

Lecturio

# Understanding Memory to Enhance Learning in Medical Education

July 22, 2021  
Online Seminar

# Seminar Learning Outcomes

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1

Participants will be able to **explain** the role that memory plays in medical education.

2

Participants will be able to **describe** the memory process and determine which learning strategies work best for each stage.

3

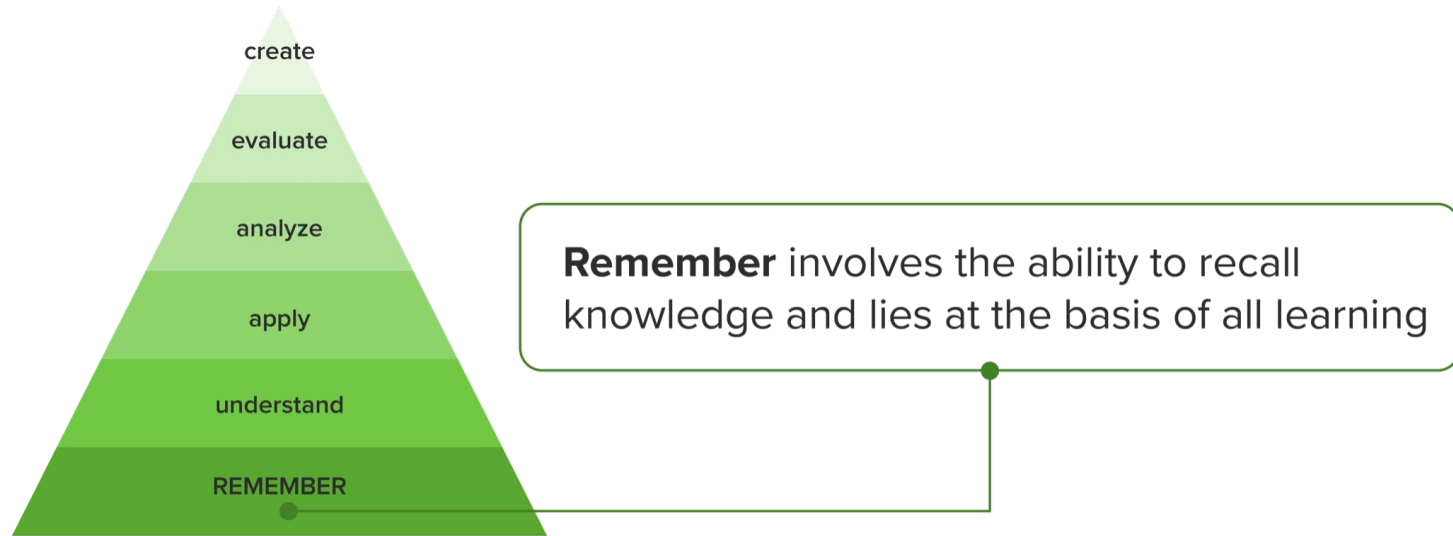
Participants will be able to **distinguish** between the different memory types and their characteristics.

4

Participants will be able to **describe** specific applications for the concepts presented.

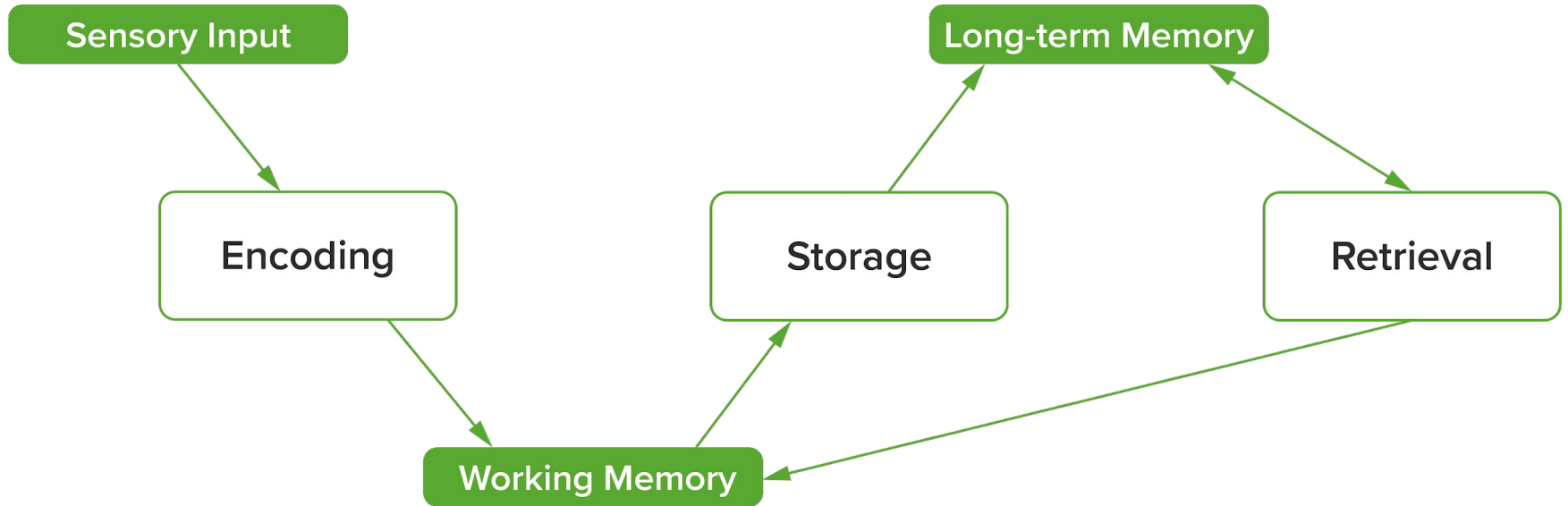
# Remembering is Foundational for Learning in Medical Education

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# Stages of the Memory Process

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## Poll

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2

How many chunks of information can the average person hold in his or her working memory?

## Working Memory Has a Limited Capacity (4-8 Items)

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SFB ICI AWH ONH SCDC



S FBI CIA WHO NHS CDC

**Remember!** Although limited, working memory can be augmented. Long-term memory, however, has infinite capacity.

# Strategies for Different Stages of the Memory Process

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## Encoding

Initial exposure to stimulus

- Dual coding
- Semantic encoding
- Elaborative encoding

## Storage

Maintaining information in long-term memory

- Chunking
- Mnemonics
- Concept maps

## Retrieval

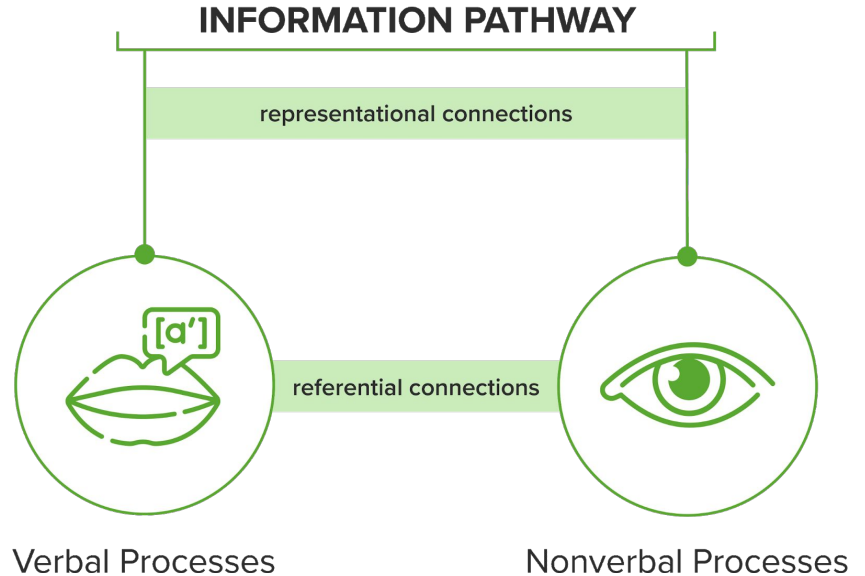
Access and utilization of information that has been encoded and stored

- Spaced retrieval
- Interleaving
- Testing effect

# Example of Encoding: Dual Coding

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- The practice of **utilizing both information pathways** when learning
- Two pathways for information: verbal and **visual**
- Stimulating both pathways helps **avoiding cognitive overload** and effectively **increases working memory capacity**





# Example of Mnemonic Devices: Pain Assessment

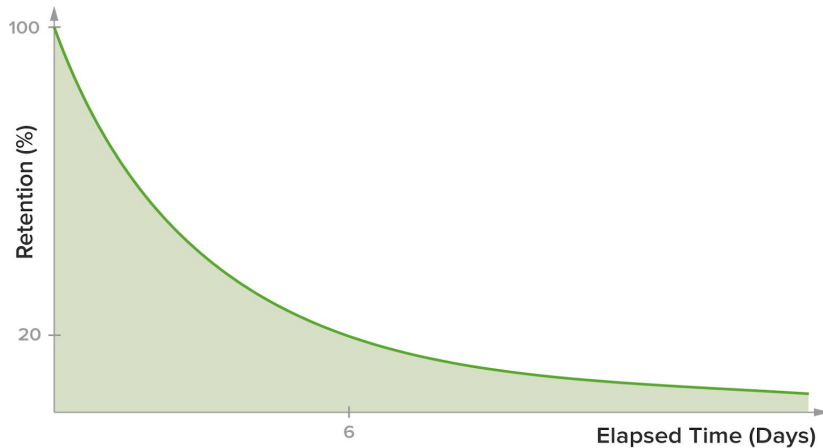
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- S** Site
- O** Onset
- C** Character
- R** Radiation
- A** Associated symptoms
- T** Timing
- E** Exacerbating and relieving factors
- S** Severity

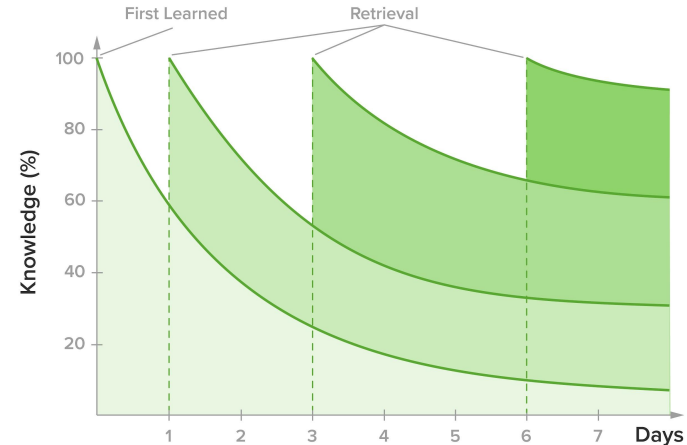
# Retrieval: the Key to Durable Learning

With no attempt at retention, **75%** of acquired information is **lost within 6 days**.



Without Spaced Retrieval

With **strategic retrieval**, acquired information is more easily accessed and employed.



With Spaced Retrieval

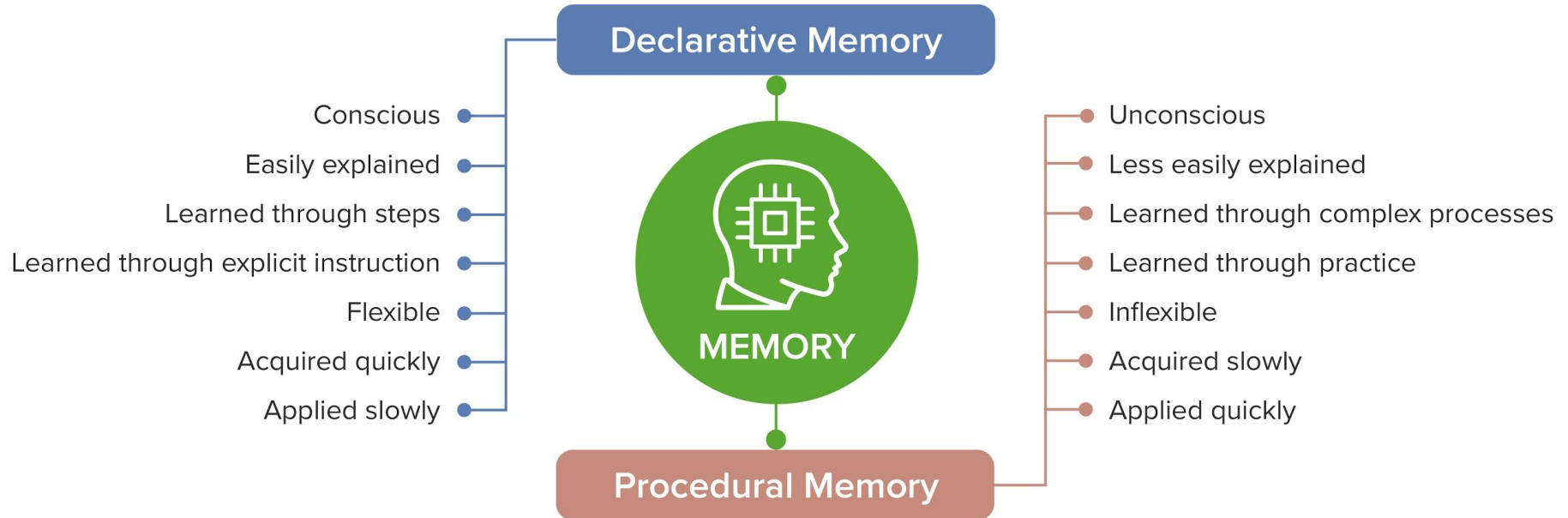


# Pathways for Learning



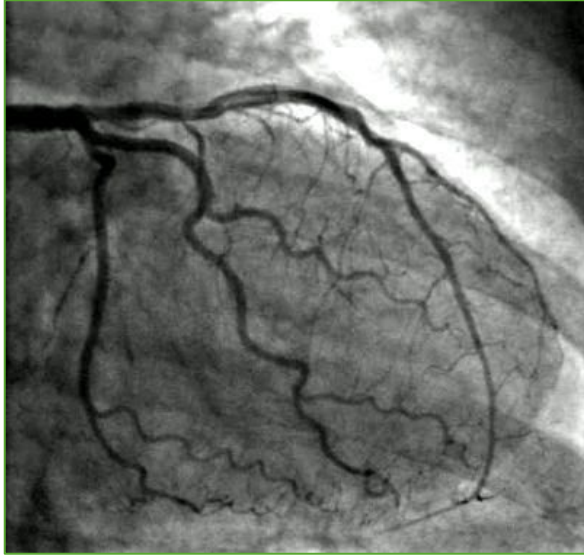
# Declarative and Procedural Memory Should Be Used in the Context of Medical Education

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# Example of Declarative vs. Procedural Memory

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**Remember!** Declarative pathway can be enhanced by direct instruction, whereas procedural pathway is best enhanced by retrieval and practice.

## Word Cloud—DO NOT READ

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Coronary artery bypass graft surgery (CABG) is a procedure used to treat coronary artery disease, which is the narrowing of the coronary arteries due to fatty material buildup in the walls of the arteries (pathophysiology). CABG is a complex procedure for which the surgeon must have intricate knowledge of the anatomy of the coronary arteries. Radiographic imaging helps identify the narrowed arteries to guide the planning of the procedure. The surgeon needs to be able to translate the 2D images into practical 3D maneuvers. The procedure involves opening the chest cavity, temporarily stopping the heart and inserting tubes that divert the blood flow through a heart–lung bypass machine. This necessitates mastery of circulatory physiology and involves clamping of vessels in a sequential manner. This is followed by obtaining a graft from a vein in the leg which then serves as the new coronary artery and is sutured into the existing network of arteries. Lastly, everything is sutured back into place. Occasionally, some complications might arise, requiring the surgeon to utilize his or her experience and knowledge to improvise surgically innovative solutions to ensure the safety of the patient and the success of the procedure.



# Modes of Thinking

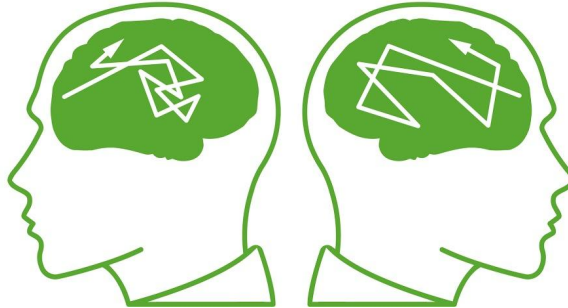


# Enhancing Memory Consolidation: Focused vs. Diffuse Modes of Thinking

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## Focused Thinking

- Targeted, concentrated thinking ○
- Needed for specific tasks ○
- Essential for acquiring knowledge and understanding ○
- Active ○



## Diffuse Thinking

- General, big picture thinking
- Creates connections and links
- Essential for consolidation of memory
- Passive

**Remember!** Learning requires both modes of thinking.

Diffuse mode allows for broader conceptual understanding owing to enhanced memory consolidation, which can be achieved by spacing lessons, incorporating breaks, and fostering a healthy sleep pattern.



# Discussion

# 3

## Poll

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Do you instruct your students on strategies to improve memory and long-term knowledge retention?

Which strategies do you promote?

## Discussion Question

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How do you implement evidence-based techniques such as spaced retrieval into your teaching methodology?

## Discussion Question

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How do you implement memory storage techniques such as chunking and mnemonics into your teaching methodology?

## Discussion Question

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How do you use multimedia design principles into your teaching methodology?

## Poll

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4

Which of the memory pathways are more involved in history taking?

## Discussion Question

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Does your curriculum focus on knowledge acquisition in the basic sciences?

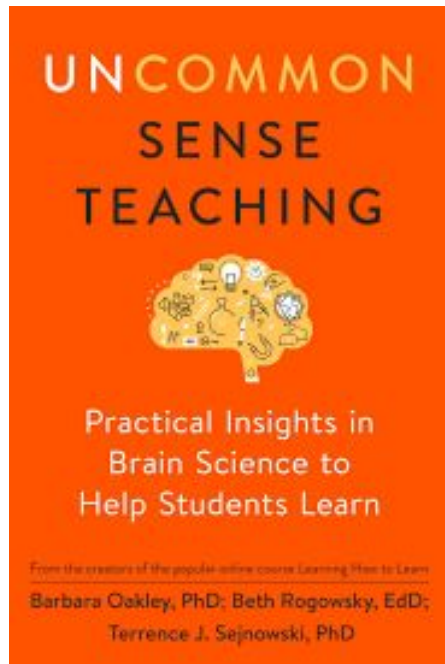
## Takeaway Message

- To strengthen both declarative and procedural pathways through different teaching activities, it is necessary to understand the difference between them. The **declarative pathway** can be enhanced by direct instruction, whereas the **procedural pathway** is best enhanced by retrieval and practice.
- It is necessary to **utilize techniques or strategies that enhance memory** in each stage of the process to foster durable learning.
- **Spaced retrieval** is a powerful learning technique that plays a role in all stages of the memory process and for all memory types.



# Our Upcoming Events

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**Save the date** for the next seminar in the Durable Learning series with our guest speaker **Dr. Barbara Oakley**:

## **The Neuroscience of Learning: Insights for Better Learning, Remembering, and Motivation**

12:00 EDT | 18:00 CEST, **September 23, 2021**

Join our upcoming event:

## **Demostración de Lecturio**

9:00 and 18:00 CDT, **July 29, 2021**





Contact us

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