



What Is Memory?

- Our memory helps make us who we are.
- It allows us to function in our daily lives, forge relationships that are vital for our well-being, and remember important events from our past
- Memory refers to the psychological processes of acquiring, storing, retaining, and later retrieving information. Memory involves three major processes: encoding, storage, and retrieval.
- Memory is the term given to the **structures and processes** involved in the storage and subsequent retrieval of information.

How Memories Are Formed

- In order to create a new memory, information must be changed into a usable form, which occurs through a process known as *encoding*. Once the information has been successfully encoded, it must be stored in memory for later use.
- Memories are created through the connections that exist between these neurons—either by strengthening these connections or through the growth of new connections
- This is why reviewing and rehearsing information improves the ability to remember it.
- Practice strengthens the connections between the synapses that store that memory.



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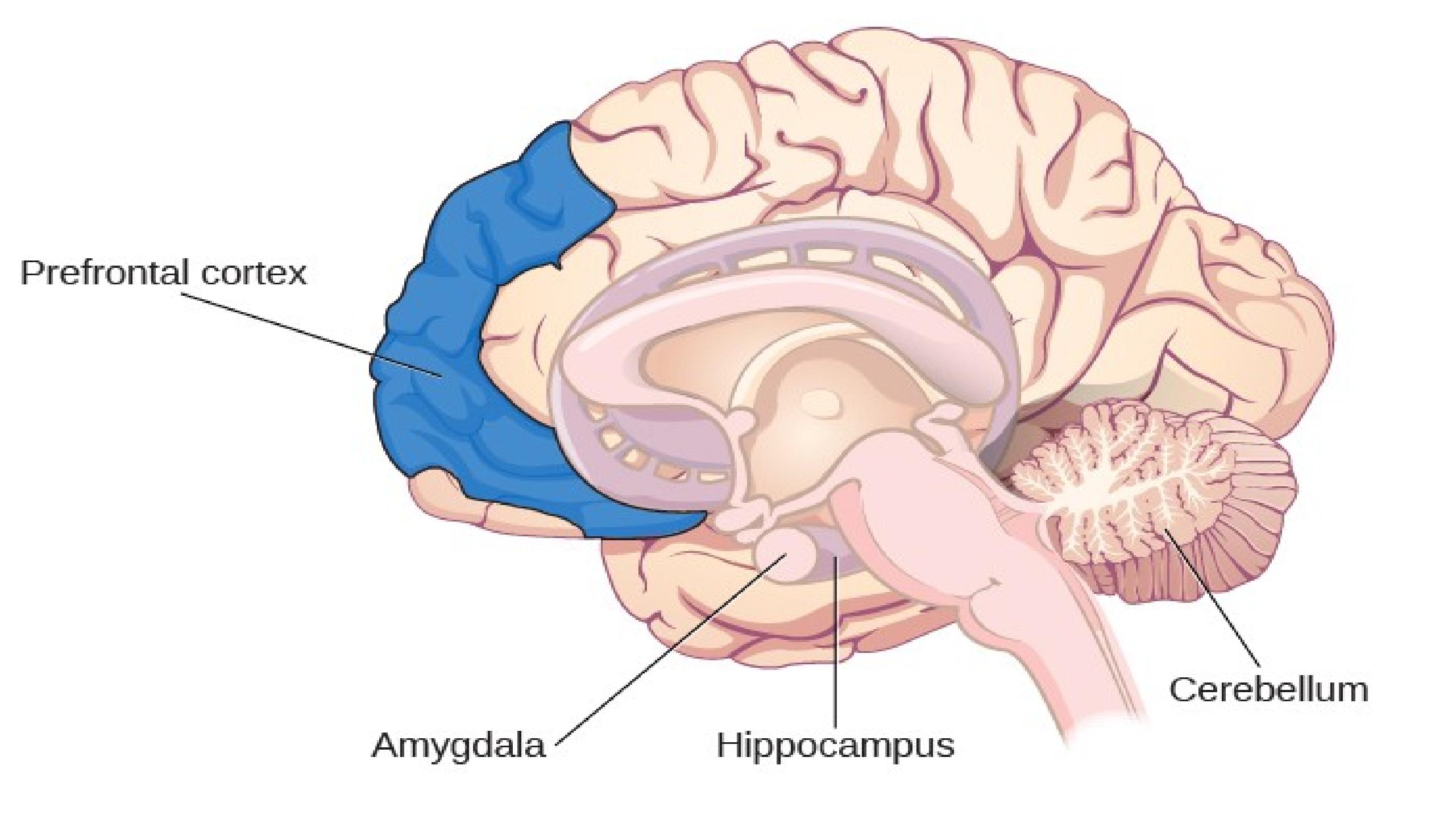
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Parts of the brain involved in memory

- The Hippocampus (forming long-term memories),
- Amygdala (emotional memories),
- Prefrontal cortex (short-term/working memory),
- Cerebellum (procedural and skill-based memories), and
- The Cerebral cortex (storing long-term memories).
- These structures work together within the limbic system and across the brain to encode, consolidate, and retrieve different types of information



There are three main processes that characterize how memory works. These processes are

- Encoding
- Storage and
- Retrieval (or recall).



Attention



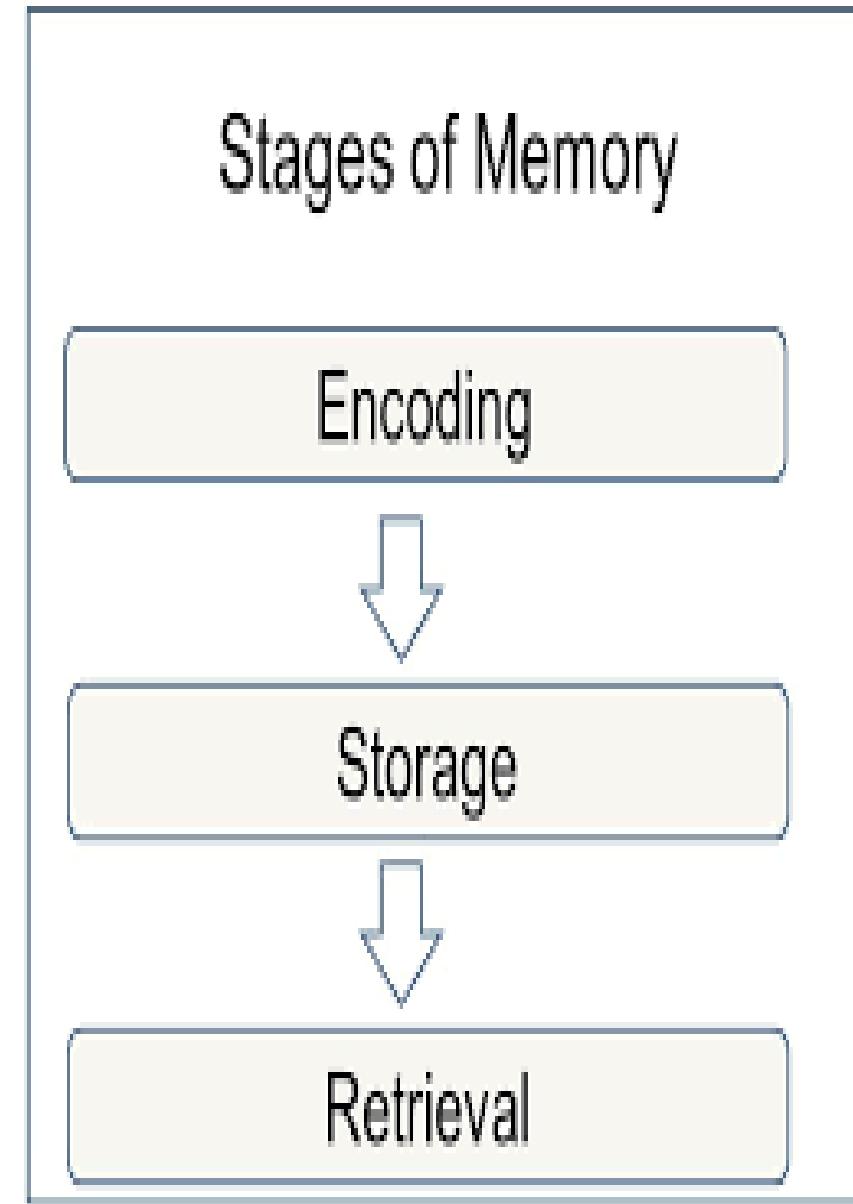
Encoding



Storage



Retrieval



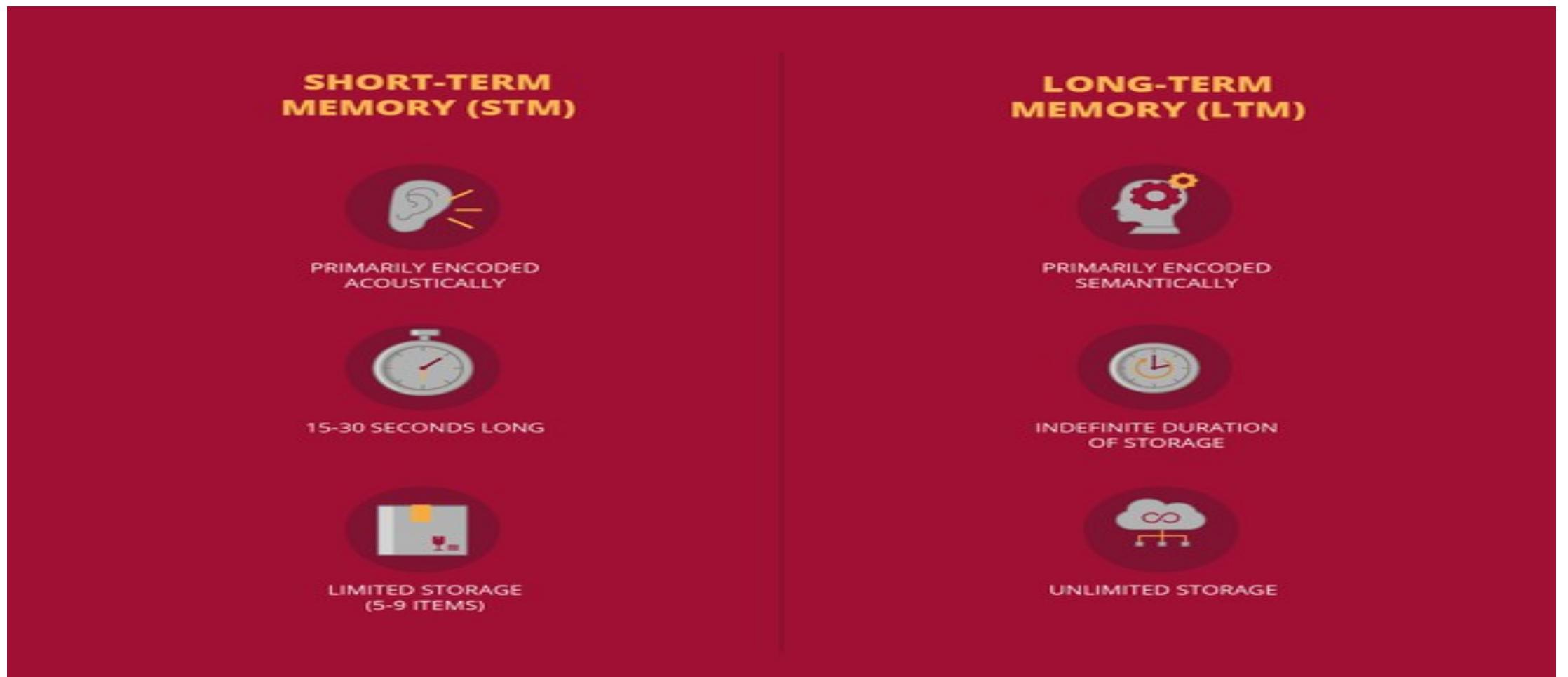
- **Encoding.** Encoding refers to the process through which information is learned. That is, how information is taken in, understood, and altered to better support storage

Information is usually encoded through one (or more) of four methods:

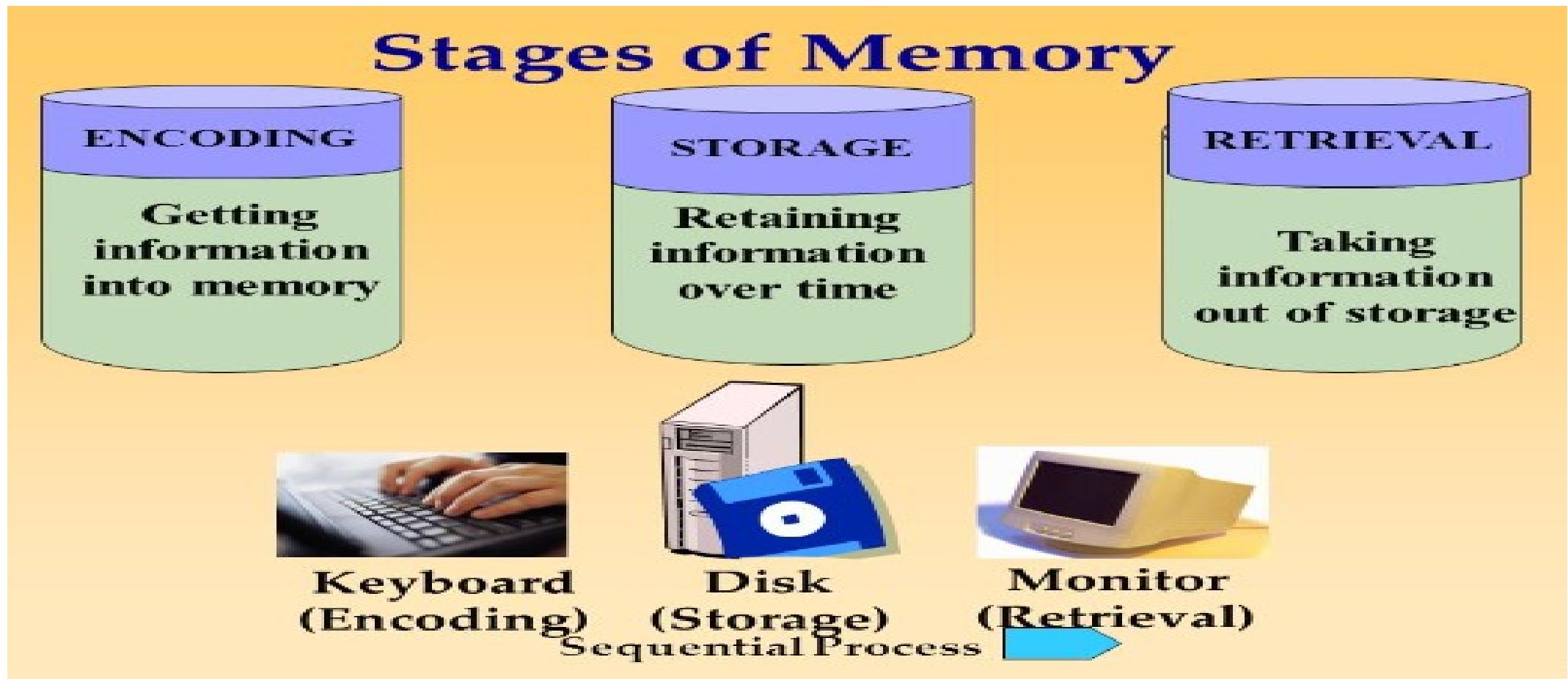
- (1) Visual encoding (how something looks);
- (2) acoustic encoding (how something sounds);
- (3) semantic encoding (what something means); and
- (4) tactile encoding (how something feels).

While information typically enters the memory system through one of these modes, the form in which this information is stored may differ from its original, encoded form

- **Storage.** Storage refers to how, where, how much, and how long encoded information is retained within the memory system .
- (storage) highlights the existence of two types of memory: short-term and long-term memory.

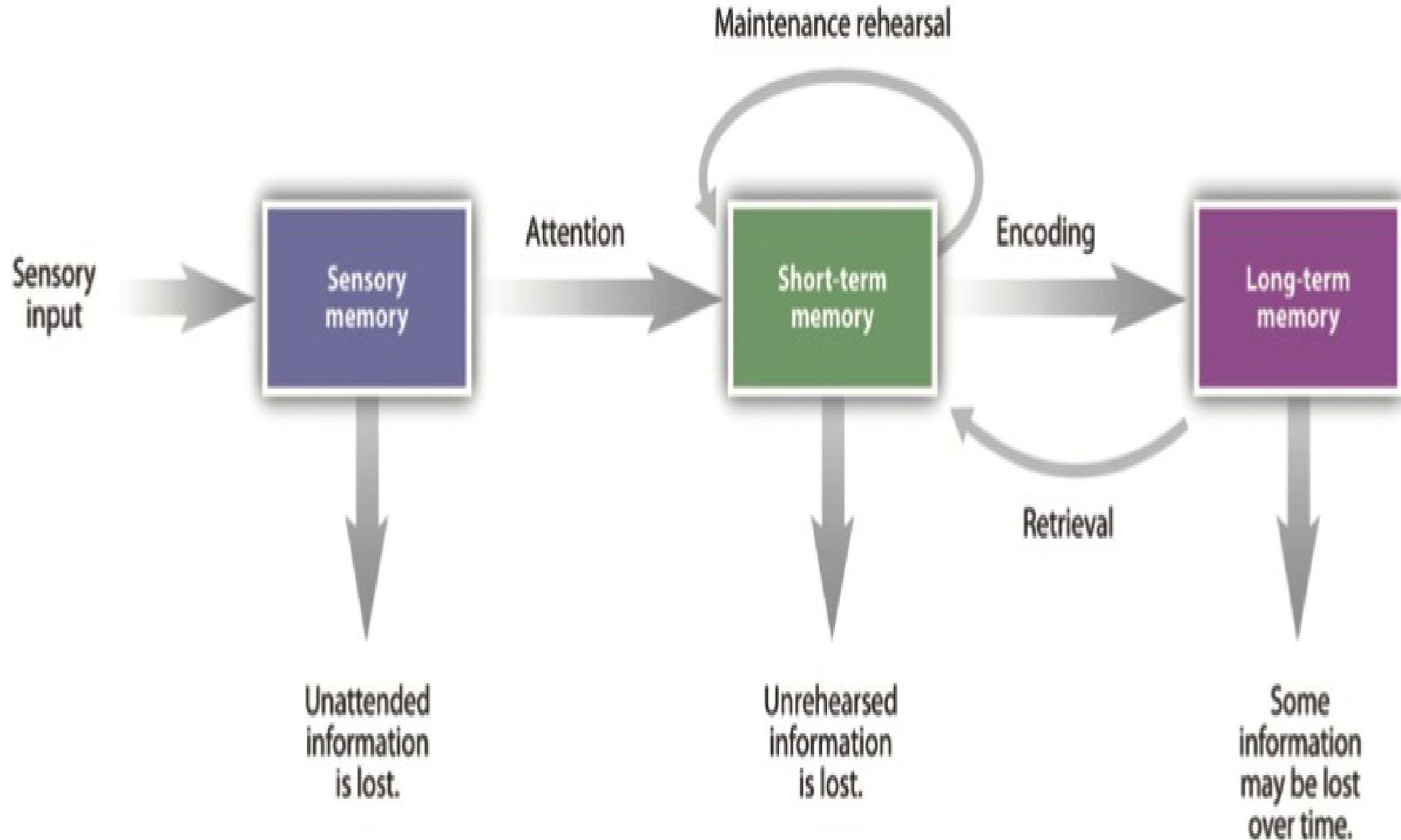


- **Retrieval**- retrieval is the process through which individuals access stored information.
- This refers to getting information out of storage.



Stages of memory

- Information begins in *sensory memory*, moves to *short-term memory*, and eventually moves to *long-term memory*.
- Also known as Multi store Memory model or **Atkinson-Shiffrin model of memory**
- But not all information makes it through all three stages; most of it is forgotten.
- Whether the information moves from shorter-duration memory into longer-duration memory or whether it is lost from memory entirely depends on how the information is attended to and processed.



Sensory Memory

- **Sensory memory** refers to the brief storage of sensory information.
- Sensory memory is a memory buffer that lasts only very briefly and then, unless it is attended to and passed on for more processing, is forgotten.
- The purpose of sensory memory is to give the brain some time to process the incoming sensations and to allow us to see the world as an unbroken stream of events rather than as individual pieces.
- Visual sensory memory is known as **iconic memory**. **Iconic memory was first studied by the psychologist George Sperling (1960)**

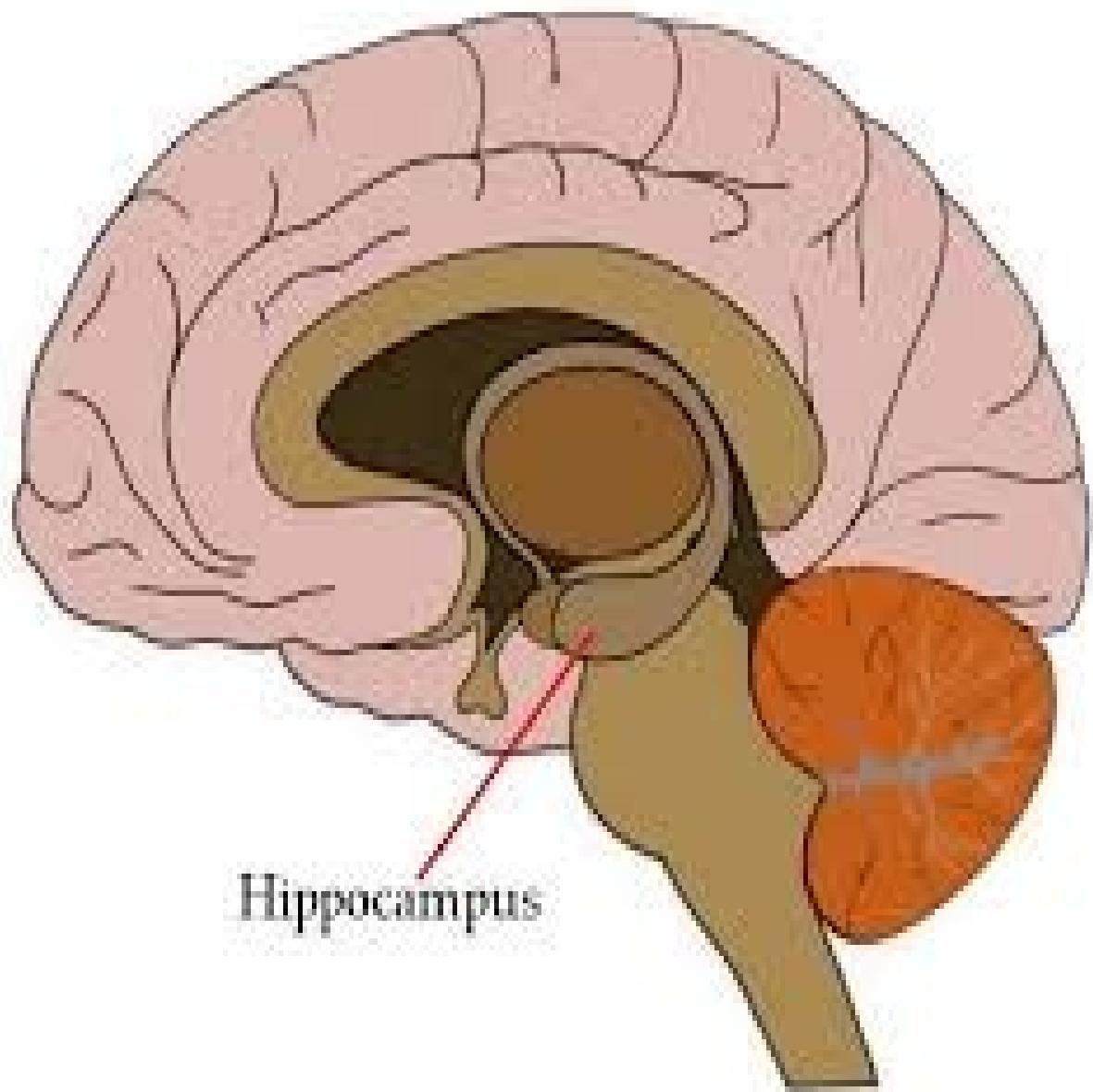
- Auditory sensory memory is known as **echoic memory**.
- In contrast to iconic memories, which decay very rapidly, echoic memories can last as long as 4 seconds (Cowan et al.,).
- This is convenient as it allows you—among other things—to remember the words that you said at the beginning of a long sentence when you get to the end of it

Short-Term Memory

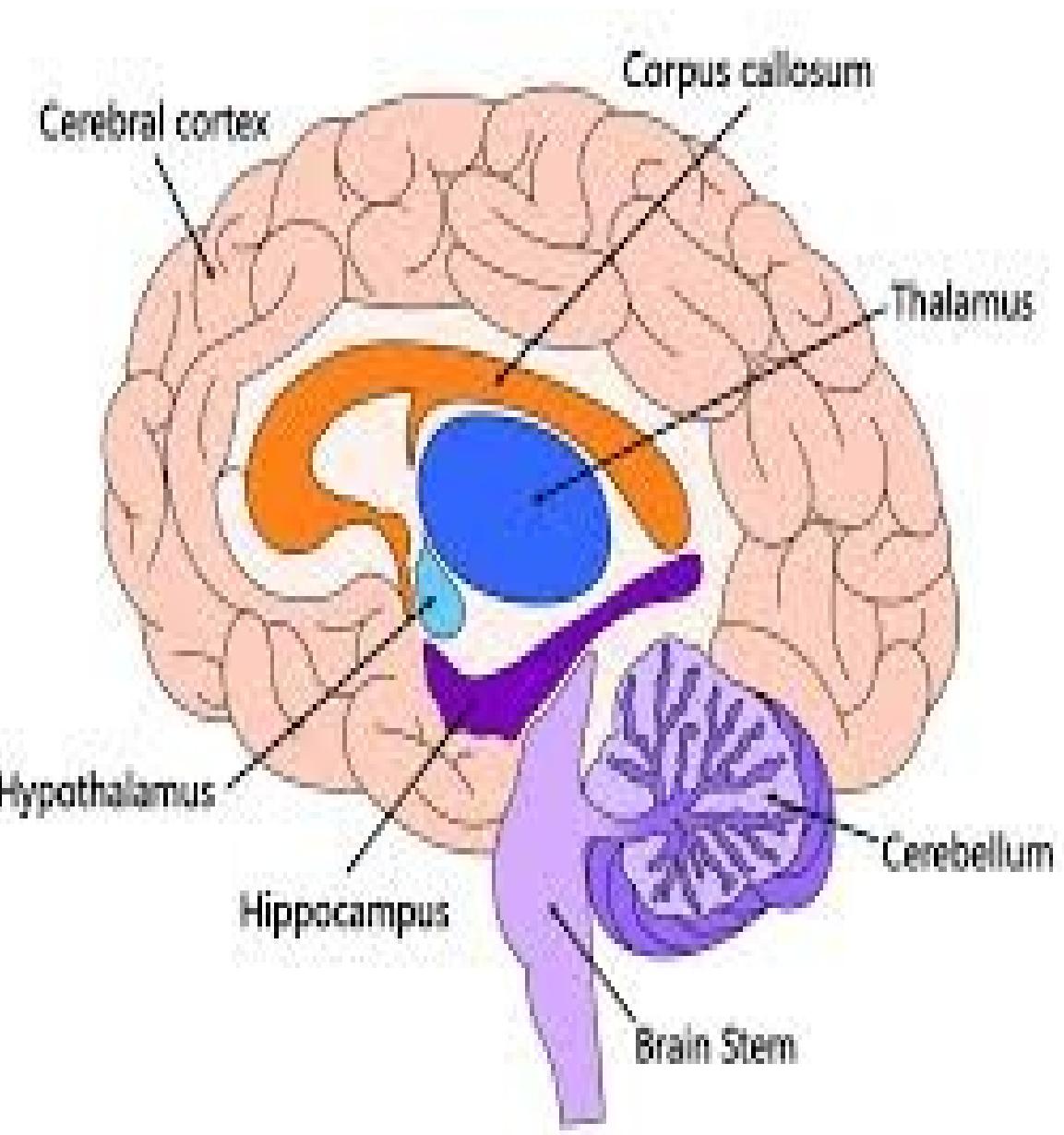
- Most of the information that gets into sensory memory is forgotten, but information that we turn our attention to, with the goal of remembering it, may pass into *short-term memory*.
- **Short-term memory (STM)** is the place where small amounts of information can be temporarily kept for more than a few seconds but usually for less than one minute
- Information in short-term memory is not stored permanently but rather becomes available for us to process, and the processes that we use to make sense of, modify, interpret, and store information in STM are known as **working memory**.

Long-term memory

- Long-term memory (LTM) is the final stage of the [multi-store memory model](#) proposed by **Atkinson-Shiffrin**, providing the lasting retention of information and skills.
- Theoretically, long-term memory capacity could be unlimited
- Long-term memory refers to the memory process in the brain that takes information from the short-term memory store and creates long lasting memories. These memories can be from an hour ago or several decades ago.
- Short-term memories become long-term memories in a region of the brain called the [hippocampus](#).
- Another part of the brain called the cortex stores these long-term memories.

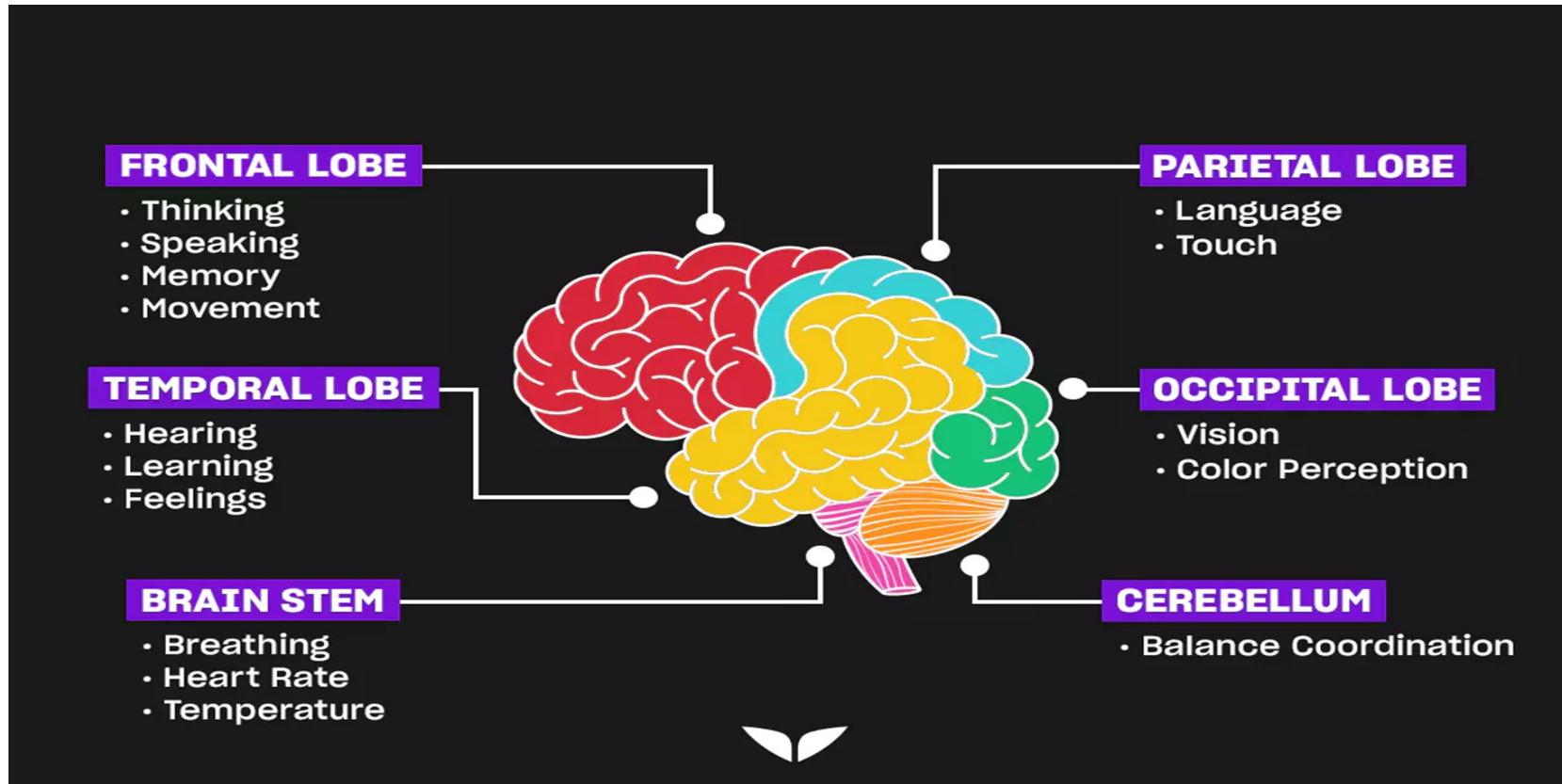


Hippocampus



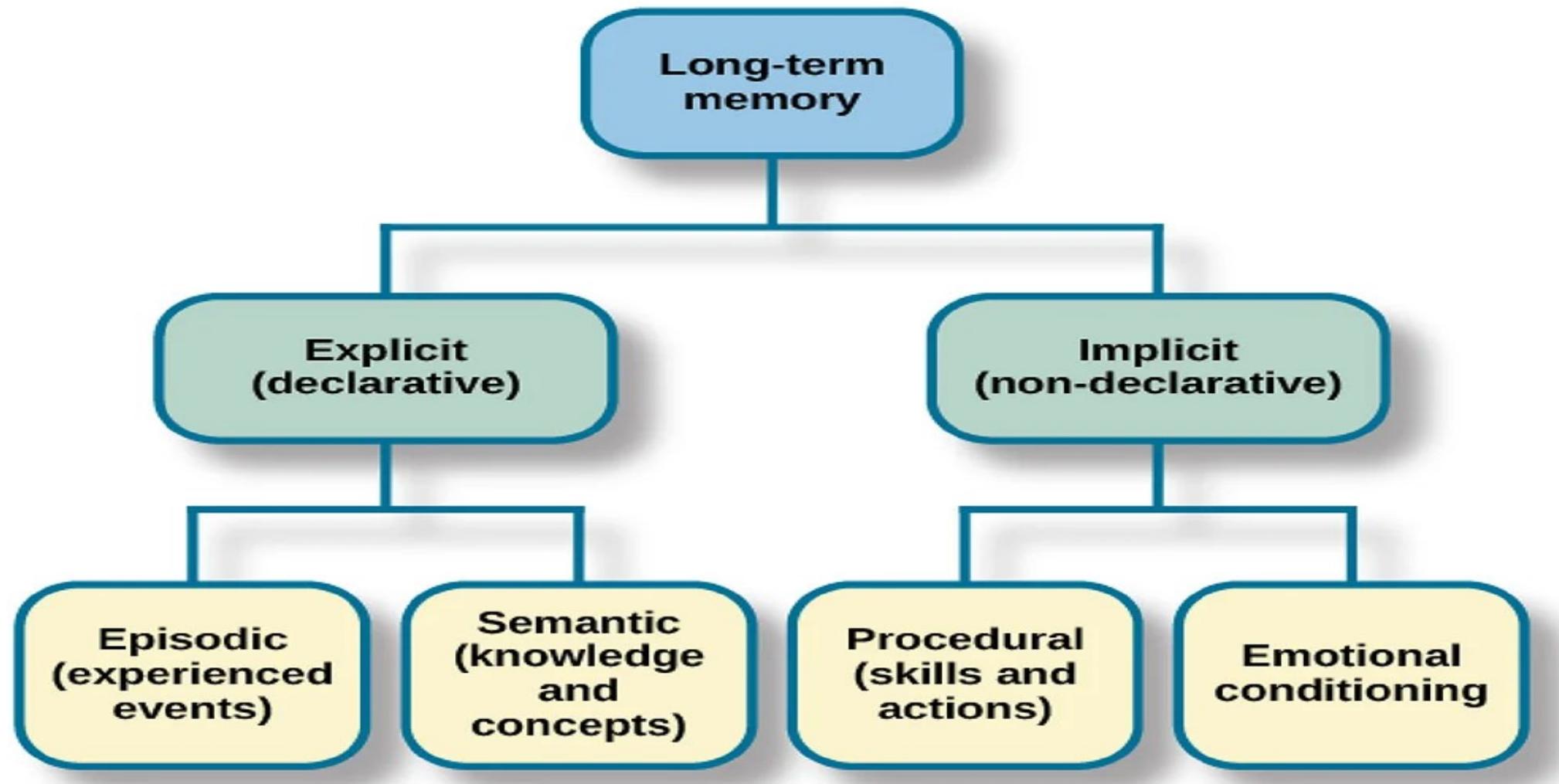
Parts of the Brain Involved in Learning & Memory

- F-Frontal Lobe for thinking and Analysis
- A- Amygdale Hippocampus for Recent Memory. That is Short Term Memory.
- T- Temporal Lobe for hearing, smell & Taste
- H- Hind Brain for Visual Images



Types of Long-Term Memory

- Long-term memory is not a single store and is divided into two types: explicit (knowing that) and implicit (knowing how). One of the earliest and most influential distinctions of long-term memory was proposed by **Tulving (1972)**.



Procedural Memory

- Procedural memory is a part of the implicit long-term memory responsible for knowing how to do things, i.e., memory of motor skills.
- It does not involve conscious (i.e., it's unconscious-automatic) thought and is not declarative. For example, procedural memory would involve knowledge of how to ride a bicycle.

Semantic Memory

- Semantic memory is a part of the explicit long-term memory responsible for storing information about the world. This includes knowledge about the meaning of words, as well as general knowledge.
- For example, London is the capital of England. It involves conscious thought and is declarative.
- The knowledge that we hold in semantic memory focuses on “knowing that” something is the case (i.e. declarative).
- For example, we might have a semantic memory for knowing that Paris is the capital of France.

Episodic Memory

- An episodic memory is a memory of a specific event. Because each person has a different perspective and experience of an event, episodic memories of that event are unique to each person.
- Imagine that you get a phone call from an old school friend. You spend an evening reminiscing about amusing moments from your days at school. Your memories of those specific events and experiences are examples of episodic memory
- Episodic memories are important for shaping your personal sense of identity. These memories provide you with a sense of personal history and a shared history with others in your life. ***Episodic memory has a profound effect on your life. Tulving described it as a "mental time machine."***

Factors that determine Learning & Memory

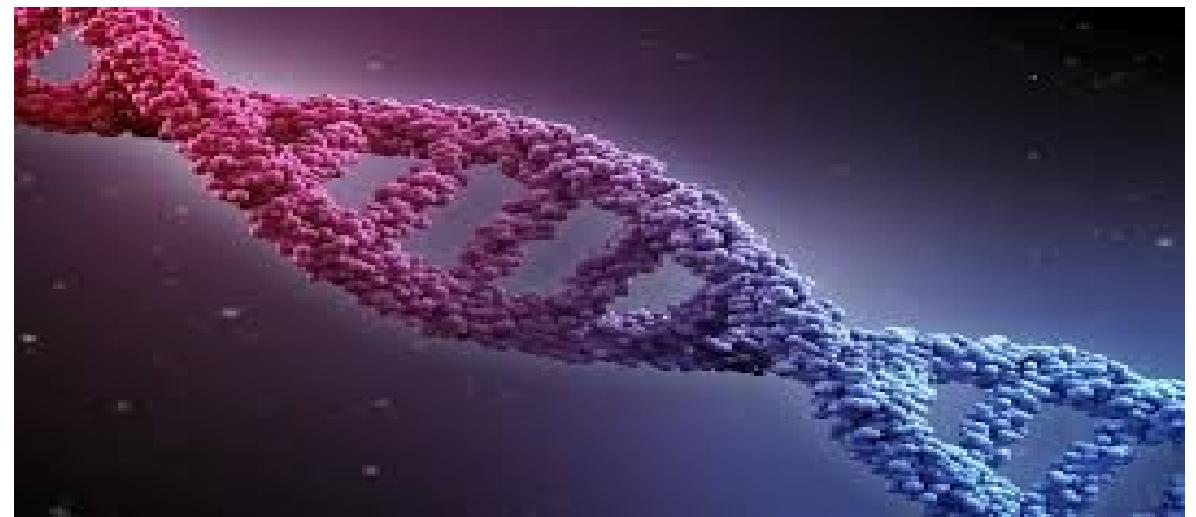
- Growth and development of the brain
- I.Q.
- Attention span and level of concentration
- Motivation to learn and remember
- Nature and usefulness of information
- Physical health
- Mental health
- Quality of teaching
- Environment
- Study habits

Growth and Development of the Brain

- Growth of the brain occurs right from 9 months of pregnancy and first five years of life
- Fully grown brain weighs 1250 gms and contains 100 billion nerve cells.
- Higher order brain functioning takes place during 18-20 yrs of age. Again it varies from individual to individual based on the following factors.



- **Genetic issues-** chromosomal abnormalities may lead to poor development of brain. Eg. Microcephaly, Down's syndrome.
- **Prenatal factor-** if the pregnant mother suffers from viral infections like chicken pox, measles, hepatitis etc, during the first three months of pregnancy or from syphilis, AIDS, diabetes mellitus the growth of the brain of the foetus is arrested. This results in M.R(Mental retardation of the child.



- **Poor nutrition-** Protein, iron, iodine deficiency in the pregnant woman and in turn the child lead to poor development of brain
- **Misuse of drugs-** consumption of alcohol, tobacco and other intoxicating substances by the pregnant women.
- **Birth trauma-** complicated, delayed delivery and difficulties faced during labor may cause damage to the brain of the child



- **Diseases** during childhood-repeated vomiting, diarrhea, fits, jaundice, head injury, brain fever during first five years of life can cause brain damage.
- **Environmental stimulation-** in a barren environment, where there are no adequate stimulation to the five senses of the child, no interactions with parents and environment can delay the maturation of the brain cells.

Intelligent Quotient

- It is calculated by the formula

$$\text{M.A/C.A} \times 100$$

MA- Mental age

CA-Chronological age (age in years)

MA- score of Stanford Binet test



- Those who have an I.Q below 70 are retarded
- I.Q is the product of genetics, nutrition and environment.
- Men are generally good in problem solving. Women are good in reasoning, word fluency and memory
- I.Q is not a static phenomenon. It keeps changing. Good health, mental equilibrium and pleasant challenging environment improve the intellectual functioning of the individual.

Attention Span & Concentration

❖ Two factors- Internal & External

Internal

- **Fasting & Feasting-** If the adolescent is fasting or took food 5 to 6 hrs ago, the glucose level in the blood drops to 60 mg per 100 ml.
- This Hypoglycemia makes the individual Unable to sustain his/her attention and concentration.
- On the other hand , if he had taken very high calorie diet, he feels drowsy and fails to concentrate.
- Pain and discomfort in the body
- Dissatisfaction and disappointments
- Worries about family, finance and future
- Negative emotions like fear, sadness, anger, jealousy, inferiority

External factors



T.V., radio, cinema



Others playing, conversing, quarrelling



Noise



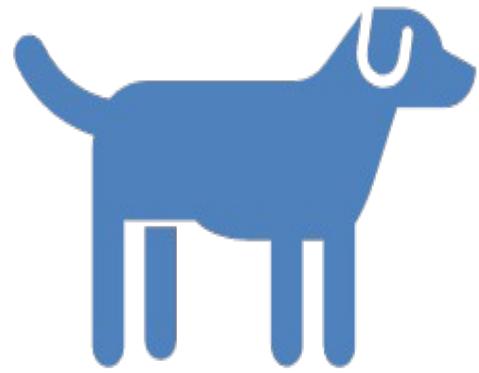
Unhealthy physical environment- no fresh air, no proper light, bad smell



Adequate and timely nutritious food, adequate sleep, physical fitness, mental well-being, interesting subjects, silent and pleasant environment improve one's attention and concentration

Motivation- again its of 2 types. Internal and External. Parents, teachers, competitive classmates, rewards, good jobs act as external motivational factors.

- Acquiring knowledge, need to excel oneself , awareness of the value of education in the personality development and in the management of life events are the internal motivating factors



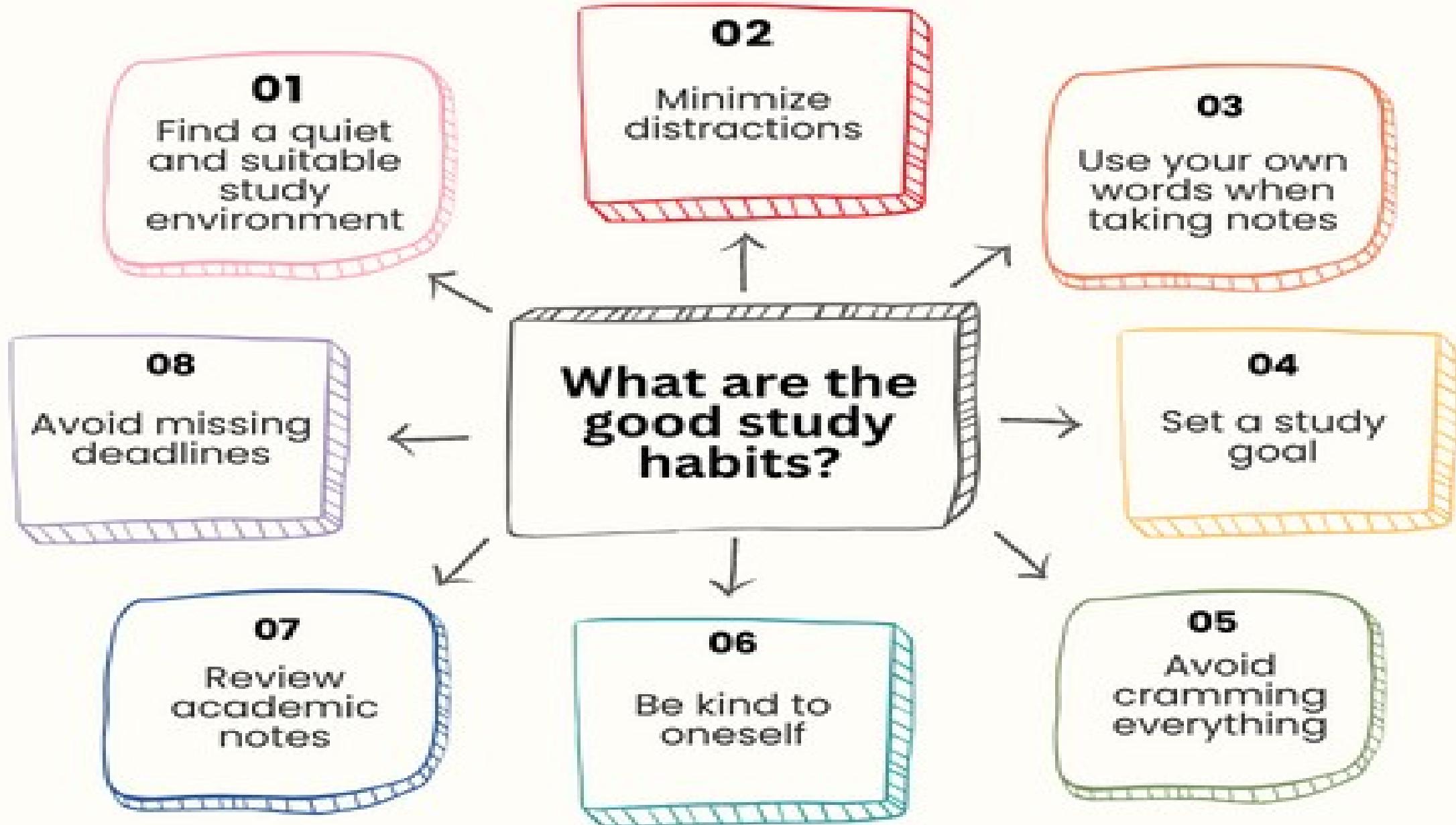
Nature of information and usefulness of the subject- Some subjects and information, by their nature, arouse interest in majority of adolescents. For example, poems, drama, information about people, animals and places and nature.



A good teacher always succeed in generating interest in majority of the students. Simple language, attractive style of presentation, pictures showing the application of knowledge in routine life make the difference.

- **Physical Health**
- **Mental health-** anxiety disorders, identity crisis, performance anxiety, the big gap between the realities of life and fantasies, lack of sexual education, social disorganization like unhealthy and unethical competitions, uncertain society, unequal distribution of wealth also leads to anxiety.
- Depression, Hysterical disorder, Drug abuse

Good study habits



Good Study Habits



Eliminate distraction

Designate study area

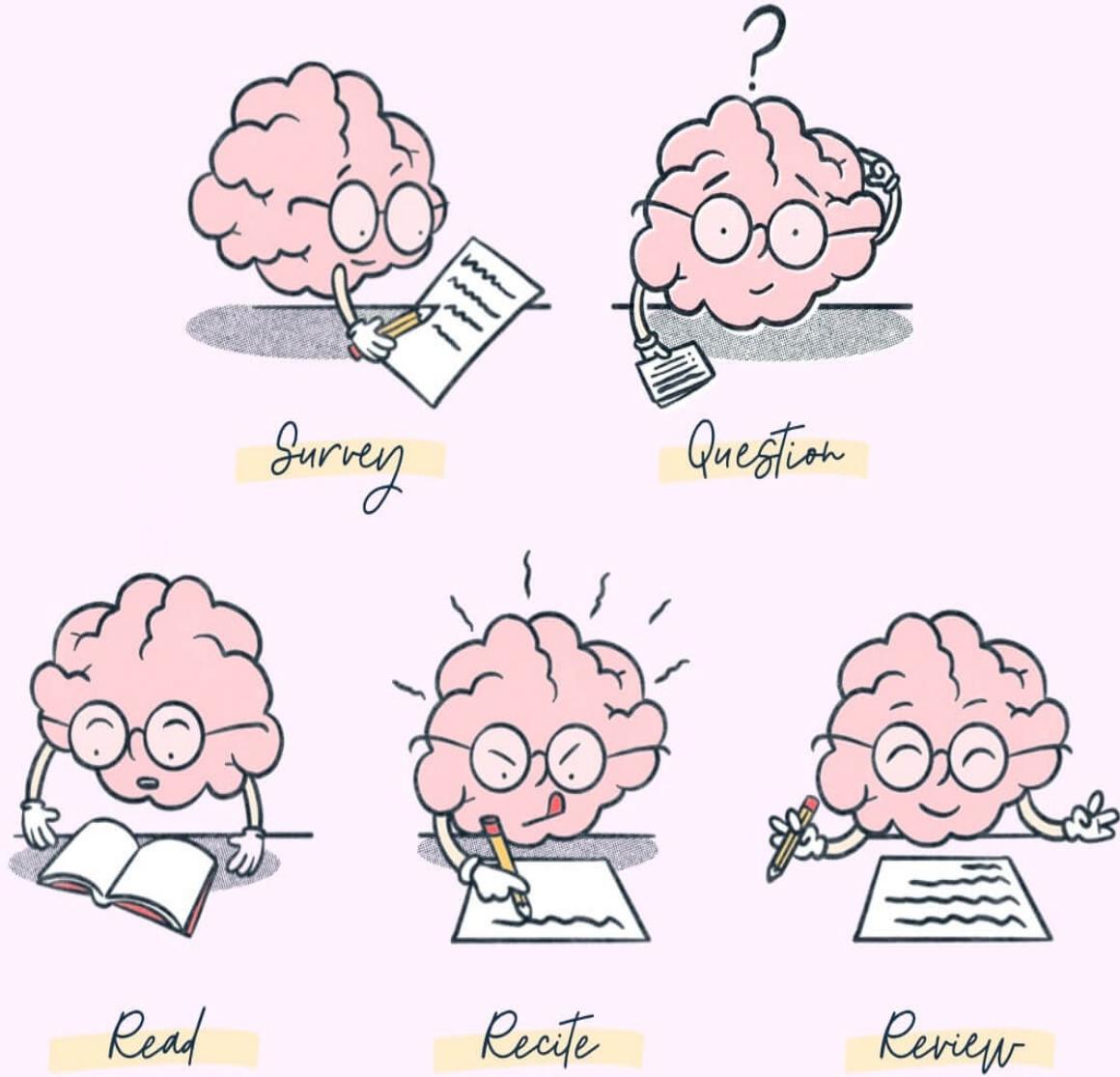
Set regular short breaks

Exercise & getting enough sleep

- There are several different things that you can do to stay motivated during your studies. Some of the most effective tips include:
 1. Set realistic goals for yourself and strive to accomplish as many of them as possible.
 2. Make a study schedule and stick to it as closely as possible.
 3. Take breaks regularly, but make sure that you set a specific time for when you will resume studying.
 4. Find a study group to help keep you accountable and motivated.
 5. Reward yourself for completing tasks or reaching milestones, but do not overindulge or get too caught up in rewards.
 6. Be willing to adjust your goals or study habits if they are not working for you.
 7. Keep a positive attitude and remember that even tricky tasks can be accomplished with enough effort and perseverance.
 8. SQ3R Method

- **SQ3R Method**

- **S-** Survey- survey the headings and subheadings
- **Q-** Questioning
- **R-** Read- read the material carefully
- **R-** Recite – after reading , recite the information from it
- **R-** Review- review the entire information by quizzing yourself and then reread anything you fail to recall.



Memory Techniques

Mnemonic method:

- It is also known as “Acronym”. Some times we have to learn and remember all information and their order. Eg: VIBGYOR

Method of loci :

- It is a technique of visualization . The technique employs a series of “loci” or locations.

Chunking :

- This is a systematic way of grouping information . Dividing words/numbers into meaningful manners.

Link method : narrative method in which unrelated items are connected in a story.

FORGETTING

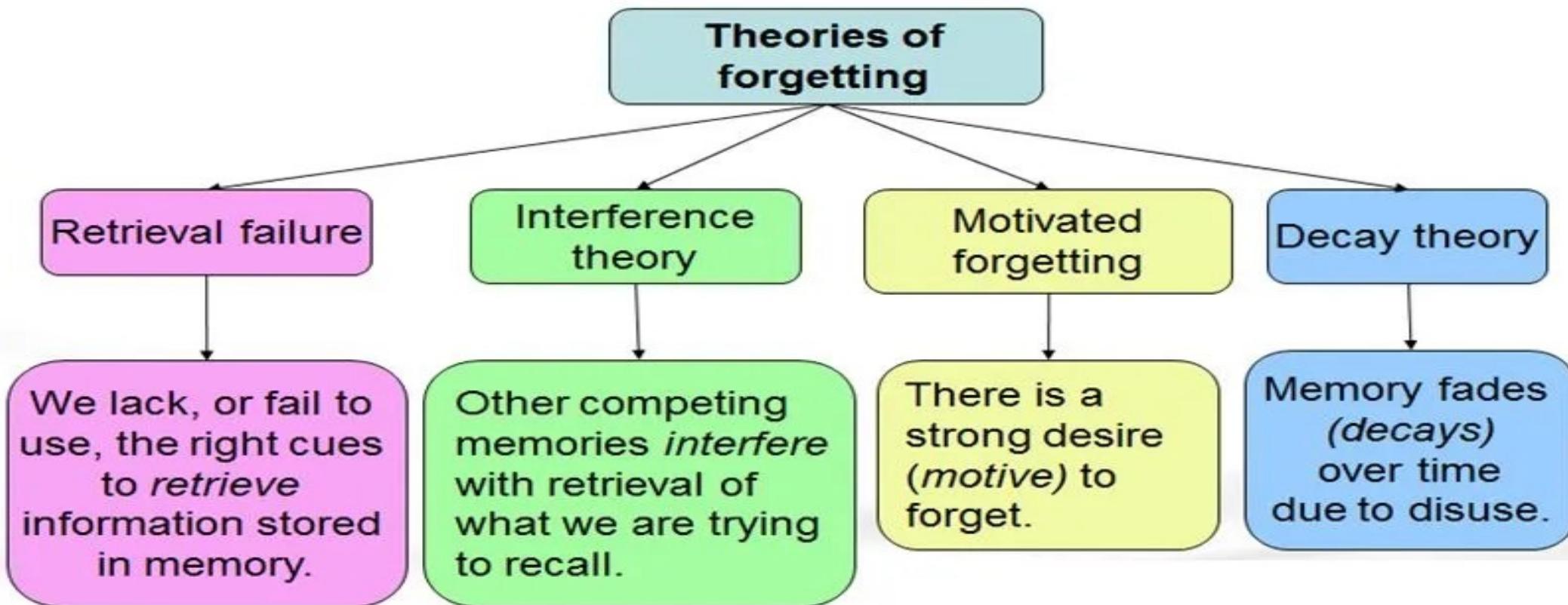
Decay Theory

- **Idea:** Memories fade over time if they are not used.
- Like “traces” in the brain that weaken gradually.
- Example: Forgetting a childhood classmate’s name because you haven’t thought of it for years.

Interference Theory

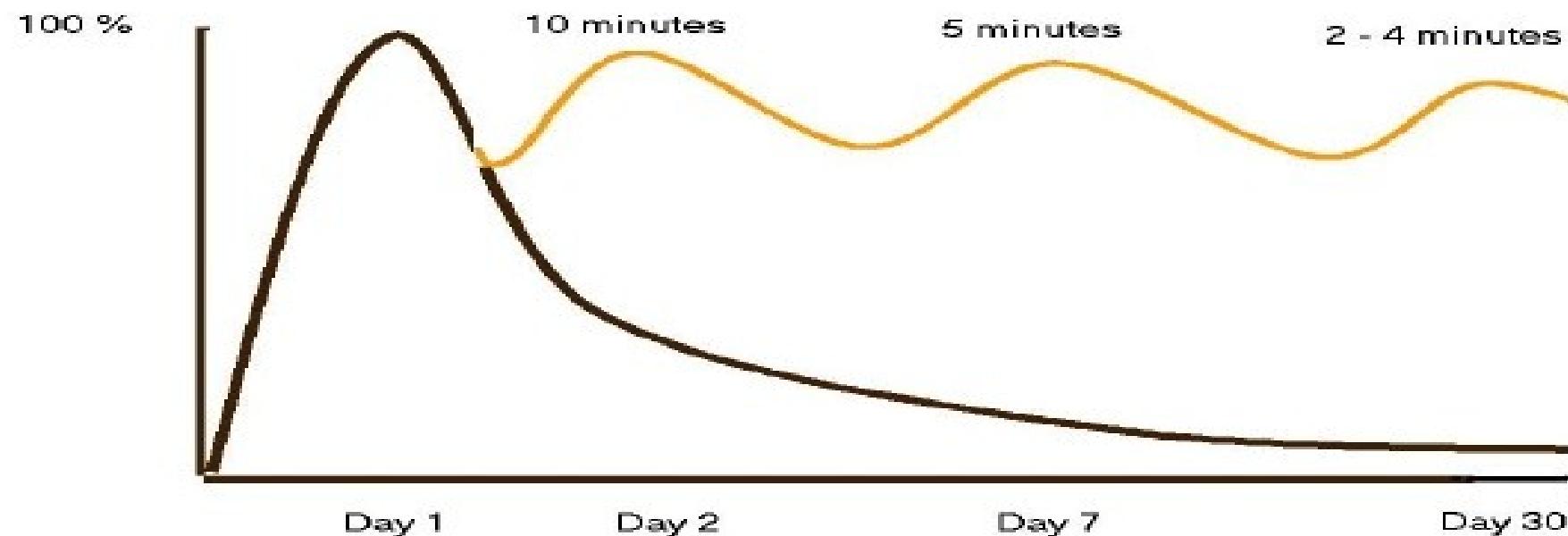
- **Idea:** Forgetting happens because other information gets in the way.
- **Two types:**
 - **Proactive interference:** Old memories block new learning.
E.g., Using your old password when trying to recall a new one.
 - **Retroactive interference:** New learning makes it harder to remember old information.
E.g., Forgetting your old phone number after memorizing a new one.

Theories of Forgetting

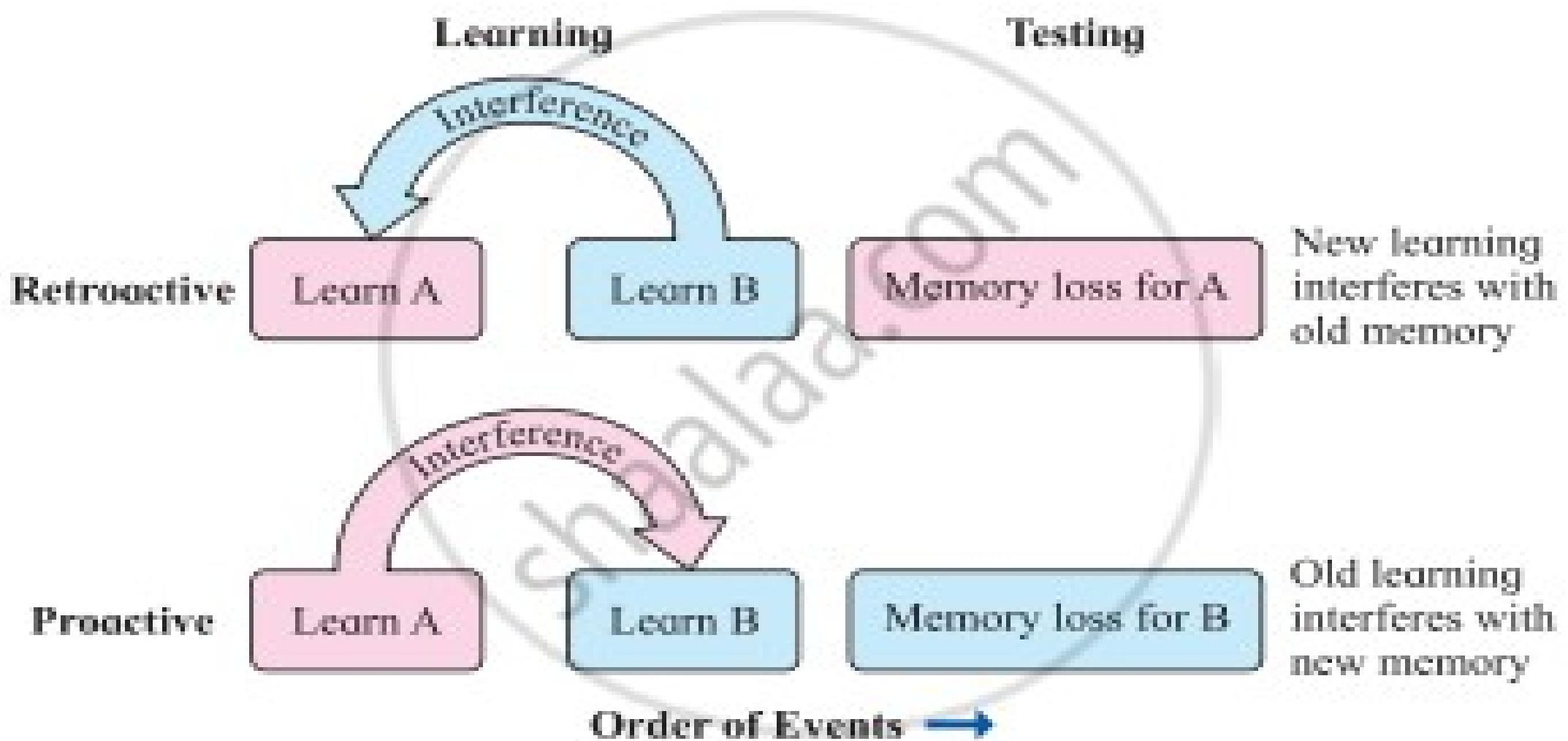


THEORY OF DECAY

- **Theory of Decay** states that impressions created in the brain during the learning process fade away with the passage of time. This is also called as forgetting.



Interference Theory



Motivated Forgetting

- ✿ Forgetting in LTM occurs because of a conscious or unconscious desire to block out painful or threatening memories
- ✿ **Repression:** Occurs unconsciously or without your awareness
- ✿ **Suppression:** When you actively and consciously attempt to put something out of awareness – you could choose to remember it

