
- Severity of injury
- Specific nature of the patient's impairments (and relative strengths)
- Goal of restoration vs. compensation

Treatment Considerations when Designing Training Procedures

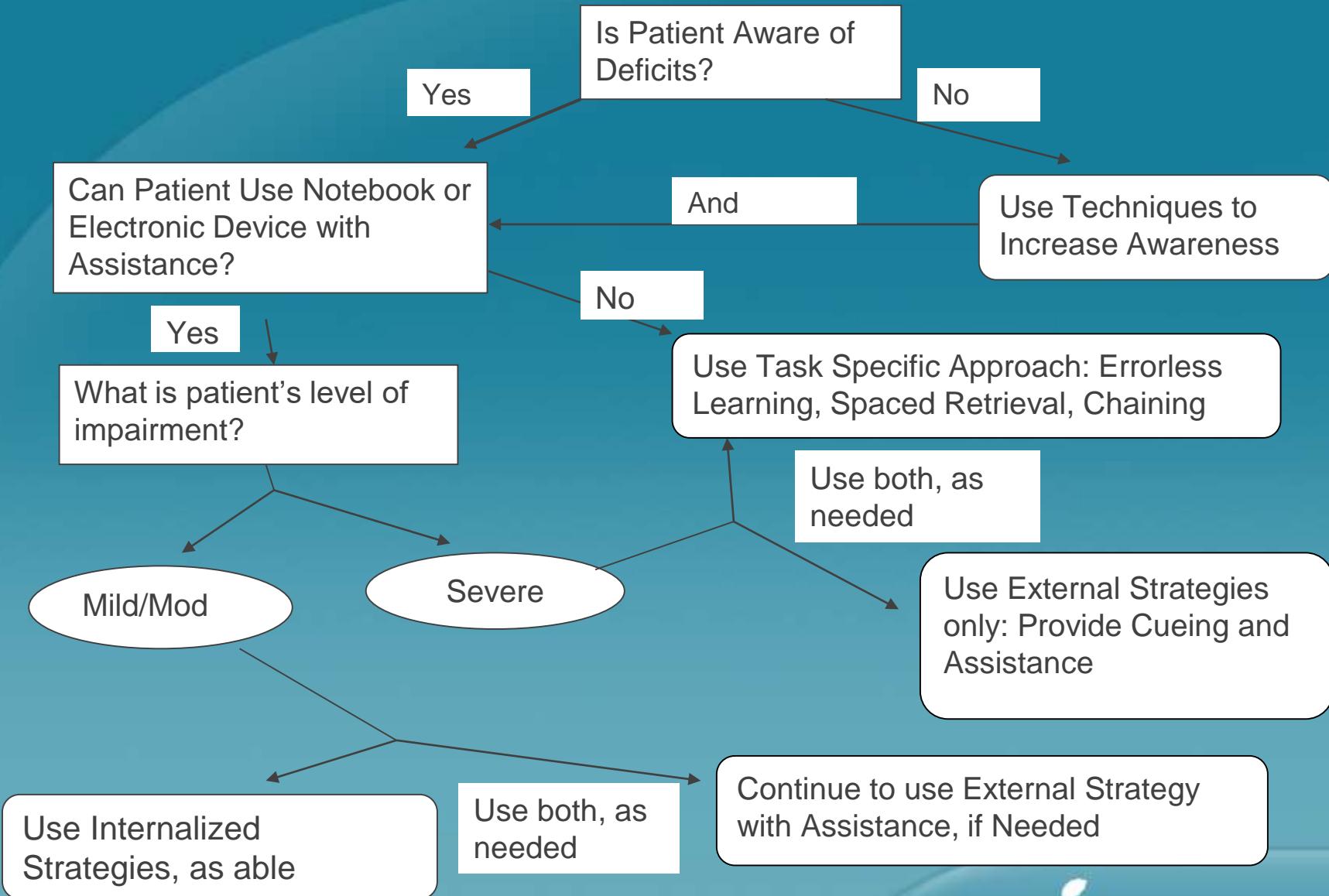
(See Decision Tree p. 12)

Task specific vs. general approaches

- General Approaches are broad and aimed at an overall domain (e.g., memory)
- Task specific protocols focus on procedural learning for a specific task (e.g., medication)

External vs. Internal Strategies

- Memory Mnemonics (Internal)
- Procedural (External)
- Impairment Level
 - Mild: benefit from both
 - Severe: benefit from external only



Goal Writing: From Strategies to Tactics

Strategic, long-term goals (LTGs)

reflect the general approach taken to the deficit linked with the stage of training and the task or domain being addressed by therapy

Tactical, short term goals (STGs)

reflect the specific means by which the strategy is implemented. The intermediate steps to accomplish the LTG

****Both types of goals are necessary and important to the overall success of treatment**

Writing Short-term (Tactical) & Long-term (Strategic) Goals

- LT (Strategic) Goal: “improve ability to independently compensate for memory deficits using external aids”
Vs.
• ST (Tactical) Goal: “patient will initiate four simple household tasks with minimal assistance using a memory notebook in 90% of opportunities”

Comprehensive Template for Goal Writing

Five Essential Factors	Example
	“Patient will perform....
Type of Task	household tasks that require scheduling
Complexity of Task	4 tasks that are simple
Level of Cueing or Assistance Needed	with minimal assistance
Type of Strategy Employed	to use a memory notebook strategy
Measurement of Performance (e,g., speed, accuracy)	In 90% of opportunities”

Collaboration in Treatment Planning and Goal Setting

- Harmony between patient's goals and therapist's goals
- All goal writing needs to be a product of collaboration between the patient and the therapist.
- Goals must be patient-centered, relevant, meaningful.
- Integrate information from all relevant sources to individualize treatment

Measurement of Treatment Progress: Clarity in Goal Writing and Evaluation

- Goals need to be clear, measureable and objective so we know when they've been reached
- Goals need a definite time frame with a beginning and an end
- Monitor and chart (daily, weekly, monthly) the patient's progress
- Collaborative appraisal of progress

Monitoring Progress Towards Goals: Obstacles to Goal Attainment

- Are the goals attainable, appropriate and clearly communicated?
- Does the patient understand the relationship between long-term and short-term goals?
- Are the strategies appropriate?
- Are the tactics effective in implementing the strategy?

Patient Progress Outcomes

1. Patient never develops necessary awareness to compensate; patient learns to perform simple routine and action sequences procedurally
2. Patient independent with use of external aids; some internalization, but still needs external guidance
3. Patient able to internalize fully-learned strategies; can apply in specific situations or tasks.
4. Patient generalizes learned skills to a range of situations and/or tasks.

Who Provides Cognitive Rehabilitation? Where? When?

- Speech-language therapists, occupational therapists, vocational rehabilitation therapists, neuropsychologists
- Currently no licensure guidelines
- Society for Cognitive Rehabilitation certification
- Pre-graduate coursework, ACRM workshops
- In- and out-patient, home, community
- **No time post-injury in which people with TBI do not benefit from Cognitive Rehabilitation**

Comprehensive Holistic Cognitive Rehabilitation

- Practice Standard
- Individual
- Group
- Community-based
- Address physical, cognitive, behavioral changes as well as emotional co-morbidities
- Family education

History and Evolution

- Initial research with stroke patients at NYU in the 1950's
 - First comprehensive holistic day treatment program
- ACRM Cognitive Rehabilitation Task Force
 - Multiple systematic reviews (Cicerone et al, 2000, 2005, 2011); evidence of effectiveness + recommendations for practice
 - Cognitive Rehabilitation Manual (2012)
 - First draft by Dr. Ed Haskins
 - Dr. Lance Trexler (Editor)

ACRM Manual - Evidence-Based Treatment of...

- Attention
- Memory
- Executive Functions
- Hemispatial neglect
- Social communication

Cicerone et al, 2000, 2005 & 2011, combined total = 370 articles

Classification of Level of Evidence

Class I/la (N = 65)	Studies with well designed, prospective, randomized controlled trials
Class II (N = 54)	Prospective, nonrandomized cohort studies; or clinical series with well-designed controls that permitted between subject comparisons of treatment conditions
Class III (N = 251)	Clinical series w/o concurrent controls, or studies with results from 1 or more single cases w/ appropriate methods

Levels of Recommendation for Rehabilitation Strategies

- Practice Standard: “substantial evidence”
- Practice Guideline: “probable effectiveness”
- Practice Option: “possible effectiveness” but requires further research

Recommendation	<p>Description – as to whether the treatment be specifically considered for persons with neurocognitive impairments and disability</p>
Practice Standard	<p>Based on at least 1 well-designed class I study with an adequate sample, with support from class II/III evidence; providing substantive evidence to support a recommendation.</p>
Practice Guideline	<p>Based on 1 or more class I studies with methodologic limitations, or well-designed class II studies with adequate samples; providing evidence for probable effectiveness to support a recommendation.</p>
Practice Option	<p>Based on class II or class III studies that directly address the effectiveness of a treatment, providing evidence of possible effectiveness to support a recommendation.</p>

Barriers to Translation of Research into Clinical Practice

- Clinical methods not often described in enough detail
- Practitioners do not have easy access to literature or time to read literature
- Training programs for practitioners do not include BI specific cognitive rehabilitation strategies
- Rehabilitation organizations have reduced training budgets
- Staff turnover results in experience drain

Purpose of the ACRM Cognitive Rehabilitation Manual

- Guide the practice of cognitive rehabilitation based on the evidence
- Assist the therapist in determining which type of strategy might be the most appropriate
- Provide structure for establishing and measuring long-term strategic and short-term tactical goals, based on the evidence
- Provide the therapist easy access to the rehabilitation procedures, tactics and strategies that were utilized in the research

BI-ISIG Recommendations for the Treatment of Attention Impairments

Practice Standard

- Remediation of attention during *post-acute* rehabilitation after TBI.



BI-ISIG Recommendations for the Treatment of Attention Impairments

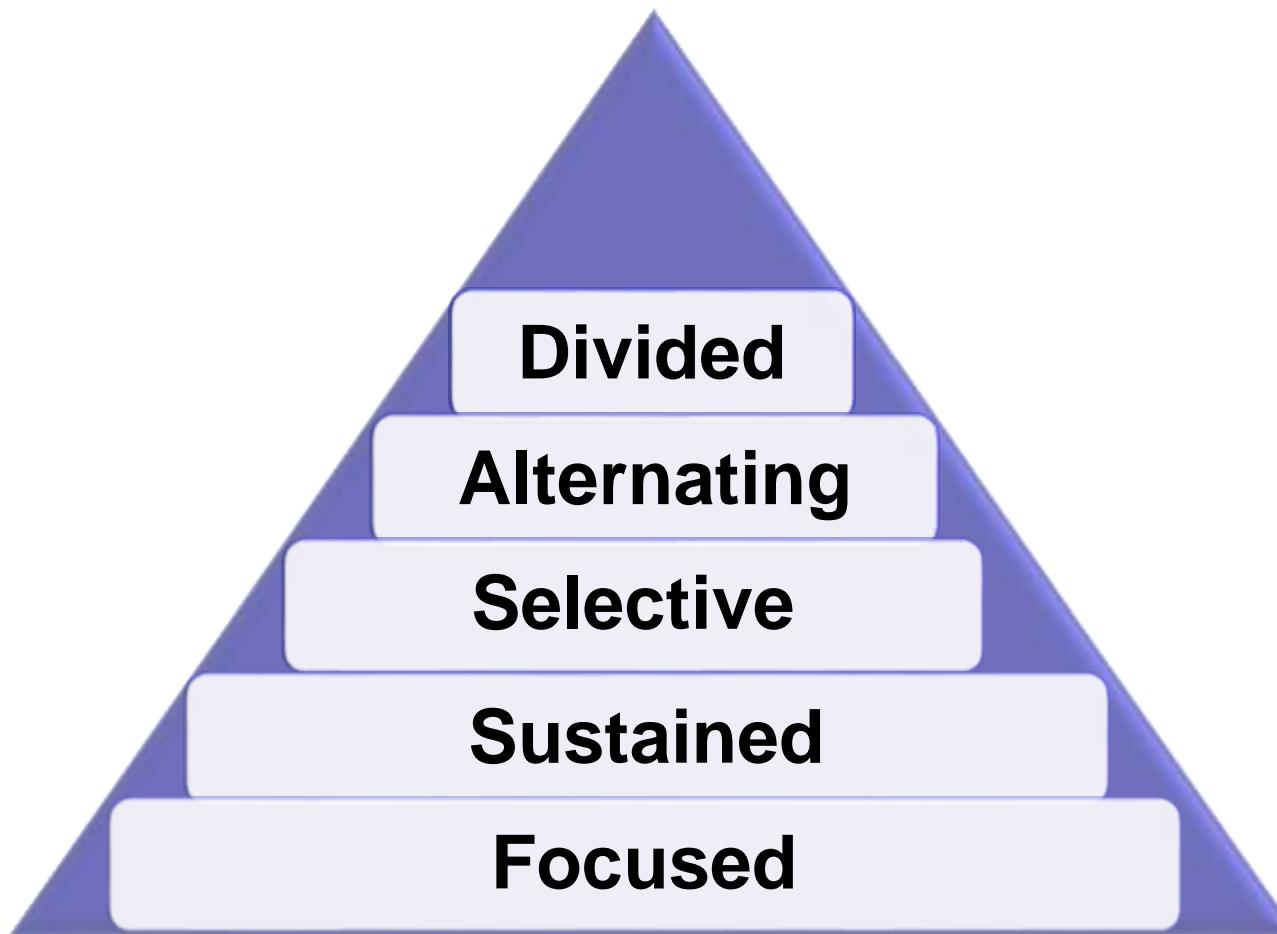
Practice Option:

- Computer-based interventions may be considered as an ADJUNCT to clinician-guided treatment for the remediation of attention deficits after traumatic brain injury or stroke
- Sole reliance on repeated exposure and practice on computer-based tasks without some involvement and intervention by a therapist is *NOT* recommended.

Evidence-Based Treatment of Attention Impairment

- Direct Training
 - Attention Process Training (Sohlberg et al., 2002)
- Strategy (Metacognitive) Training
 - Time Pressure Management (Fasotti et al., 2000)
 - Working memory rehabilitation based on n-back procedures (Cicerone, 2002)

Hierarchy of Attention



Time Pressure Management

- Analyzing Time Pressure
 - Are two or more things to be done at the same time in which not enough time? Will I get overwhelmed or distracted?
- Preventing Time Pressure
 - Make a plan of decisions and actions to take before the task starts. Preparatory tasks to reduce time pressure during activity
- Handling Time Pressure
 - Make an emergency plan for anything unexpected. Include all actions that could be taken in case of increased time pressure
- Monitoring Task Performance

Working Memory Strategy Training

- Clinical Assumptions of Working Memory Rehabilitation
 - Cicerone (2002) - Attention problems become more pronounced in situations that demand attention to rapidly presented information and/or multiple sources of information
 - Patients can be taught to use strategies to help allocate attention resources and manage the rate of information processing
- N-back procedure
- Strategies
 - Verbal mediation
 - Rehearsal
 - Self-pacing
 - Sharing attentional resources
 - Self-monitoring
 - Managing emotional reactions

Attention Training

- Education about types of attention (Focused, sustained, selective, divided, alternating)
- Identifying internal and external distractions and managing them to improve attention (e.g., change lighting, decrease noise)
- Monitor attention slips (automatic attention slips vs. distracted attention slips)
- Stop-Think-Plan (STP)
- Monitor attention slips and successes
- Time Pressure Management

Attention Pie, Identifying Distractions

- Attention Pie
 - Overall attentional capacity less than before injury
 - Each slice of pie takes away already reduced attention capacity
 - Use strategies to remove slices or make them smaller so available attention capacity greater
- Distractions
 - Internal – Thoughts (e.g., past, future), Emotions (e.g., anxiety, excitement), Physical (e.g., fatigue, pain, hunger, cold, illness, physical discomfort, alcohol/drugs)
 - External – e.g., Noise, interruptions, visual clutter

Strategies to Promote Attention

- Ensure you have their attention before proceeding
- Minimize distractions
- Cue that what you are saying is important and they need to listen
- Keep instructions simple and direct
- Speak slowly
- Provide a quiet area for work that is challenging
- Give advanced warning and preparation time prior to changing activity

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

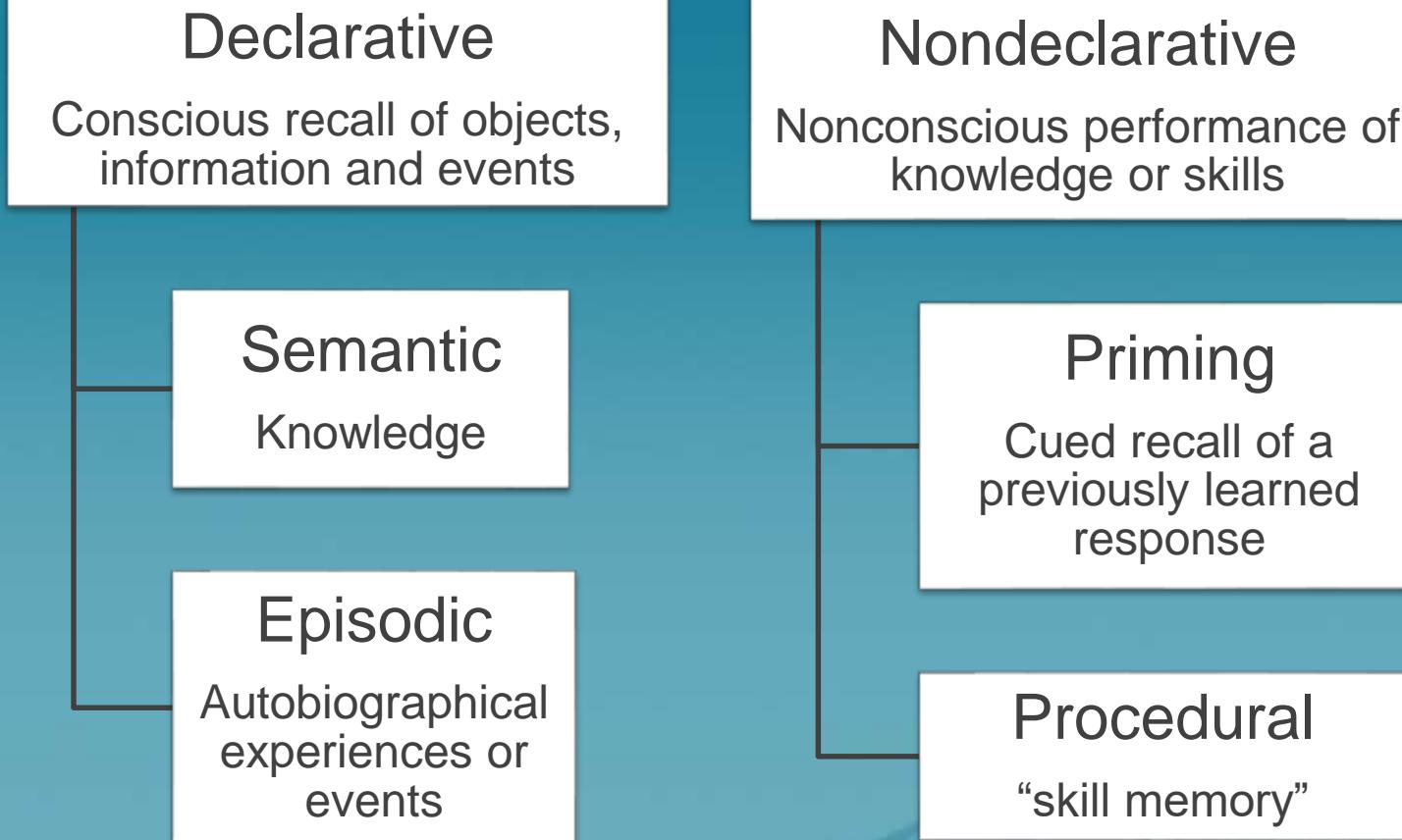
- For people with severe memory impairments after TBI, errorless learning techniques may be effective for learning specific skills or knowledge, with limited transfer to novel tasks or reduction in overall functional memory problems.
- Group-based interventions may be considered for remediation of memory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

Components of Memory



(Sohlberg & Mateer, 2001)

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

Approaches and Techniques in the Rehabilitation of 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

Strategies to Promote Memory

- Encourage retelling
- Cue to write information down
- Constant and easy access to memory notebook or external aid
- Multiple learning and generalization trials
- Training of all staff and family in use of memory aid

Executive Functioning???

- The integrative cognitive processes that determine goal-directed and purposeful behavior
- Includes
 - Formulate goals and solve problems
 - Anticipate the consequences of actions
 - Plan and organize behavior
 - Initiate relevant behaviors
 - Monitor and adapt behavior to fit o particular task or context

Executive Dysfunction

- Cognitive
 - Problems with awareness, anticipating problems, analyzing situations, planning and executing solutions, maintaining a flexible approach to tasks, and self-monitoring
- Behavior
 - Fail to think before acting, impulsivity or disinhibition, initiation deficits, hyperverbosity, poor emotional control

BI-ISIG Recommendations for the Treatment of Executive Dysfunction

- **Practice Standard:** Metacognitive strategy training (self-monitoring and self-regulation) for deficits in executive functioning after TBI, including impairments in emotional self-regulation, and as a component of interventions for deficits in attention, neglect and memory

BI-ISIG Recommendations for the Treatment of Executive Dysfunction (cont'd)

- **Practice Guideline:** Training in formal problem-solving strategies and their application to everyday situations and functional activities during post acute rehabilitation after TBI
- **Practice Option:** Group-based interventions may be considered for remediation of executive and problem-solving deficits after TBI

Techniques in the Rehabilitation of Executive Functioning

- Time Pressure Management
- Awareness Training Protocol
- ICRP Activity Analysis
- Goal-Plan-Do-Review
- Goal Management Training (Stop-Think-Plan)

A General Algorithm for Re-mediation of Executive Dysfunction

- Awareness and goal setting
- Anticipation and planning
- Execution and monitoring
- Evaluation and revision

Goal, Plan Do, Review

Ylvisaker & Feeney, 1998

- Goal: What do I want to accomplish?
- Plan: How am I going to accomplish the goal? List all the steps.
- Do: Execute the plan
- Review: How did I do? What worked? What didn't?

Rehabilitation of Executive Functions

- Self-monitoring (Stop-Think-Plan)
 - Stop whatever you are doing. Brief pause or lengthy break
 - Think about what you are doing or intend to do. Questions to ask yourself include: Am I still focused on my task? What was my original goal and am I still moving towards it? Have I become distracted by anything? Am I missing or forgetting something?
 - Based on answers to the above questions, you may need to either refocus your attention and/or adjust your plan to get back on track

Strategies to Promote Executive Functioning

- Establish structure
- Set goals
- Break tasks down into small steps
- Use checklists
- Give direct feedback
- Use Self-questioning
- Problem solve step by step

Factors that Influence the Cognitive Rehabilitation Process and Outcome

- Therapist variables
 - Lack of, or insufficient communication
 - Not incorporating interventions to address emotional factors
 - Therapist frustration or other emotional reactions towards the patient
 - Not involving the family, caretakers and/or significant others in treatment

Factors that Influence the Cognitive Rehabilitation Process and Outcome

- Patient variables
 - Impairments of awareness
 - Neurocognitive, psychological, socio-environmental factors (Fleming and Ownsworth 2006)
 - Emotional factors
 - Neuropathological changes in brain
 - Emotional reactions to injury
 - Pre-morbid psychiatric disorders

Emotional Factors

- Rehabilitation is likely to fail if we do not deal with emotional issues (Prigatano, 1999)
- Evidence-based interventions based on metacognitive strategy training emphasize that cognitive and emotional aspects of behavioral regulation must be addressed together (e.g., Rath et al., 2003; Gordon, Cantor, & Ashman, 2006).

Emotional Factors

- Improved self-regulation of both cognitive and emotional processes (via metacognitive strategy training) = increased patients' self-efficacy beliefs = improved outcomes including patients' subjective sense of well-being and life satisfaction.
- Patients' beliefs and their subjective experience are an integral component of the rehabilitation process and effective rehabilitation after TBI "must address patients' attitudes and beliefs in addition to their cognitive abilities; remediation of cognitive abilities may have more generalized effects if it increases self-efficacy beliefs as well as trains cognitive skills" (Cicerone, Mott, Azulay, Friel, 2004).

Emotional Regulation Training

- Cognitive Energy/Emotion Scale (CES)
 - Self monitoring
 - Improve “emotional literacy” and awareness
 - Identify and avoid triggers
- Challenge cognitive distortions
- Replace maladaptive thoughts
- Teach relaxation strategies and techniques to manage stress
- Mindfulness Meditation (body scan, mindful activity)

Factors that Influence the Cognitive Rehabilitation Process

- Contextual considerations
 - Reimbursement