Errorless Learning: An intervention option for individuals with severe memory deficits

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Learning Objectives

- To identify the difference between explicit/declarative and implicit/procedural memory
- Identify the basic principles of errorless learning
- Identify 1 process for implementing an errorless learning strategy
Overview

- Memory
  - Process
  - Systems
- Errorless Learning
- Outcomes and Discussion

How Are Memories Made?

- ACQUIRE the information
- STORE the learned information
- RETRIEVE the information when needed

Memory PROCESS

<table>
<thead>
<tr>
<th>Acquisition</th>
<th>Storage</th>
<th>Retrieval</th>
</tr>
</thead>
<tbody>
<tr>
<td>Taking in Information</td>
<td>Recording it, Filing it</td>
<td>Accessing information when needed</td>
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<td>Encoding</td>
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(MossRehab Clinical Work Group, 2015)
Memory PROCESS

Acquisition
• Attention impacts acquisition
• Information is registered
• Sensory systems are utilized, so damage to a primary area will impact acquisition efforts
• There is a limited capacity to process info when it is first acquired
  "Short term memory" (not held, a buffer that only can manage about 7 pieces of verbal info)

Storage
• Recall of recent info
• Immediate memory (The ability to reproduce info after a brief time delay) For example, "tell me this back in a few seconds/minutes"
• As info is consolidated, it is no longer part of STM
• Delayed memory reflects more TIME since acquisition
• Long-term memory storage is limitless and the information can be transformed with each retrieval

Retrieval
• The ability to access stored information
• Cues may be helpful/necessary, e.g., letter prompts
• Retrieval (i.e., without prompts) vs. Recognition (i.e., choices)
• How a question is asked can influence the outcome
Review of Terms

- Acquisition
  - Initial stage of memory; encoding
- Consolidation
  - The time-dependent processes that stabilize a memory trace in the neural connections after the initial acquisition
- Retrieval
  - Searching for or activating existing memory traces; requires monitoring the accuracy and appropriateness of memories pulled from storage
- Prospective Memory
  - Remembering to initiate intended actions at a future time
- Working Memory
  - Refers to the short term storage of info and the active process of manipulating that information either for storage or retrieval. Integrally related to attention.

Memory PROCESS

- Acquisition
- Storage
- Retrieval

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Post Traumatic Amnesia

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<tr>
<td>Retrograde Amnesia</td>
<td>Deficient ability to retrieve information stored prior to brain damage, time gradient</td>
</tr>
<tr>
<td>Anterograde Amnesia</td>
<td>The inability to acquire new information following brain damage</td>
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<tr>
<td>Post Traumatic Amnesia (PTA)</td>
<td>Disorientation, period of confusion with inability to remember events, usually following decreased consciousness; time of PTA related to severity of injury/prognosis</td>
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Memory Systems

- **Declarative**
  - Explicit - Conscious recall of objects, information, and events
  - Semantic (knowledge)
  - Impact on learning
  - Examples: recalling a phone number or an appointment time, recalling an answer to a test question

- **Non-Declarative**
  - Implicit - Unconscious performance of knowledge or skill
  - Procedural
  - Impact on learning
  - Examples: riding a bike, putting on a shirt, throwing a ball

Declarative

Conscious recall of objects, information and events

Episodic

Autobiographical experiences

Semantic

Knowledge

Non-Declarative

Nonconscious performance of knowledge or skills

Priming

Cued recall of a previously learned response

Procedural

“skill memory”

Haskins et al., 2012

2017 ATRA Academy Webinar Series B, Session Three
Errorless Learning (EL): Basic Principles

» Relies on implicit or procedural memory
» Individuals with severe memory impairment are often not able to learn from errors
» Individuals are prevented from making mistakes during learning
» Minimize attentional demands

EL: Basic Principles

» Information/skill will become automatic
» Highly structured, frequent repetition
» Information/skills taught the same way each time
» Simpler is better

Errorless Learning

» Strengths
  - Skills can be learned even if they cannot be consciously recalled
  - Slow to acquire, however very strong
  - Evidence supports the use of EL as an instructional practice
Errorless Learning

- Weaknesses
  - Skills typically do not generalize
  - Learning is specific to the stimulus and context
  - Stimulus variability must be built into the instruction
  - In a functional setting, difficult to eliminate all errors

Remediation of Memory Deficits

- 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

  (Cicerone et al. 2011)

EL: Process

- Break down the skill/information to be taught into discrete steps (task analysis)
- Teach only one step/piece of information at a time
- Skill must be meaningful to the individual and taught in the setting/context it will be used
- Provide a model
- Avoid guessing and trial and error learning
EL: Process

- Provide the amount of cueing and/or physical assistance needed to prevent an error from occurring
- Intervene to prevent errors
- Use a cueing hierarchy
- Fade cues from the most to the least intrusive as individual begins to initiate more of the actions correctly

EL: Process

- Use a forward or backward chaining technique
  - Each step is learned as an isolated unit then linked to the step before and after
  - Example: forward chaining
    - Therapist guides the individual performing the first step of the task, then therapist completes the rest
    - Once individual able to perform the first step, the second step is added and the individual is then guided through the performance of both steps together
    - This continues until all steps are linked together

- Conscious choice of therapist
- Errorless Learning
  - Severe memory loss
  - Trial and error/errorful learning is not effective
  - Individual is in PTA
- Trial and error
  - Learn better making mistakes
  - Better generalization in learning
Evidence-Based Practice

- Study results have found EL to be effective teaching the following skills:
  - Using an external compensatory device – electronic aids/planner or compensatory strategy
  - Reducing the amount of assistance needed by participants to complete targeted personal ADL
  - Improving verbal recall and functional task acquisition
  - New factual information as long as have adequate STM about one minute
  - Face-name associations
  - Route-finding
  - Better performance in a procedural task than trial and error learning for individuals with dementia

Outcomes

- Tasks with the following characteristics are more likely to benefit from EL:
  - Tasks involving a single cognitive domain and a single component of behavior or those that can be broken down into a series of discrete learning steps
  - Tasks that do not require flexibility of response
  - Tasks that require minimal attentional demands
Outcomes

- EL can be an effective learning strategy for teaching for individuals with severe memory impairment new information, skills, or procedures when other methods fail
- Procedural memory is utilized
- Route finding for a specific route (if path blocked or closed trouble!!)

Outcomes

- Instruction should occur in the actual setting or context in which the skill/procedure will be used
- Repetition and frequency are critical for effectiveness

Examples:

- Teaching the use of a strategy
Teaching use of Strategy:
Cleaning Clubhouse Bathrooms

1. WEAR GLOVES!!!!!
2. Lift up toilet seat, close toilet with splash of Pine-Sol cleaner and toilet brush
3. Spray sink and toilets with Scrubbing Bubbles spray
4. Disinfect soap dispensers, light switches, doorknobs, handle bars, toilet paper holder, and toilet handle with Clorox wipes
5. Wipe mirror with Windex and paper towel
6. Wipe Sink and Toilet with Wyp-Alls. (Do not flush wyp-alls)
7. Sweep, then empty dustpan into trash.
8. Take 5 minute break, set 5 minute alarm on phone, then start bathroom #2.

Teaching use of Strategy

How to Log on the Computer

- Step 1: Type in "padlabhouse" in the first box
- Step 2: On the keyboard, hit the "Tab" button
- Step 3: Type in "padlabhouse1"
- Step 4: On the keyboard, hit the "Enter" button

Examples:

- Teaching the use of a strategy
- Transfers in inpatient setting
- Route finding to YMCA
- Using a planner/electronic devices
Important Considerations

- Frequent, consistent repetition
- Skill taught the same way each time
- Prevent errors from occurring during learning
- Sensitive to all environmental factors

References


References


The 2017 ATRA Webinar Program

**Series C: Behavioral Health (May–July)**

**Session C3**: Active Transportation for Individuals with Mental Health Conditions  
Presented by: Gretchen Smetten, Ph.D., CTRS and Brandt Scott, CTRS  
Date: July 12, 2017     12:00 pm Eastern Time

**Session D1**: Recreation Therapy in the Schools using the Model of Functional Authenticity  
Presented by: Dan Scaduto, CTRS  
Date: July 19, 2017     12:00 pm Eastern Time

**Session D2**: Developing through Dance in Schools  
Presented by: Rebekah Now, CTRS  
Date: August 16, 2017     12:00 pm Eastern Time

**Session D3**: Adventure Facilitation for Adolescents on the Autism Spectrum: Evidence-Based Interventions for RT Professionals  
Presented by: Jason Silva, TRS, CTRS  
Date: September 20, 2017     12:00 pm Eastern Time

**Series D: Recreational Therapy in Community Settings (August–October)**

**Session E1**: Inclusion Process in a Community Parks and Recreation Organization  
Presented by: Kristen Clatos Riggins, MA, CTRS, ATRIC  
Date: August 9, 2017     12:00 pm Eastern Time

**Session E2**: Evidence Based Practice: Community Day Camp for Teens with IDDD  
Presented by: Kristen Clatos Riggins, MA, CTRS, ATRIC  
Date: September 6, 2017     12:00 pm Eastern Time

**Session E3**: The King Adult Day Enrichment Program: A Practical Application of TR in the Community  
Presented by: Donna Lozano, M.Ed., CTRS  
Date: October 18, 2017     12:00 pm Eastern Time
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Series F: A Comprehensive Overview of the CTRS Certification Process (August–November)

**Session F1:** Certification 101  
Presented by: Robin McNeal, CTRS  
Date: August 23, 2017  12:00 pm Eastern Time

**Session F2:** NCTRC Internship Guidelines: Ensuring a Quality Internship  
Presented by: Noelle Molloy, MSEd., CTRS  
Date: September 27, 2017  12:00 pm Eastern Time

**Session F3:** NCTRC Recertification: Continuing Professional Competence  
Presented by: Susan Kaufer, CTRS  
Date: October 11, 2017  12:00 pm Eastern Time

**Session F4:** NCTRC Specialty Certification  
Presented by: Robin McNeal, CTRS  
Date: November 15, 2017  12:00 pm Eastern Time