Memory

WEEK 3

BY:AQSA FAYYAZ
LECTURER

(SCIENCE AND HUMANITIES)

Memory

- "Memory refers to our capacity to acquire ,store and retrieve the information. It is a process of maintaining information over time."

(Matlin, 2005)

- "Memory' is a label for a diverse set of cognitive capacities by which humans and perhaps other animals retain information and reconstruct past experiences, usually for present purposes."
- "Memory is an organism's mental ability to store, retain and recall information"

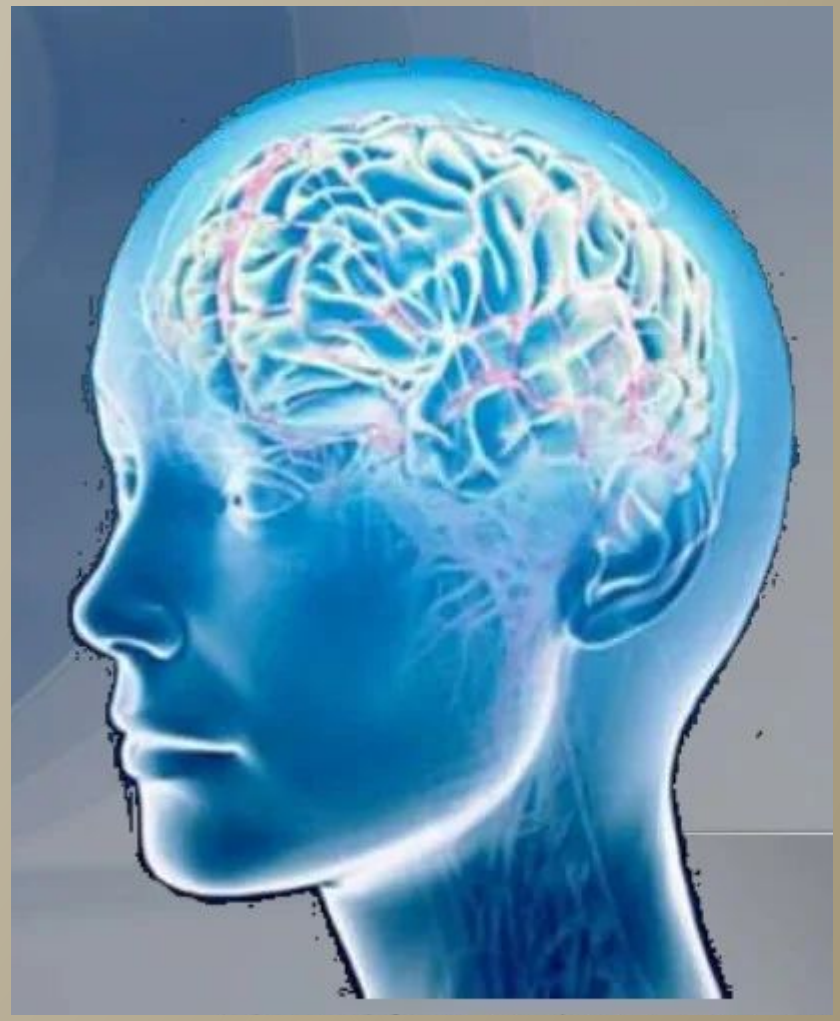
(Stanford

Why memory is important?

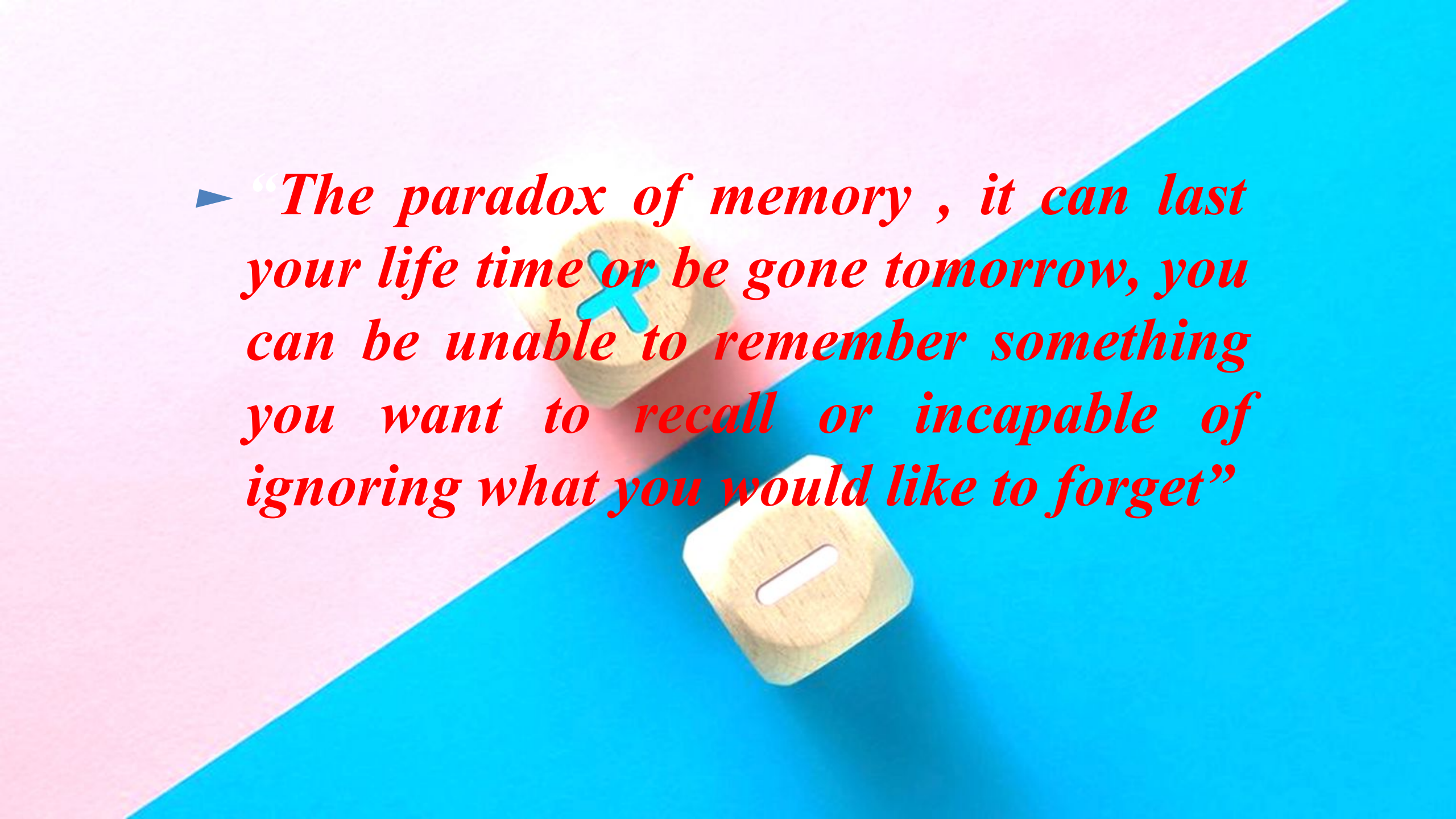
- Memory is essential to all our lives. Without a memory of the past, we cannot operate in the present or think about the future.
- We would not be able to remember what we did yesterday, what we have done today or what we plan to do tomorrow.
- Without memory, we could not learn anything.

Human Memory is Good at..

- Information on which attention is focused
- Information in which we are interested
- Information that arouses us emotionally
- Information that fits with our previous experiences
- Information that we rehearse

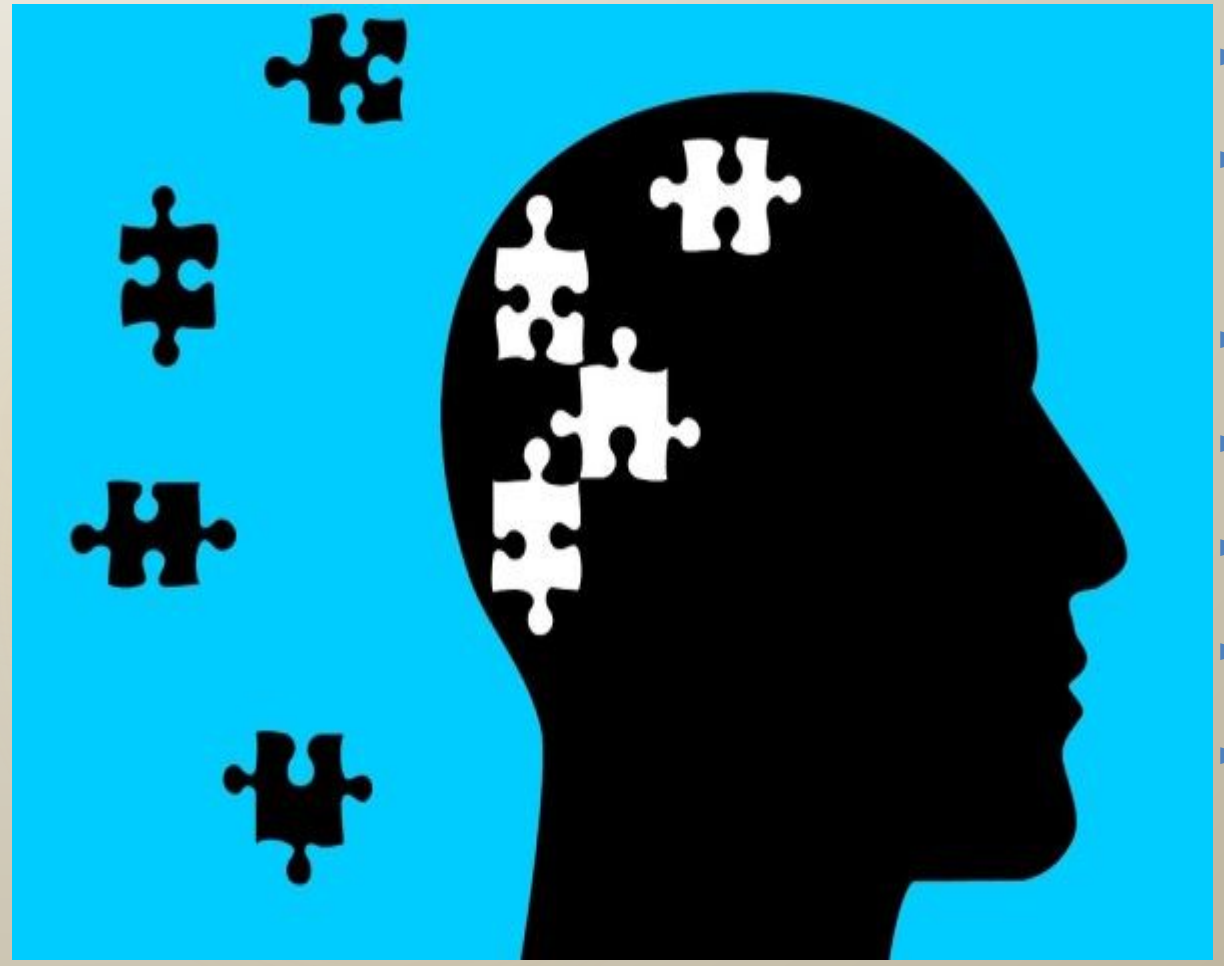


BUT….



- *“The paradox of memory , it can last your life time or be gone tomorrow, you can be unable to remember something you want to recall or incapable of ignoring what you would like to forget”*

Seven sins of memory by Schacters



- Memories are transient (Fades with time)
- We do not remember what we do not pay attention to
- Our memories can be temporarily blocked
- We can misattribute the source of memory
- We are suggestible in our memory
- We can show memory distortion (Bias)
- We often fail to forget the things we would like not to recall (persistence of memory)

The Process of Memory

"Memory is a mental capacity to store, recall or recognize the events that were previously experienced".

PROCESS OF MEMORY

1. **Encoding**: The registration (receiving, processing and combining of received information)
2. **Storage**: The retention of encoded material over time.
3. **Retrieval**: The process of getting the information out of memory storage.

1. Encoding

The registration (receiving, processing and combining of received information)

WAYS OF ENCODING:

There are three main ways in which information can be encoded:

1. **Visual (picture)**
2. **Acoustic (sound)**
3. **Semantic (meaning)**

2. Storage

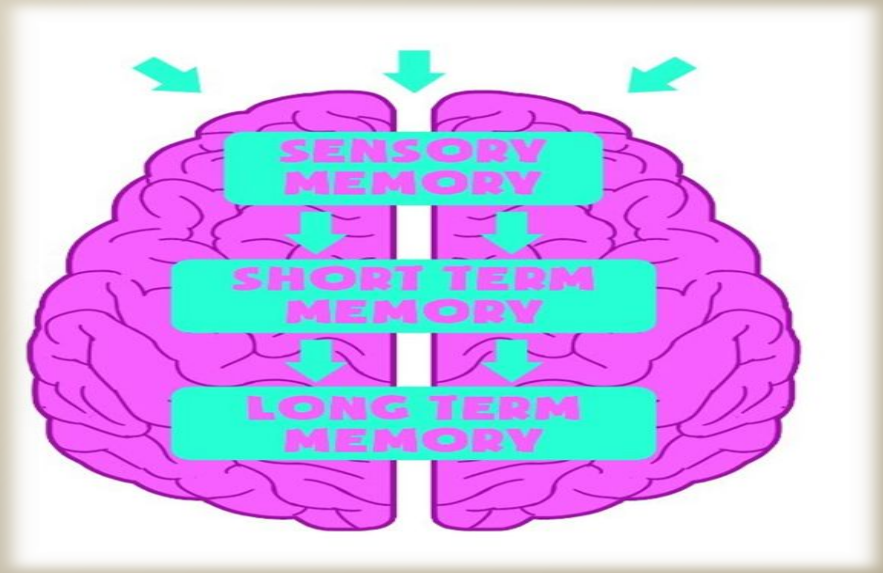
- Involves retention of encoded material over time
- what kind of information is held.

3. Retrieval

- occurs when the fact/ information is recovered from storage
- Example: when we take an exam
- Involves the location and recovery of information from memory

Stages of Memory

Stages or storage of Memory



Stage 1: Sensory memory

- Preserves brief sensory impressions of stimuli, also called sensory register.
- It is the first stage of memory, takes place through the process of **encoding**.
- The ability to look at an item, and remember what it looked like with just a second of observation, or memorization, is an example of sensory memory. " LIKE A SNAPSHOT OF THE WORLD"

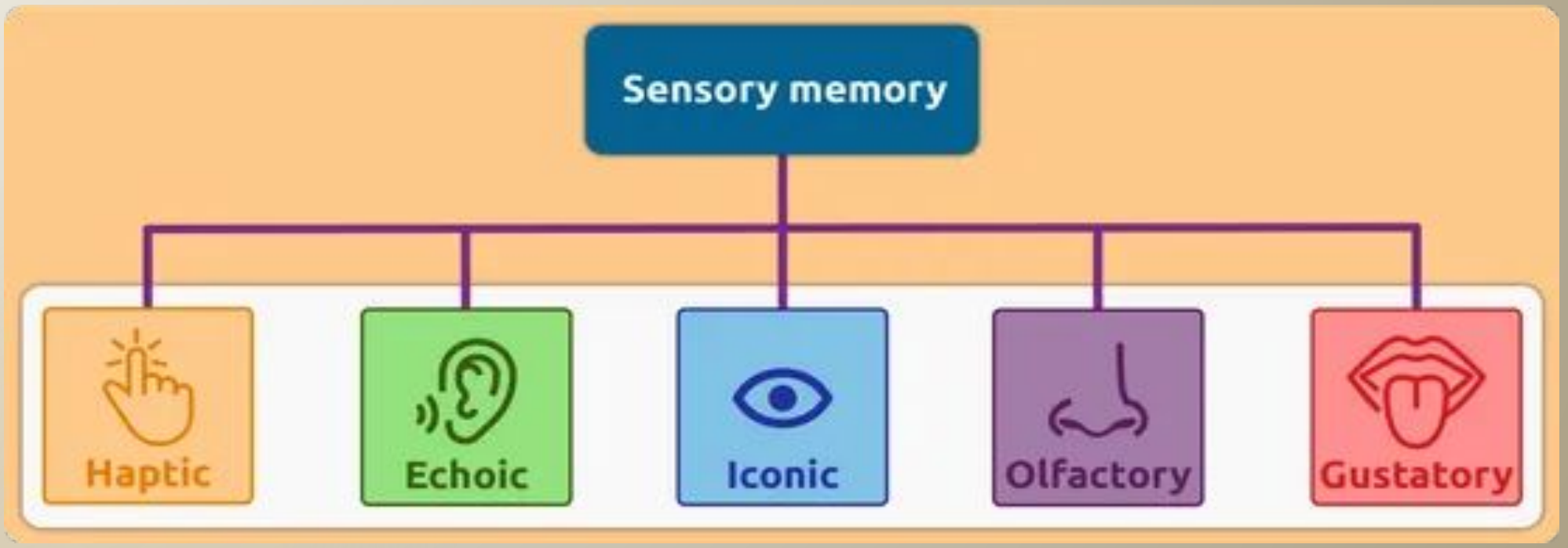
Cont.

- Duration
  millisecond
- Capacity
  all sensory experience (limited capacity)
- Encoding
  sense specific (e.g. different stores for each sense)

- *Infromation is going to nervous system through your sense organs*

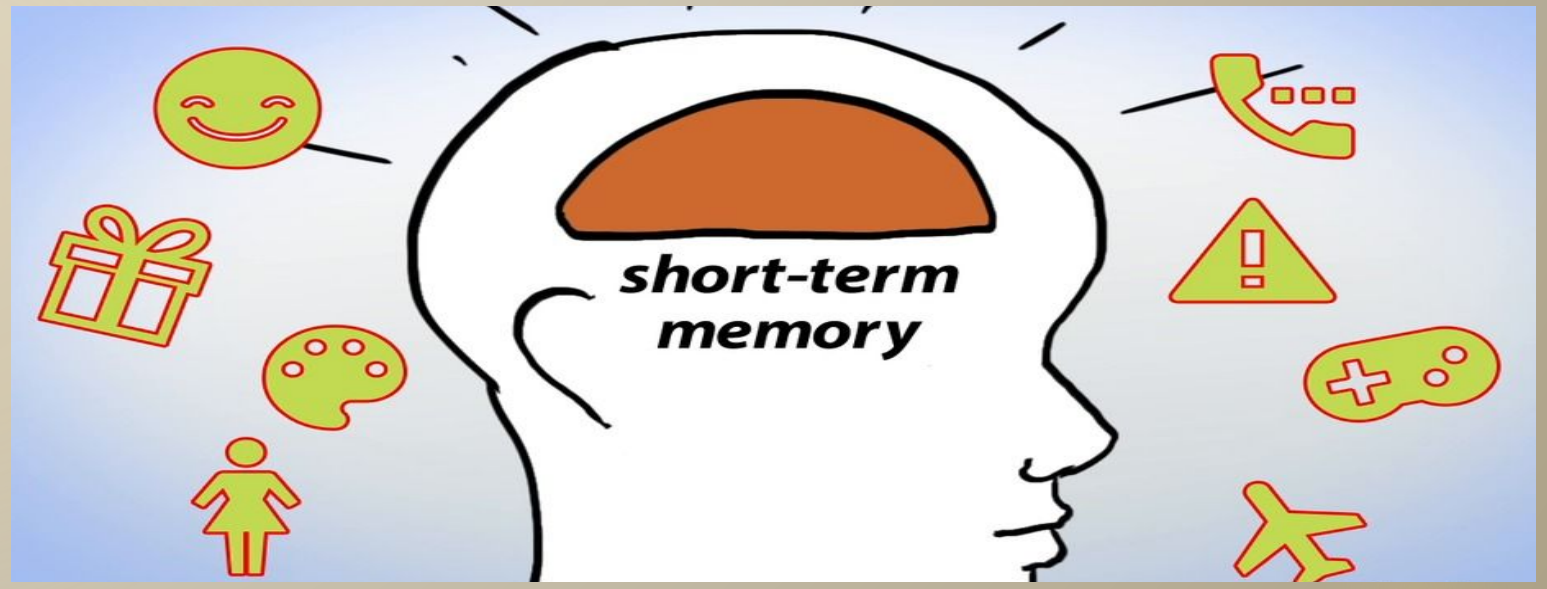
Your sensory memory creates something of a quick "snapshot" of the world around you, allowing you to briefly focus your attention on relevant details.

By attending to this information, we can then transfer important details into the next stage of memory, which is known as short-term memory.


Sensory memory
Haptic
Echoic
Iconic
Olfactory
Gustatory

Stage 2: Short Term Memory

- The stuff we encode from the sensory goes to STM.
- Events are encoded visually, acoustically or semantically.
- We recall digits better than letters.



Cont.

- Short term memory is also called working memory.
- The memory system in *which information is held for brief periods* of time while *being used.*
- Capacity:

  the amount of information that can be stored in short-term memory can vary .

- In an influential paper titled "The Magical Number Seven, Plus or Minus Two," psychologist George Miller (1965) suggested that people can store between five and nine items in short-term memory.

  Limited capacity = 7±2 items

- STM is susceptible to interference e.g., if counting is interrupted, have to start over

Encoding & Storage in Working Memory

- **Chunking**

Organizing pieces of information into a smaller number of meaningful units.

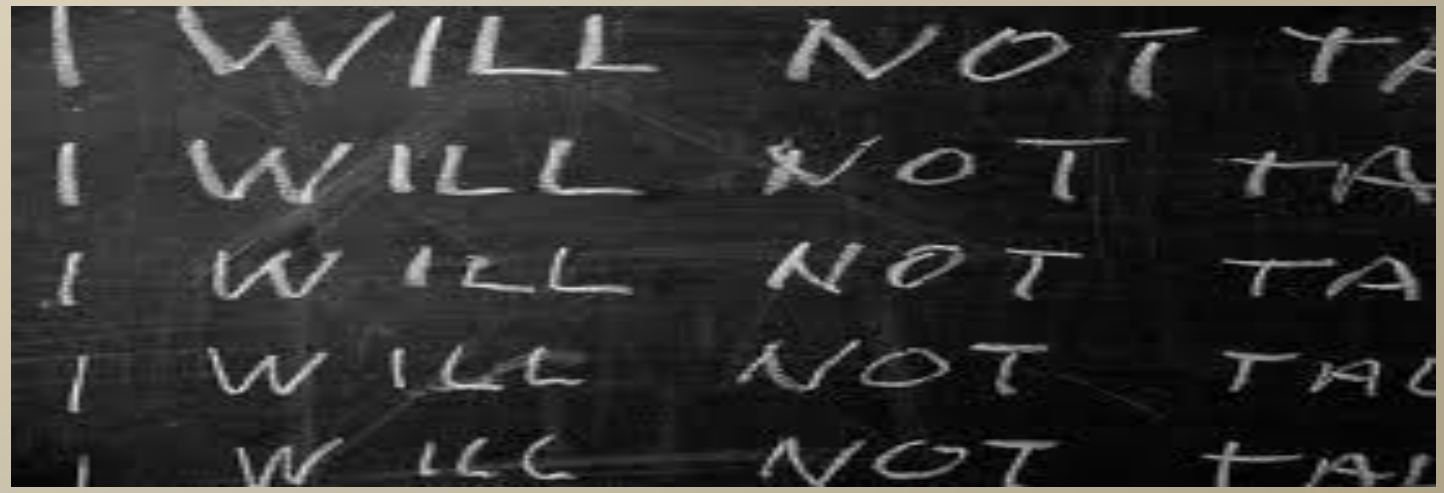
- Chunking allows people to take smaller bits of information and combine them into more meaningful, and therefore more memorable, wholes.

For example, a phone number sequence of 4-7-1-1-3-9-2 would be chunked into 471-1392.

- **Maintenance rehearsal**

Process in which information is repeated or reviewed to keep it from fading while in working memory.

For example: imagine that you are trying to remember a phone number. The other person rattles off the phone number, and you make a quick mental note. Moments later you realize that you have already forgotten the number. Without rehearsing or continuing to repeat the number until it is committed to memory, the information is quickly lost from short-term memory.

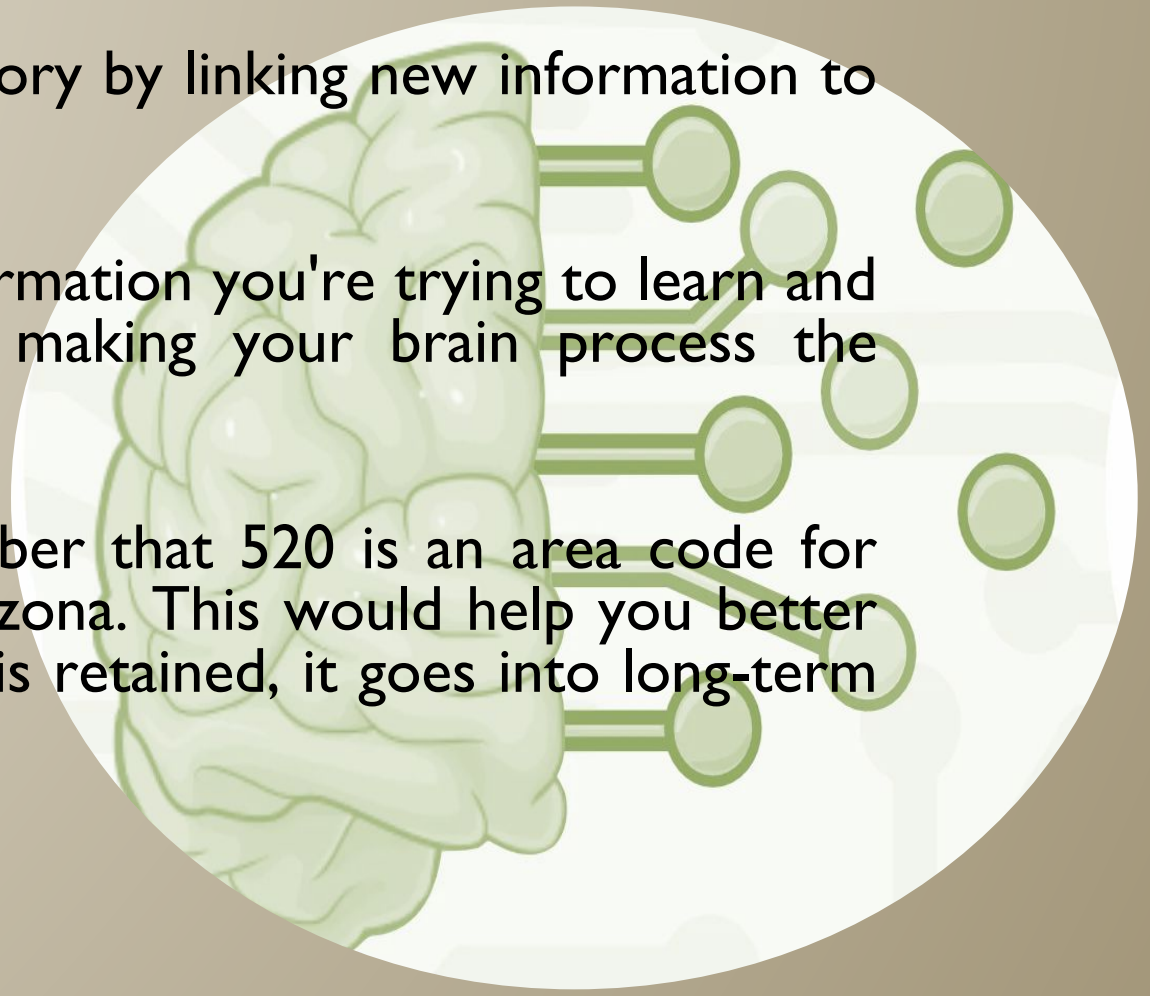


- **Elaborative rehearsal**

A strategy to facilitate the formation of memory by linking new information to what one already knows.

By making associations between the new information you're trying to learn and the information you already know, you're making your brain process the information in a more in-depth way.

For example: in this case, you could remember that 520 is an area code for Arizona and the person you met is from Arizona. This would help you better remember the 520 prefix. If the information is retained, it goes into long-term memory.



Stage 3: Long term Memory (LTM)

- Unlimited storehouse of information

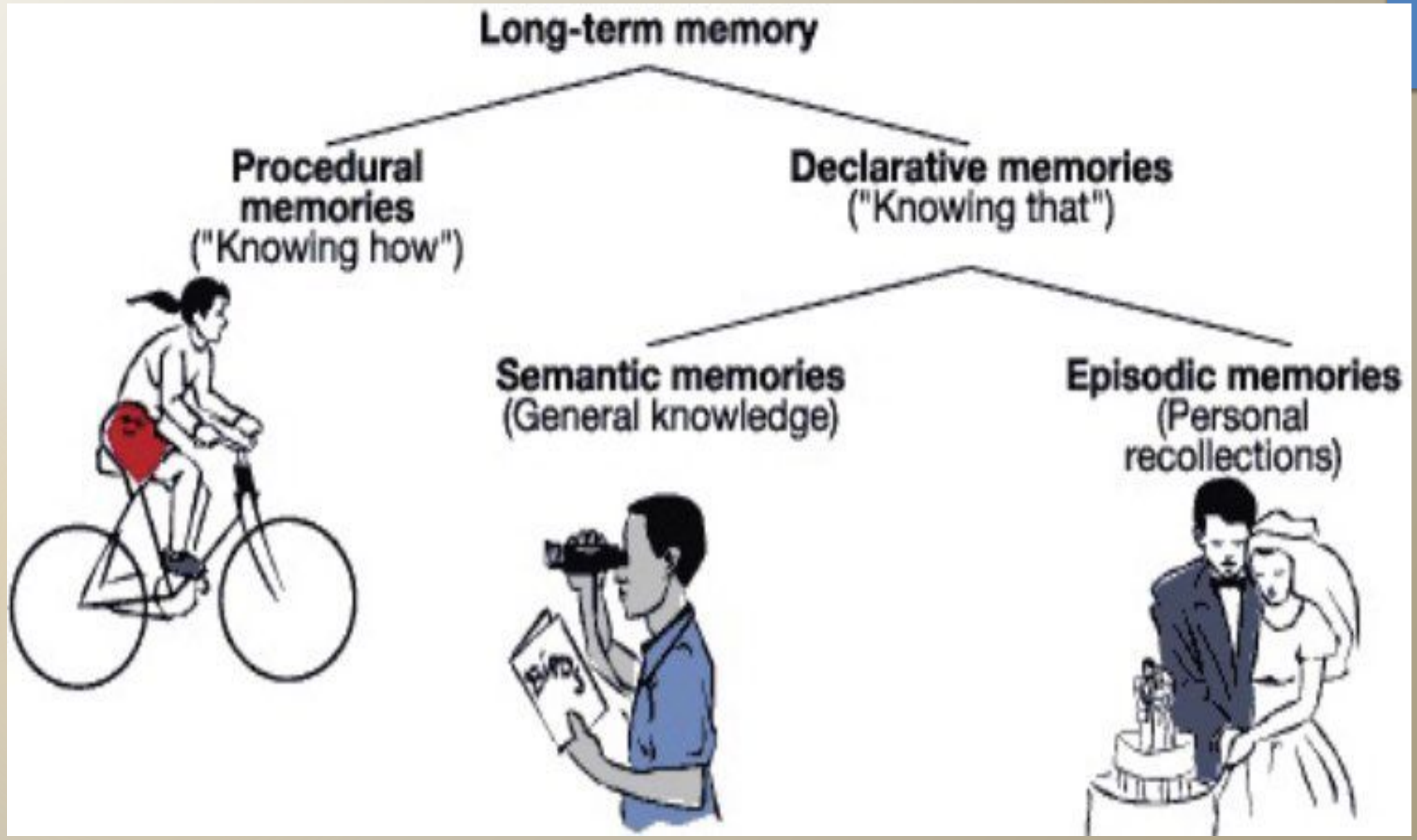
- The system of memory into which all the information is placed to be kept more or less permanently.

- Duration

  Unlimited

- Capacity

  Unlimited


Long-term memory
Procedural memories ("Knowing how")
Declarative memories ("Knowing that")
Semantic memories (General knowledge)
Episodic memories (Personal recollections)

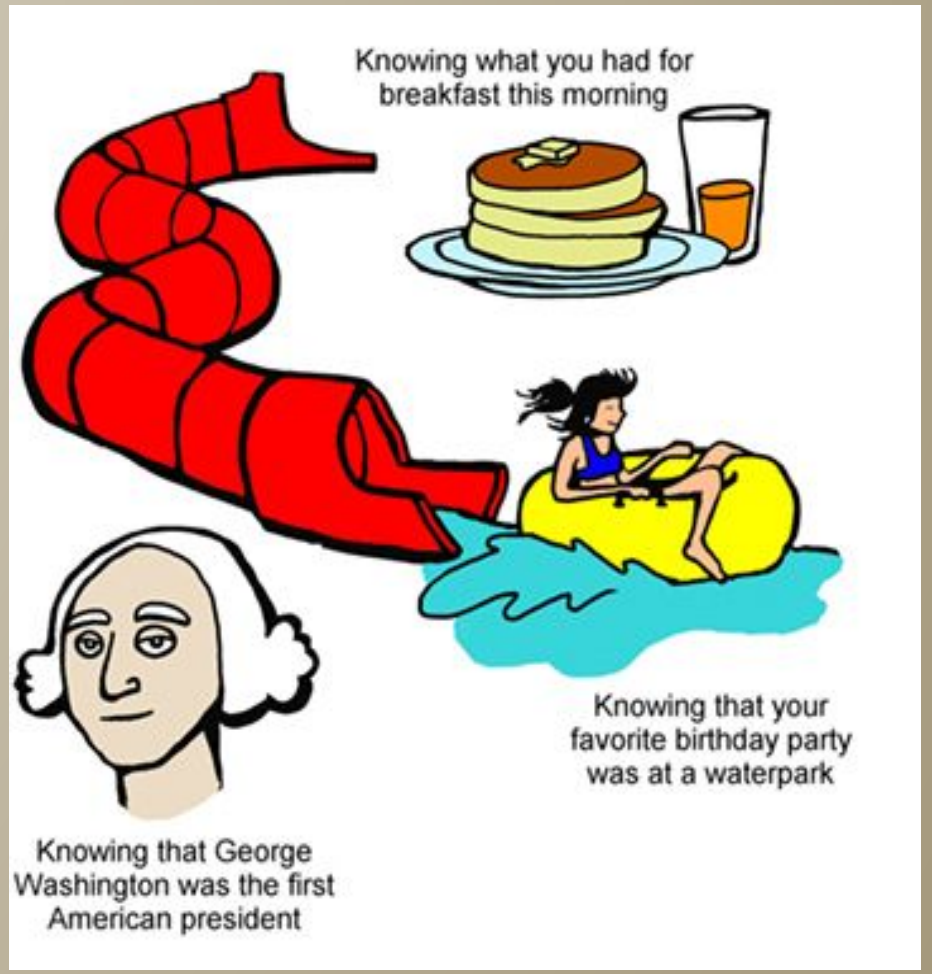
Types of Long Term Memory(LTM):

1. Procedural memory (IMPLICIT UNCONCIOUS)

- A type of long term memory that stores memories for *how things are done*.
- Memories for the performance of actions or skills (i.e., procedural memories, "knowing how")
- Example: Riding a bike, tying your shoes, and Writing with a pen are all examples of procedural memories.

II. Declarative memory (EXPLICIT CONCIOUS)

- Division of LTM that stores explicit information (also known as fact memory)
- Memories of facts, rules, concepts, and events (i.e., declarative memories, "knowing that").
- Example: London is the capital of England, zebras are animals, and the date of your mum's birthday



Types of Declarative memory

- **Episodic memory (specific event)**

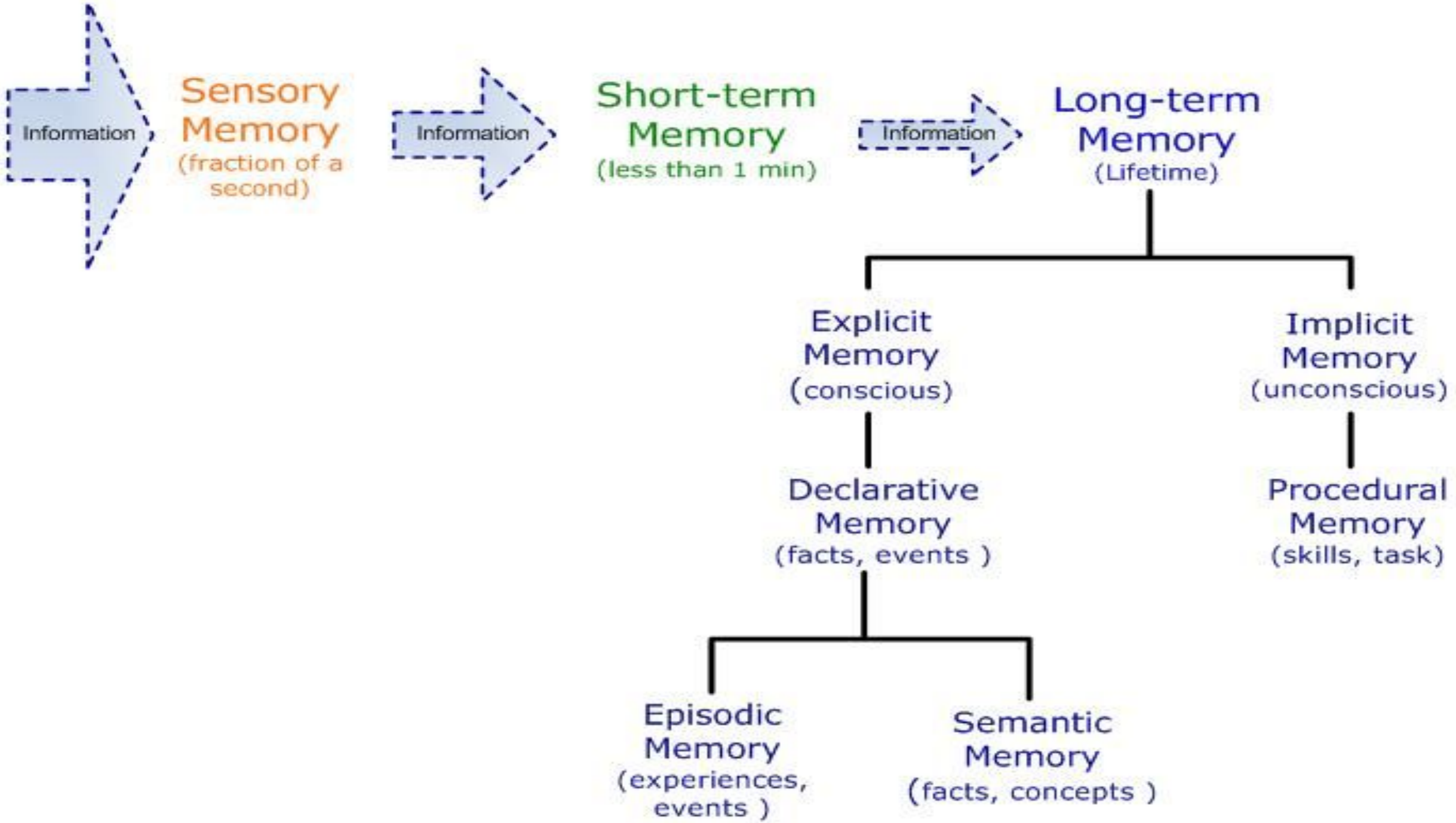
Subdivision of declarative memory that stores memories for personal events, or "episodes"

Memories of autobiographical events, situations, and experiences.

Example: remembering you 5th birthday party.

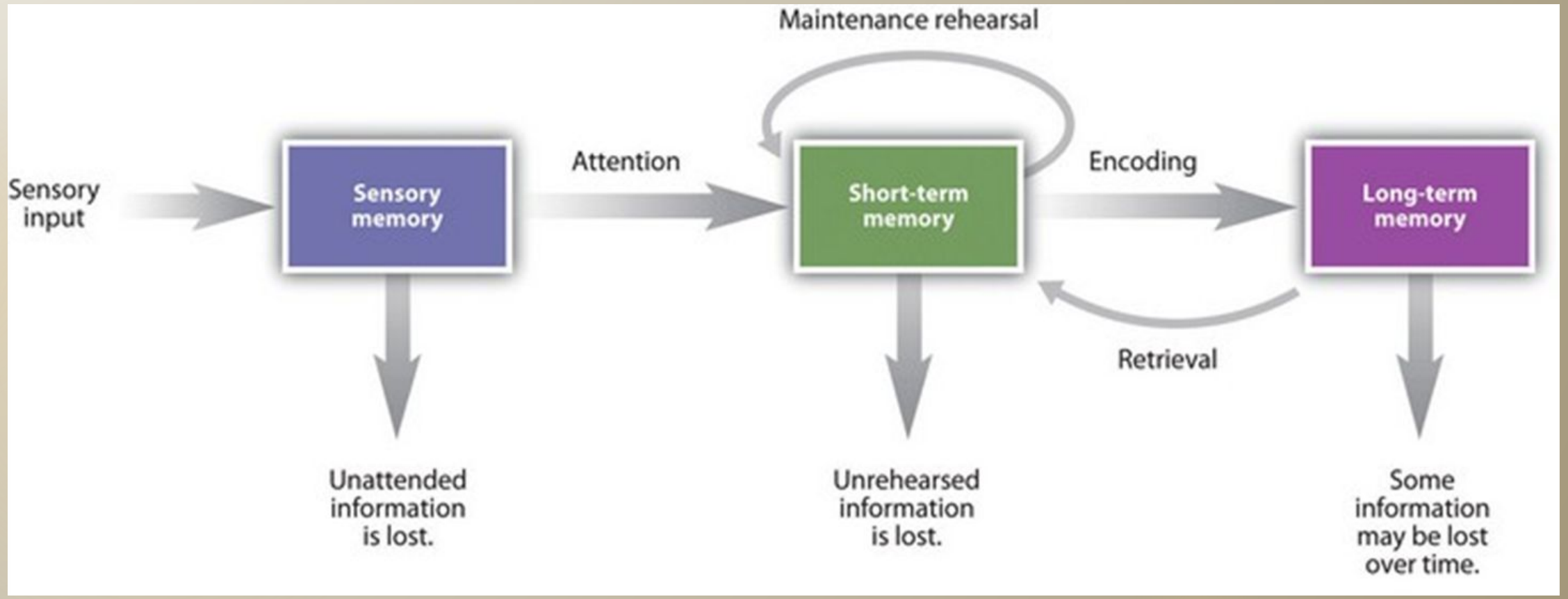
- **Semantic memory (Fact based but meaning associated)**

Subdivision of declarative memory that stores general knowledge, including meanings of words and concepts.


Information
Sensory Memory
(fraction of a second)
Information
Short-term Memory
(less than 1 min)
Information
Long-term Memory
(Lifetime)
Explicit Memory
(conscious)
Implicit Memory
(unconscious)
Declarative Memory
(facts, events)
Procedural Memory
(skills, task)
Episodic Memory
(experiences, events)
Semantic Memory
(facts, concepts)

Traditional Model of Memory

- Atkinson & Shiffrin (1968) 3 Stage Model



ACTIVITY

Here are the words in the order viewed

BED
CLOCK
DREAM
NIGHT
TURN
MATTRESS
SNOOZE
NOD
TIRED
NIGHT

ARTICHOKE
INSOMNIA
REST
TOSS
NIGHT
ALARM
NAP
SNORE
PILLOW

Here are the words in the order viewed

BED
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TIRED
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ALARM
NAP
SNORE
PILLOW

Did you recall?	Explanation
Bed? Clock?	Primacy Effect
Snore? Pillow?	Recency Effect
Night?	Spacing Effect
Artichoke?	Distinctiveness
Toss? Toss & Turn?	Clustering
Sleep?	False Memory

Serial Position Effect

- **Primacy effect** – remembering stuff at beginning of list better than middle

- **Recency Effect** – remembering stuff at the end of list better than middle because of lack of Interference

Methods in Study of Memory

Which type of memory test would you rather have?

- An essay or a multiple choice exam?

- The difference between these two types of tests captures the difference between a **recall task** and a **recognition test**

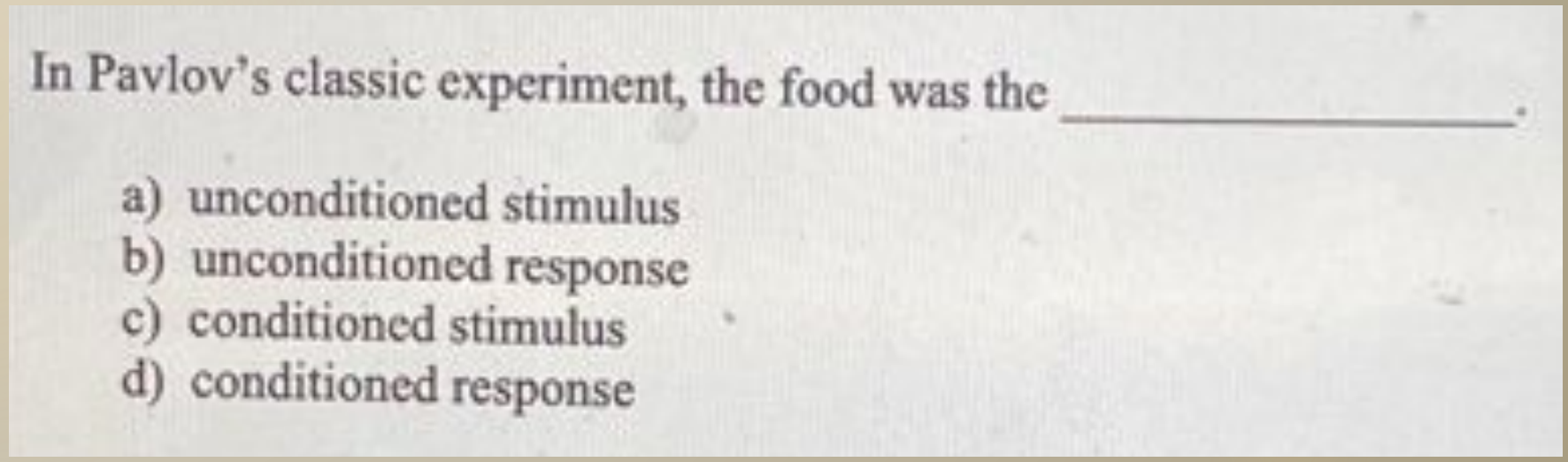
Recall Tasks

- **Free Recall**
  - Recall all the words you can from a list you saw previously
- **Cued Recall**
  - Recall everything you can that is associated with Ivan Pavlov in Psychology
  - Participants are given a cue to facilitate recall
- **Serial Recall**
  - Recall the names of all previous prime ministers in the order they were elected
  - Need to recall order as well as item names

Recognition Tasks

- Recognition, in psychology, a form of remembering characterized by a feeling of familiarity when something previously experienced is again encountered.

- Example: Most students would rather take a multiple-choice test, which utilizes recognition memory.


In Pavlov's classic experiment, the food was the _____.

a) unconditioned stimulus
b) unconditioned response
c) conditioned stimulus
d) conditioned response

Causes of Retrieval Failure

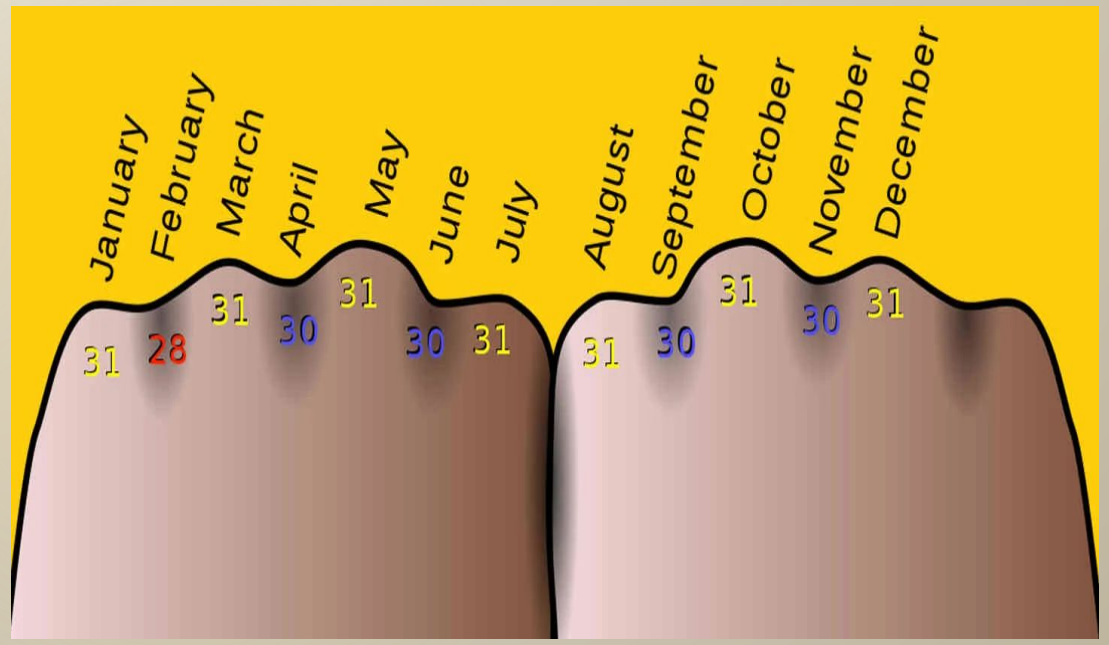
- **Interference:**
  The phenomenon by which information in memory disrupts the recall of other information i.e., retroactive & proactive interference
- **Anxiety:**
  During exam, students were unable to recall a specific name or date and recalled it just after the exam.
- **Poor psychological / physical state:**
  Depression, anxiety, poor concentration, headache, stress etc.
- **Age Factor:**
  Dementia
- **Decay:**

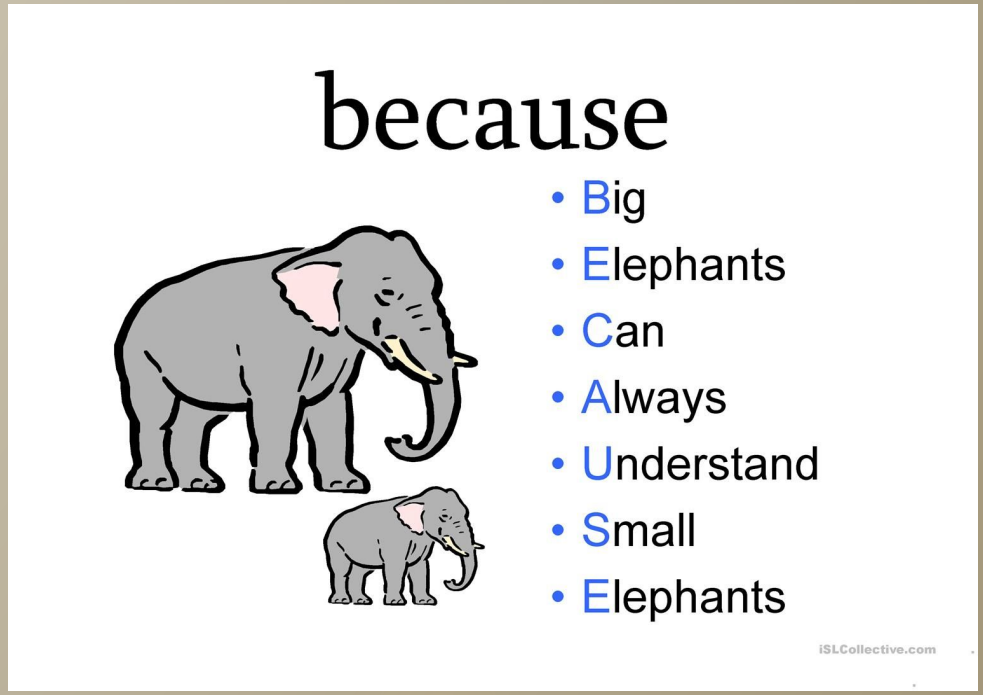
  Non use of information for a longer period of time

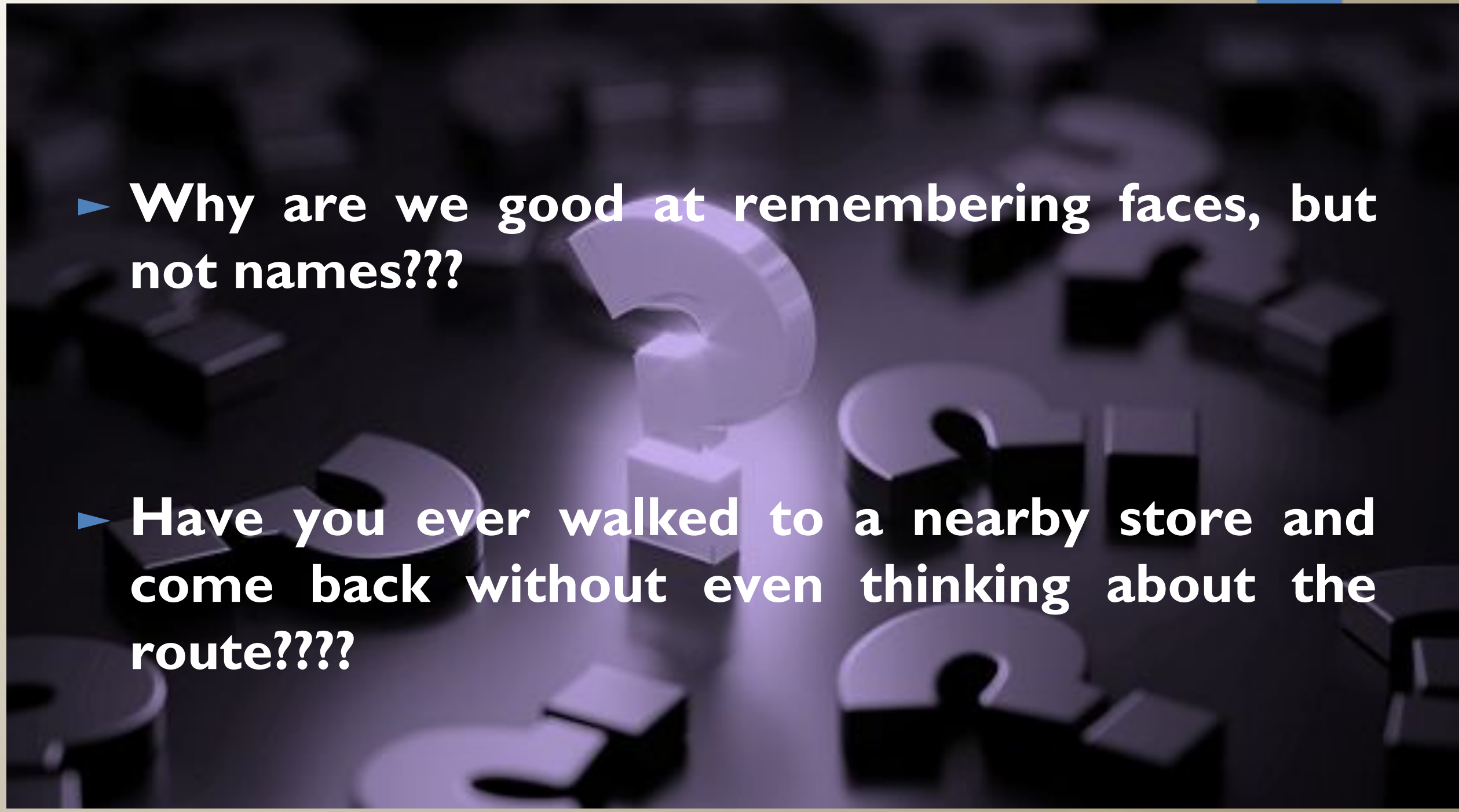
Memory Strategies: To get from STM to LTM

Memory Strategies: To get from STM to LTM

- **Mnemonics are the techniques in which new information is associated with something familiar and previously encoded”**



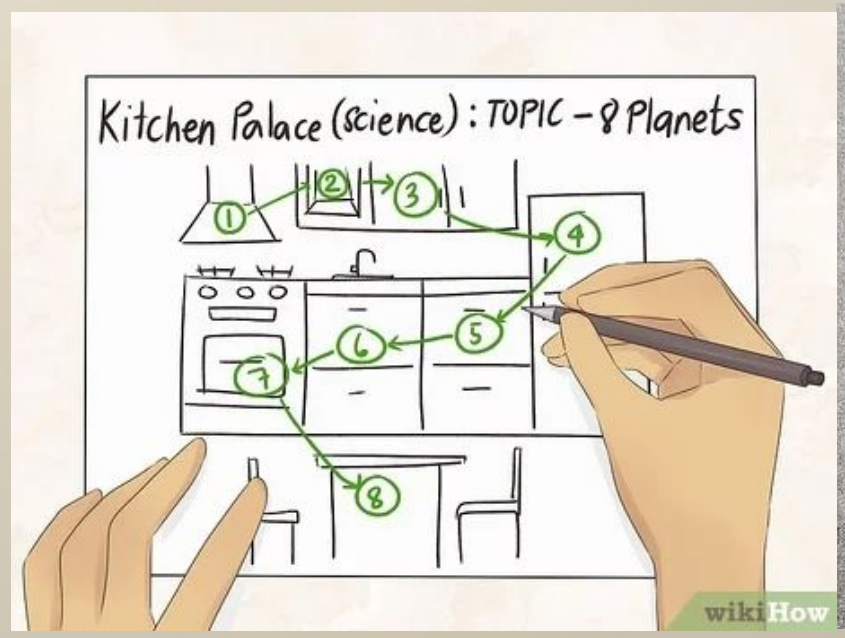


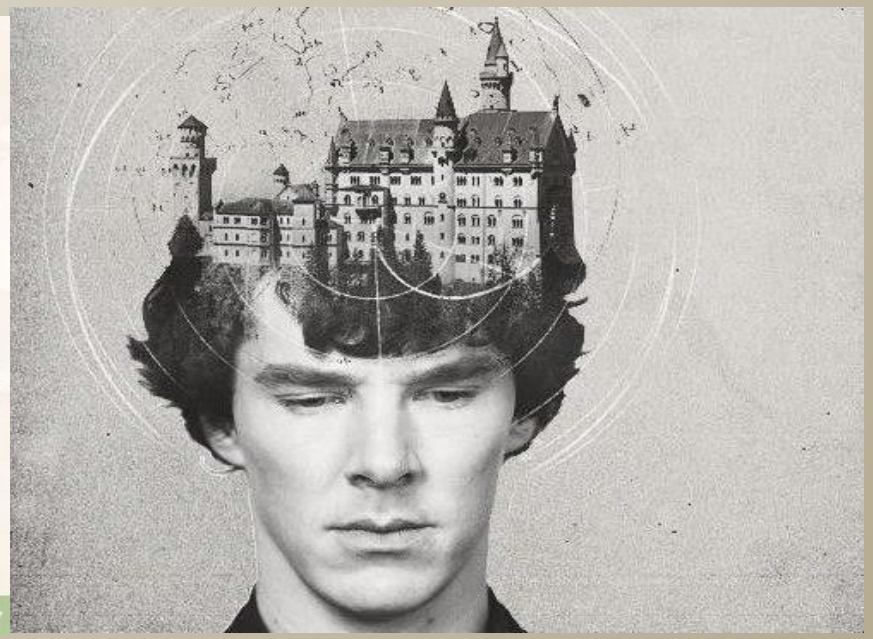


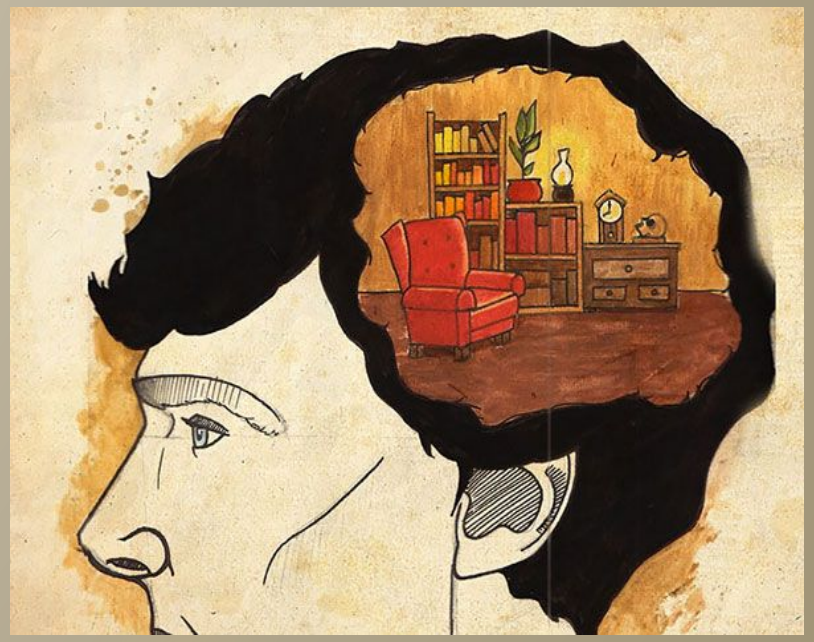
- Why are we good at remembering faces, but not names???
- Have you ever walked to a nearby store and come back without even thinking about the route????

Memory Strategies: To get from STM to LTM

2.Method of Loci/Memory Palace: ideas are associated with a place or part of a building







Forgetting

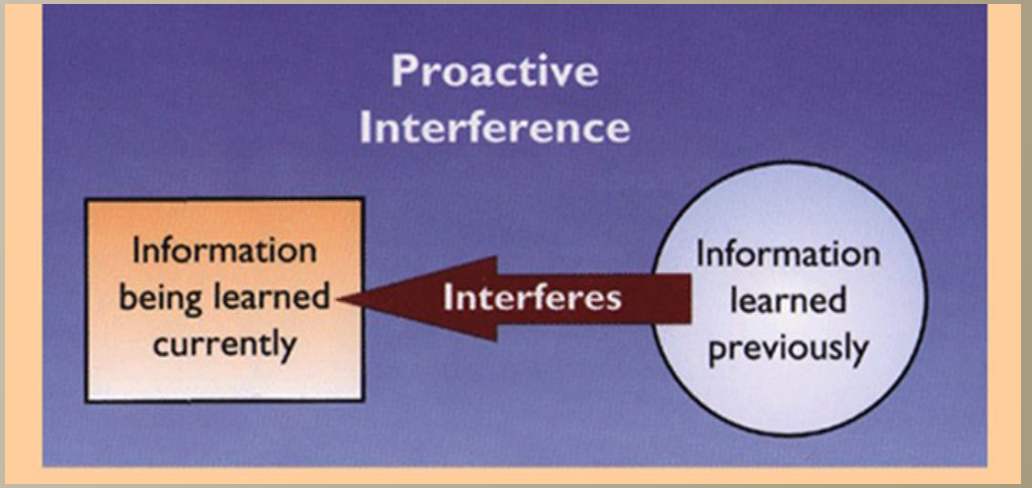
"Forgetting refers to the loss of information that was previously stored in memory"

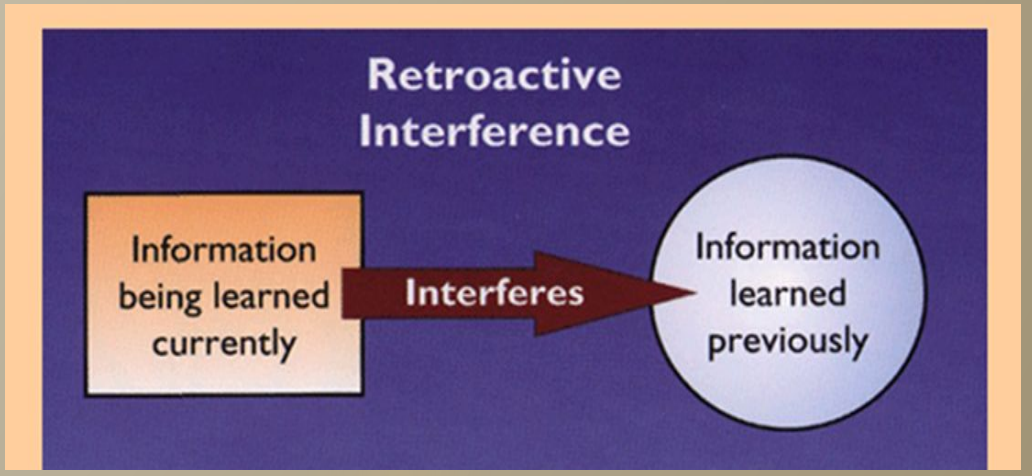
Forgetting

- Loss or failure to recall information stored in human memory

Forgetting Is a Process, Too!

- **Proactive interference:**
  - Old information interferes with recall of new information
  - i.e. Call new friend with the old friend's name
- **Retroactive interference:**
  - new information interferes with recall of old information
  - i.e. Forgetting old car number as soon as you get new car





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Decay theory (Fading theory):

memory trace fades with time

Motivated forgetting:

Involves the loss of painful memories (protective memory loss)

Retrieval failure:

The information is still within LTM, but cannot be recalled because the retrieval cue is absent

Other reasons for forgetfulness

- Alcohol
- Anxiety and Stress
- Depression
- Any other Mental Health Problem
- Physical Injury or Trauma to brain
- Organic Causes: Alzheimer, Dementia and Amnesia

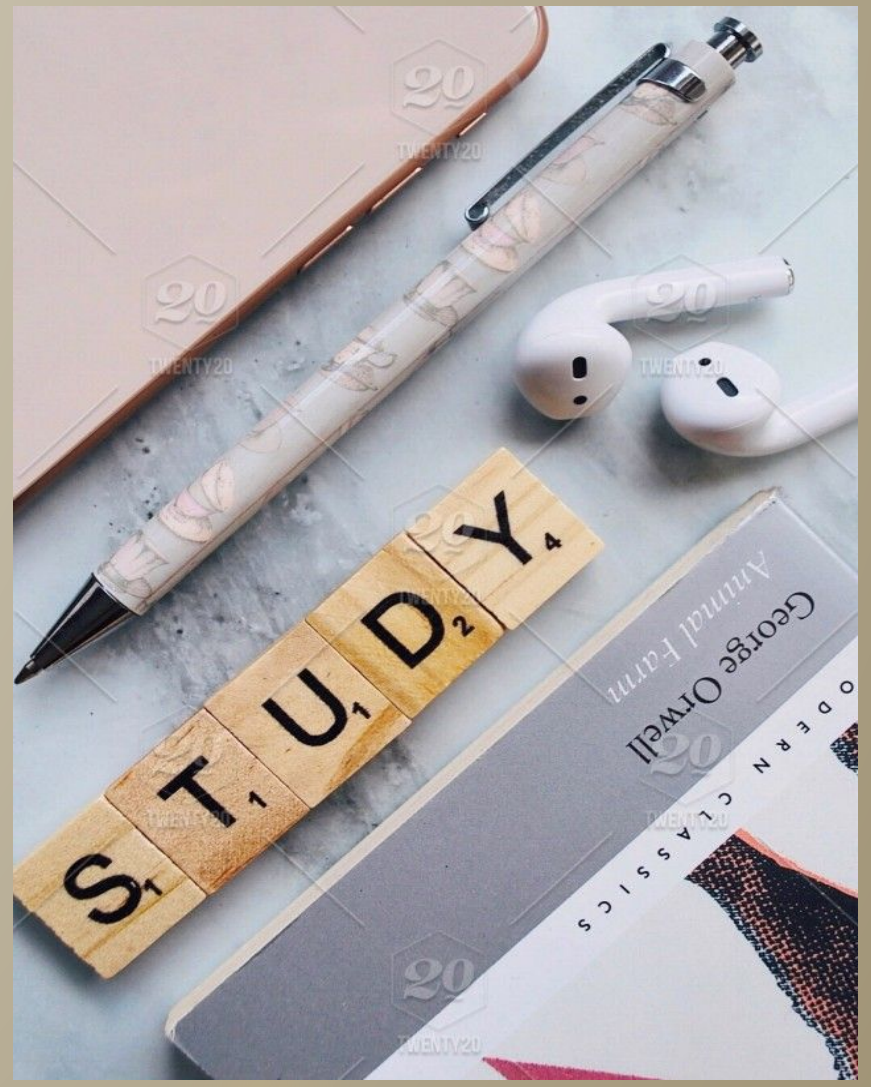
Ways of improving your Memory

Ways of improving memory

1. **Avoid cramming by establishing regular study sessions.**

According to Bjork (2001), studying materials over a number of session's gives you the time you need to adequately process the information.

Research has shown that students who study regularly remember the material far better than those who did all of their studying in one marathon session.



Ways of improving memory

2. Structure and organize the information you are studying.

Researchers have found that information is organized in memory in related clusters. You can take advantage of this by structuring and organizing the materials you are studying. Try grouping similar concepts and terms together, or make an outline of your notes and textbook readings to help group related concepts.

Ways of improving memory

3. Utilize Mnemonic devices to remember information

- Mnemonic devices are a technique often used by students to aid in recall. A mnemonic is simply a way to remember information. For example, you might associate a term you need to remember with a common item that you are familiar with.

- The best mnemonics are those that utilize positive imagery, humor or novelty. You might come up with a rhyme, song or joke to help remember a specific segment of information.

Ways of improving memory

4. Elaborate and Rehearse the Information are studying.

- In order to recall information, you need to encode what you are studying into long-term memory. One of the most effective encoding techniques is known as elaborative rehearsal.
- An example of this technique would be to read the definition of a key term, study the definition of that term and then read a more detailed description of what that term means. After repeating this process a few times, your recall of the information will be far better.

Ways of improving memory

5. Teach new concepts to another person

Research suggests that reading materials out loud significantly improves memory of the material. Educators and psychologists have also discovered that having students actually *teach* new concepts to others enhances understanding and recall. You can use this approach in your own studies by teaching new concepts and information to a friend or study partner.


Thank
You