

Memory

Cont.

- Memory is more than a single process.
- It allows us to acquire, retain and recall information in our memory.
- The process of remembering is affected by a common phenomenon called forgetting.
- Memory allows us to acquire, retain and recall information and the corresponding processes are encoding, storage and retrieval.

Cont.

- **Encoding:** - the process of converting information in to a form that can be entered and stored in memory.
- **Storage:** - the process where by an encoded memory is held for future use.
- **Retrieval:** - the process where by a stored memory is brought in to consciousness.
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Information processing model of memory stage model

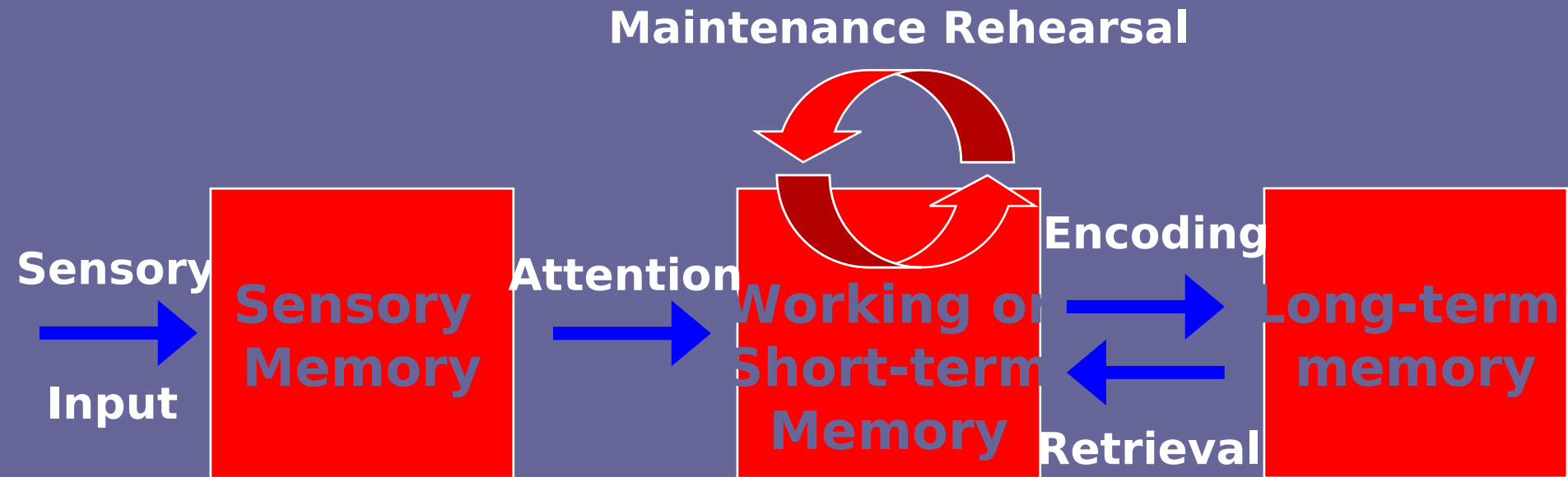
- Memory is currently thought to have three stages very short, short and long. These stages vary.
 - ❖ In type of information
 - ❖ Function
 - ❖ Duration and
 - ❖ Capacity

Memory Processes

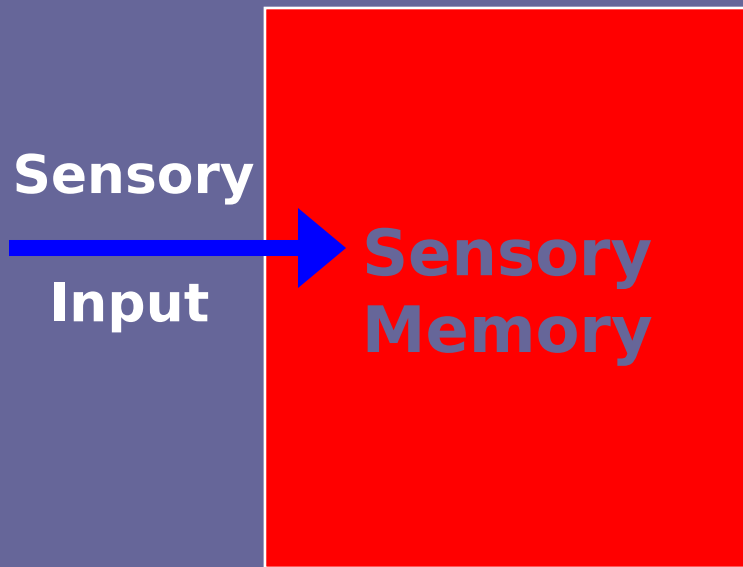
- Encoding--transforming information into a form that can be entered and retained in the memory system
- Storage--retaining information in memory so that it can be used at a later time
- Retrieval--recovering information stored in memory so that we are consciously aware of it

Three Stages of Memory

- Three memory stores that differ in function, capacity and duration

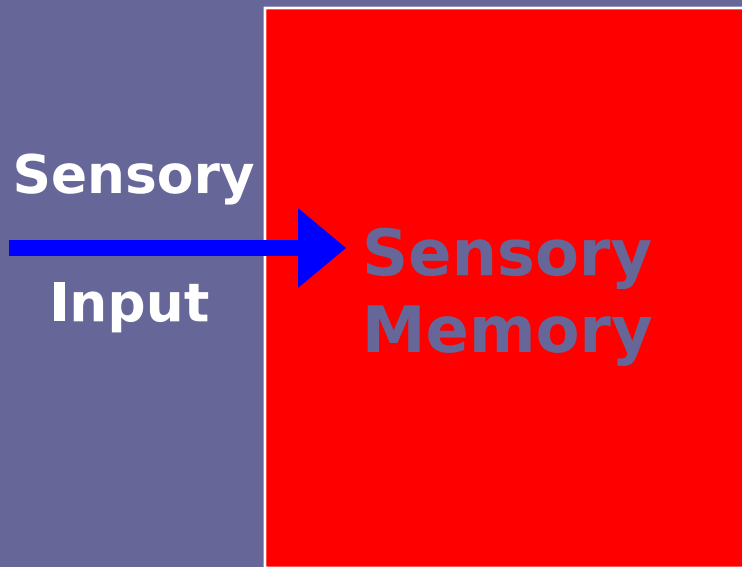


Sensory Memory



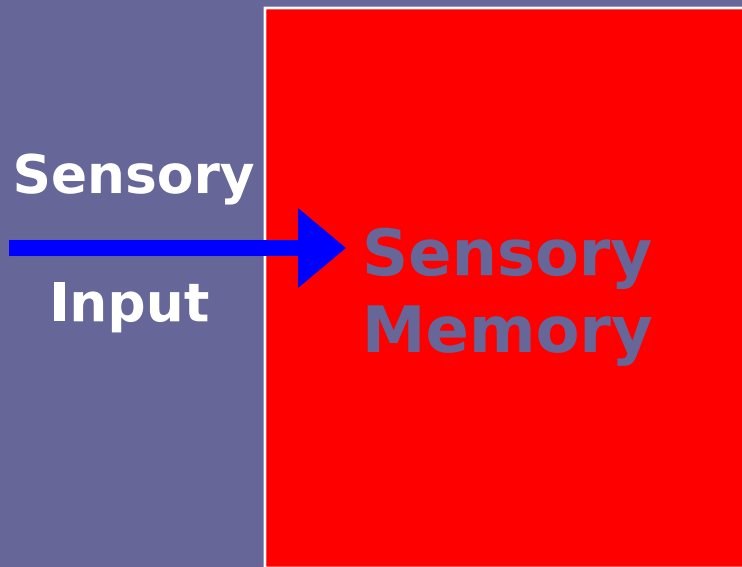
- Function—holds information long enough to be processed for basic physical characteristics
- Capacity—large
 - can hold many items at once
- Duration—very brief retention of images
 - 3 sec for visual info
 - 2 sec for auditory info

Sensory Memory



- Divided into two types:
 - iconic memory– visual information
 - echoic memory– auditory information
- George Sperling studied iconic memory

Sensory Memory

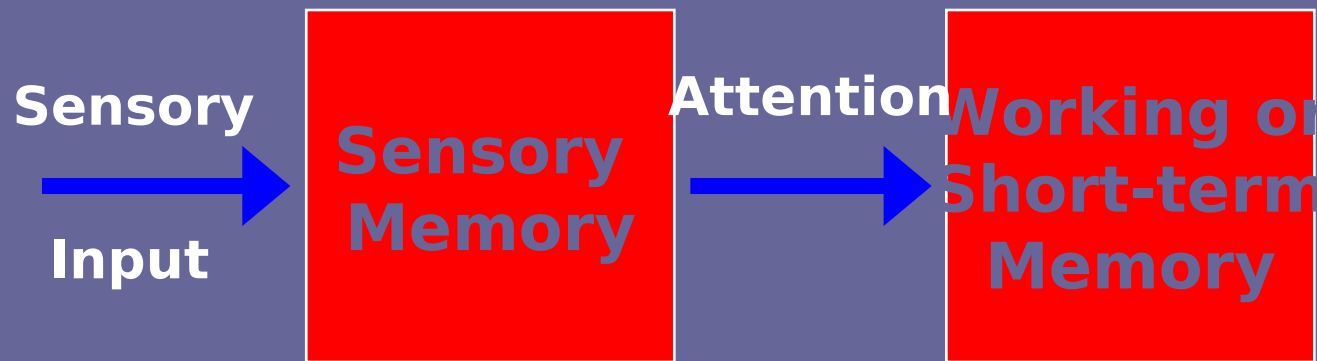


- Sensory memory forms automatically, without attention or interpretation
- Attention is needed to transfer information to working memory

Sensory Memory

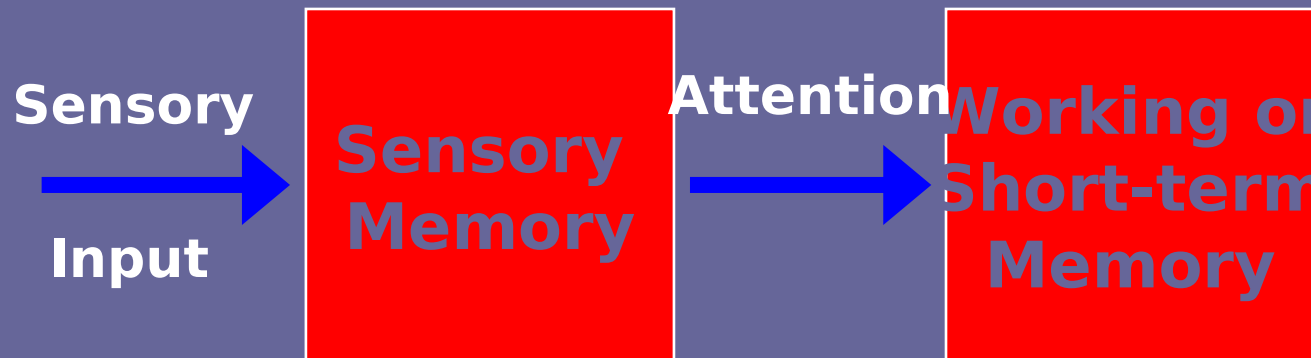
- Visual sensory memory—brief memory of an image or icon. Also called iconic memory.
- Auditory sensory memory—brief memory of a sound or echo. Also called echoic memory.
- Auditory sensory memories may last a bit longer than visual sensory memories

Short Term or Working Memory



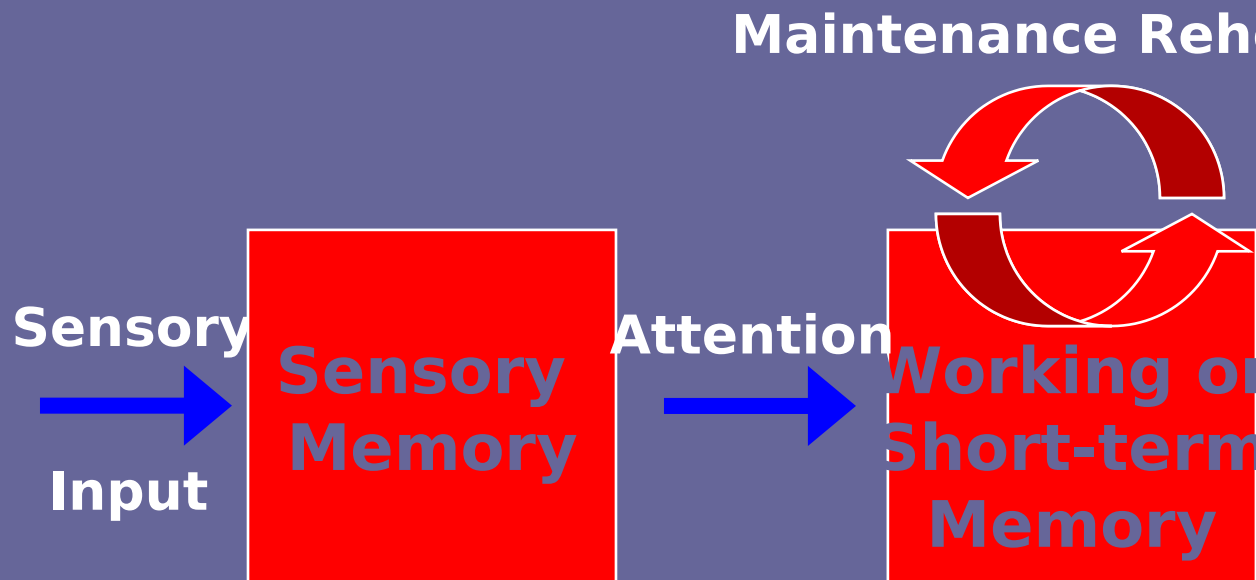
Short-Term Memory

- Function—conscious processing of information
 - where information is actively worked on
- Capacity—limited (holds 7 ± 2 items)
- Duration—brief storage (about 30 seconds)



Maintenance Rehearsal

- Mental or verbal repetition of information allows information to remain in working memory longer than the usual 30 seconds



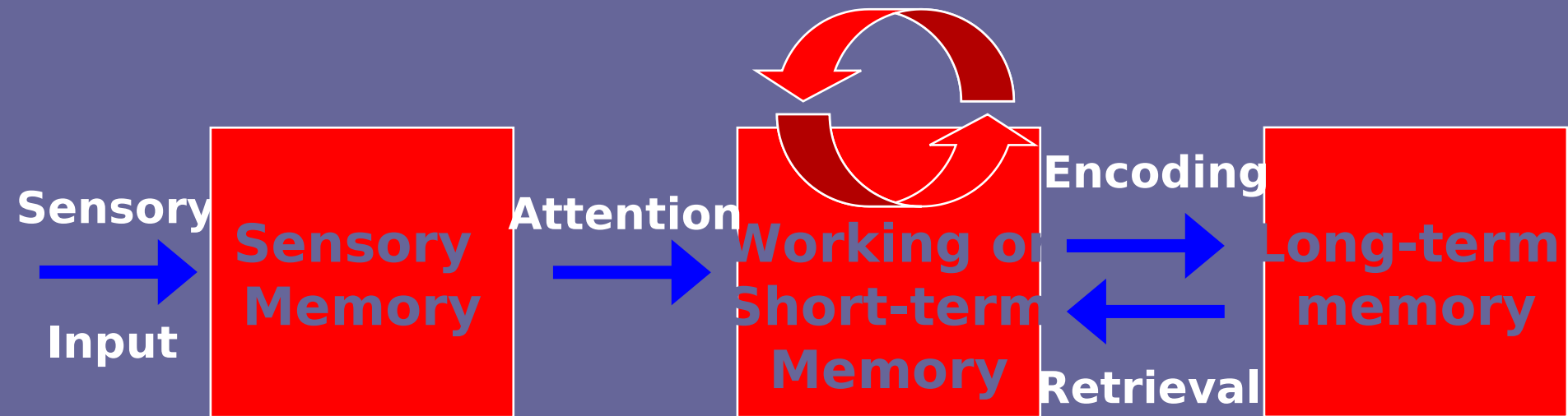
Chunking

- Grouping small bits of information into larger units of information
 - expands working memory load
- Which is easier to remember?
 - 4 8 3 7 9 2 5 1 6
 - 483 792 516

Long-Term Memory

- Once information passes from sensory to working memory, it can be encoded into long-term memory

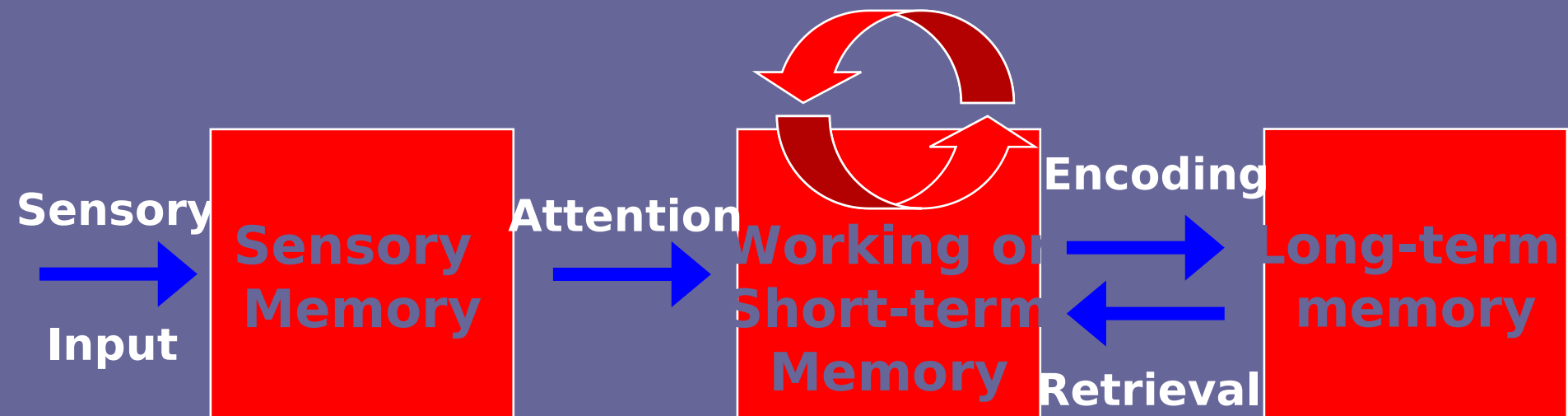
Maintenance Rehearsal



Long-Term Memory

- Function—organizes and stores information
 - more passive form of storage than working memory
- Unlimited capacity
- Duration—thought by some to be permanent

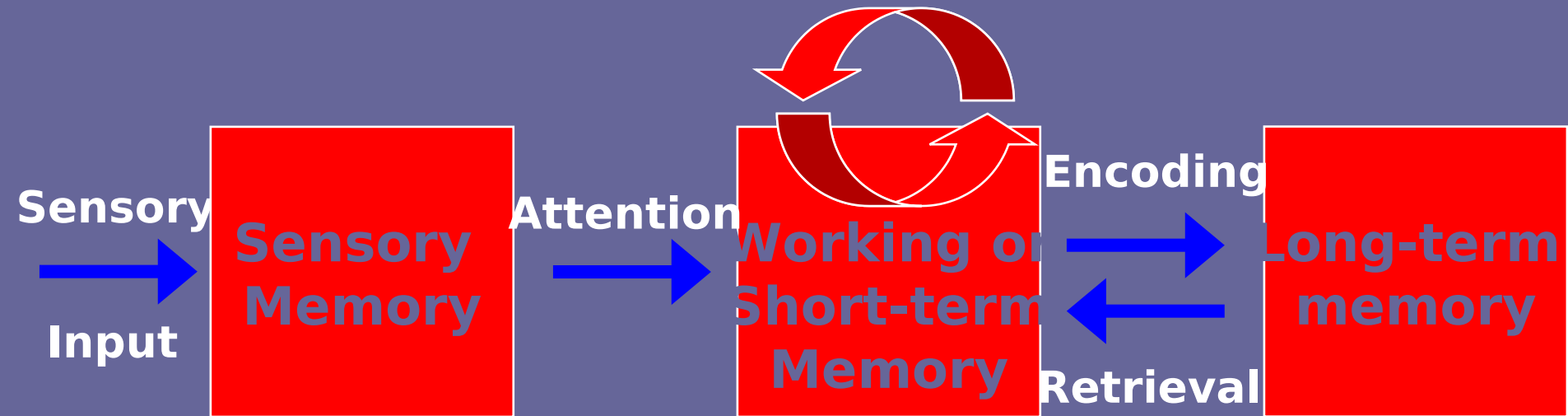
Maintenance Rehearsal



Long-Term Memory

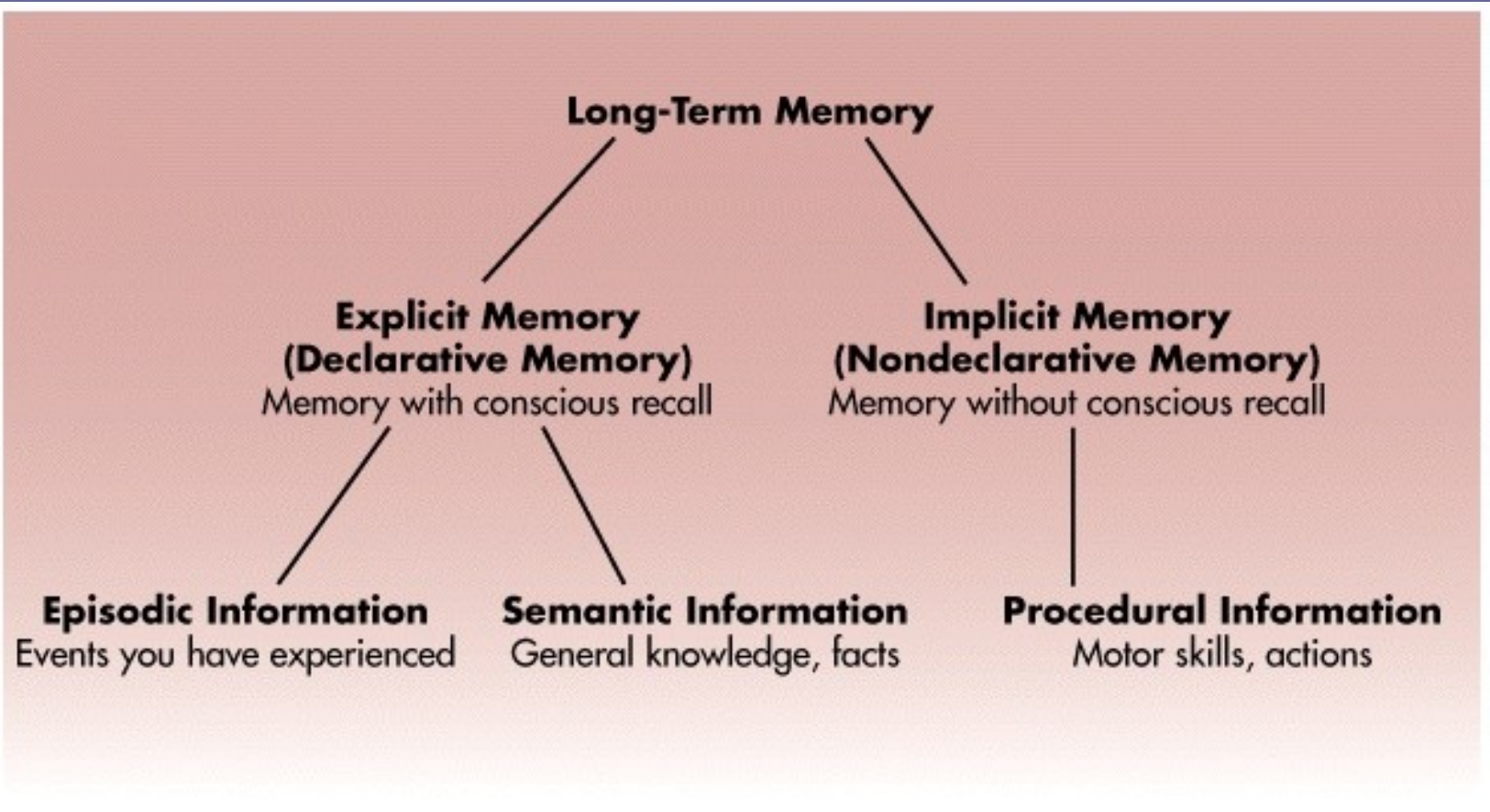
- Encoding—process that controls movement from working to long-term memory store
- Retrieval—process that controls flow of information from long-term to working memory store

Maintenance Rehearsal



Types of Long-Term Memory

- Explicit memory—memory with awareness; information can be consciously recollected; also called declarative memory
- Implicit memory—memory without awareness; memory that affects behavior but cannot consciously be recalled; also called non-declarative memory



Explicit Memory

- Declarative or conscious memory
- Memory consciously recalled or declared
- Can use explicit memory to directly respond to a question
- Two subtypes of explicit memory

Explicit Memory

- Episodic information—information about events or “episodes”
- Semantic information—information about facts, general knowledge, school work

Episodic Memory

- Memory tied to your own personal experiences
- Examples:
 - What month is your birthday?
 - Do you like to eat apples?
- Q: Why are these explicit memories?
- A: Because you can actively declare your answers to these questions

Semantic Memory

- Memory not tied to personal events
- General facts and definitions about the world
- Examples:
 - How many tires on a car?
 - What is a cloud?
 - What color is a banana?

Implicit Memory

- Nondeclarative memory
- Influences your thoughts or behavior, but does not enter consciousness

Procedural Memory

- Memory that enables you to perform specific learned skills or habitual responses
- Examples:
 - Riding a bike
 - Using the shift stick while driving
 - Tying your shoe laces
- Q: Why are these procedural memories implicit?
- A: Don't have to consciously remember the steps involved in these actions to perform them
 - Try to explain to someone how to tie a shoelace

Why do we forget?

Sensory memory
The senses momentarily register amazing detail



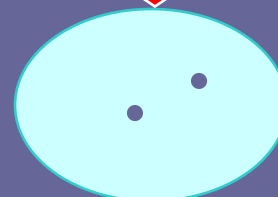
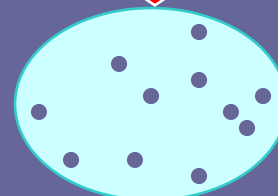
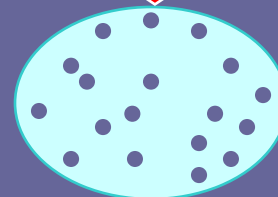
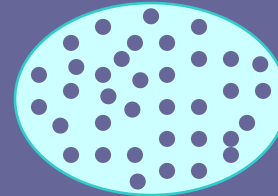
Short-term memory
A few items are both noticed and encoded



Long-term storage
Some items are altered or lost



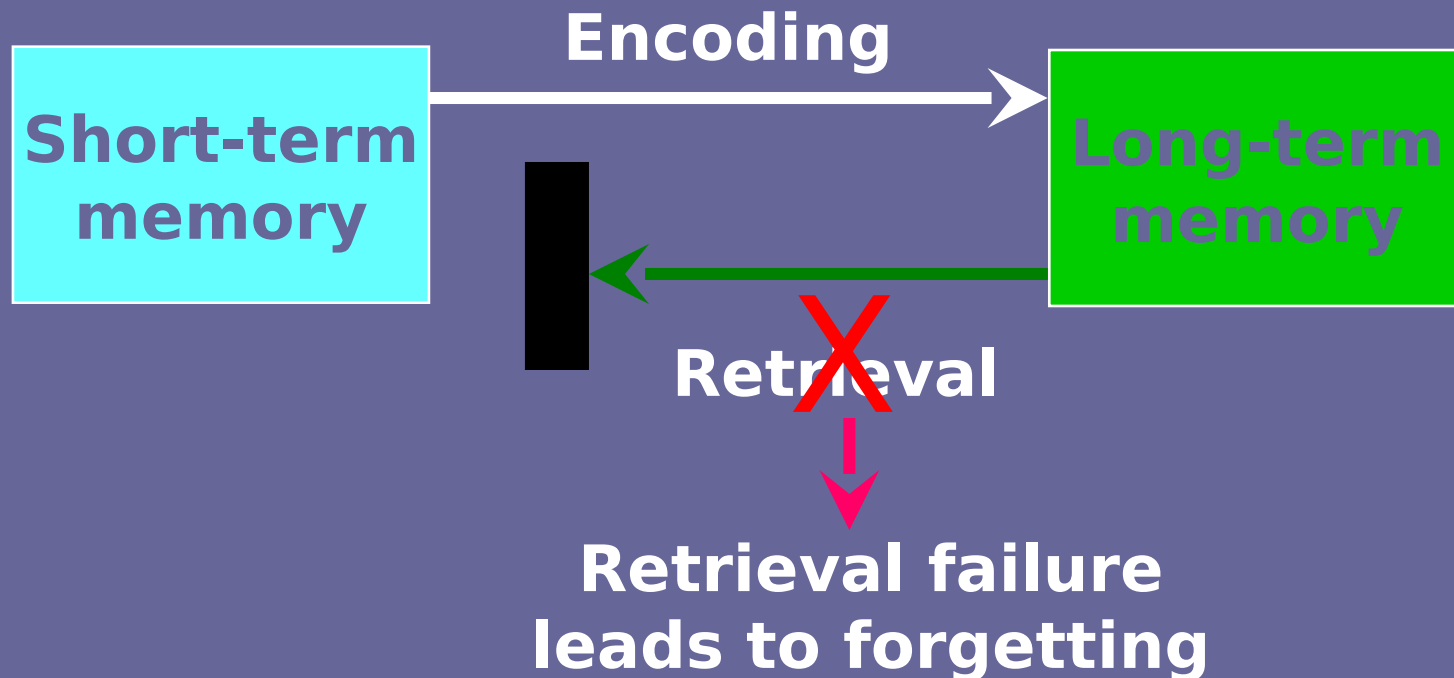
Retrieval from long-term memory
Depending on interference, retrieval cues, moods, and motives, some things get retrieved, some don't



- Forgetting can occur at any memory stage

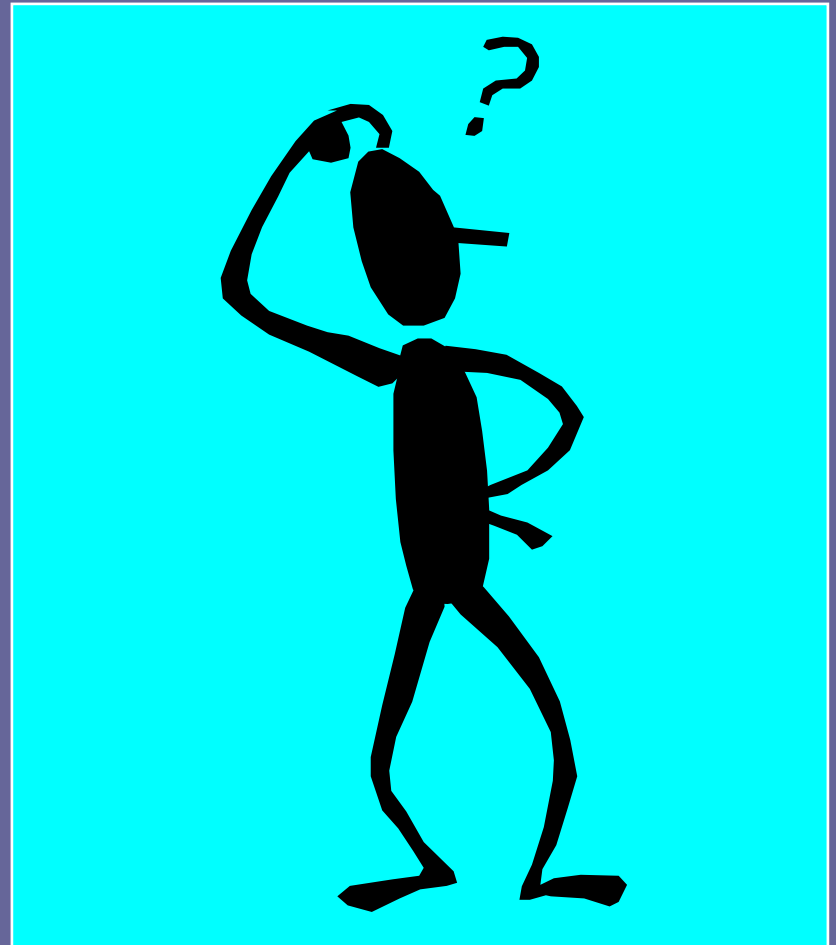
Forgetting as retrieval failure

- Retrieval—process of accessing stored information
- Sometimes info IS encoded into LTM, but we can't retrieve it



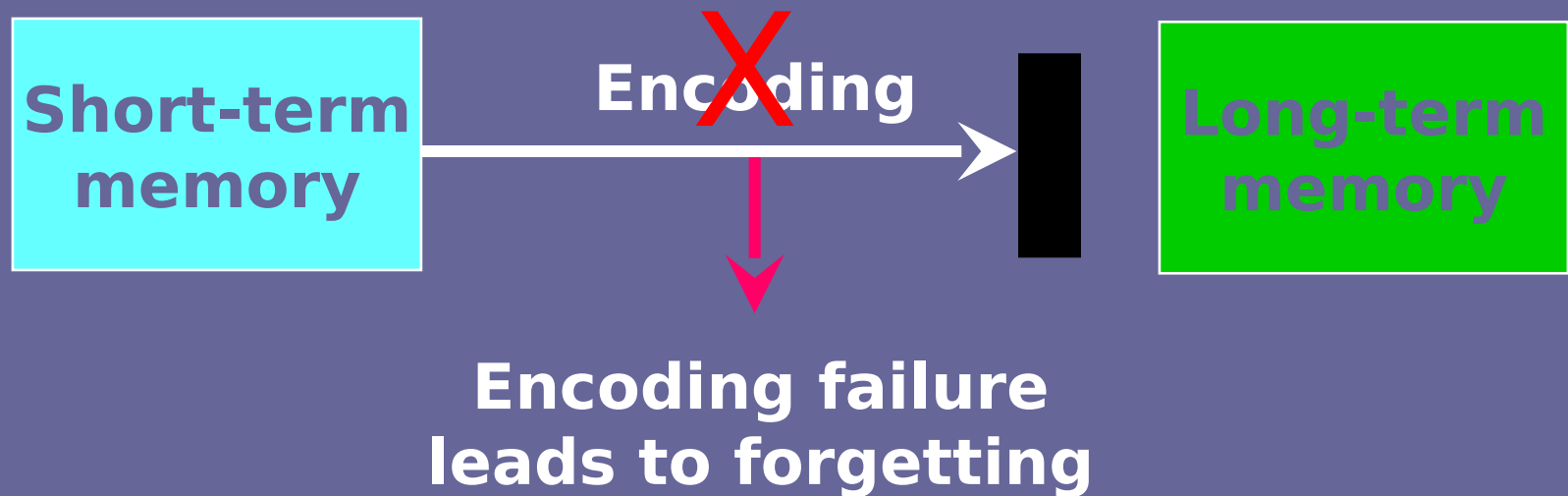
Forgetting Theories

- Encoding failure
- Interference theories
- Motivated forgetting
- Decay



Forgetting as encoding failure

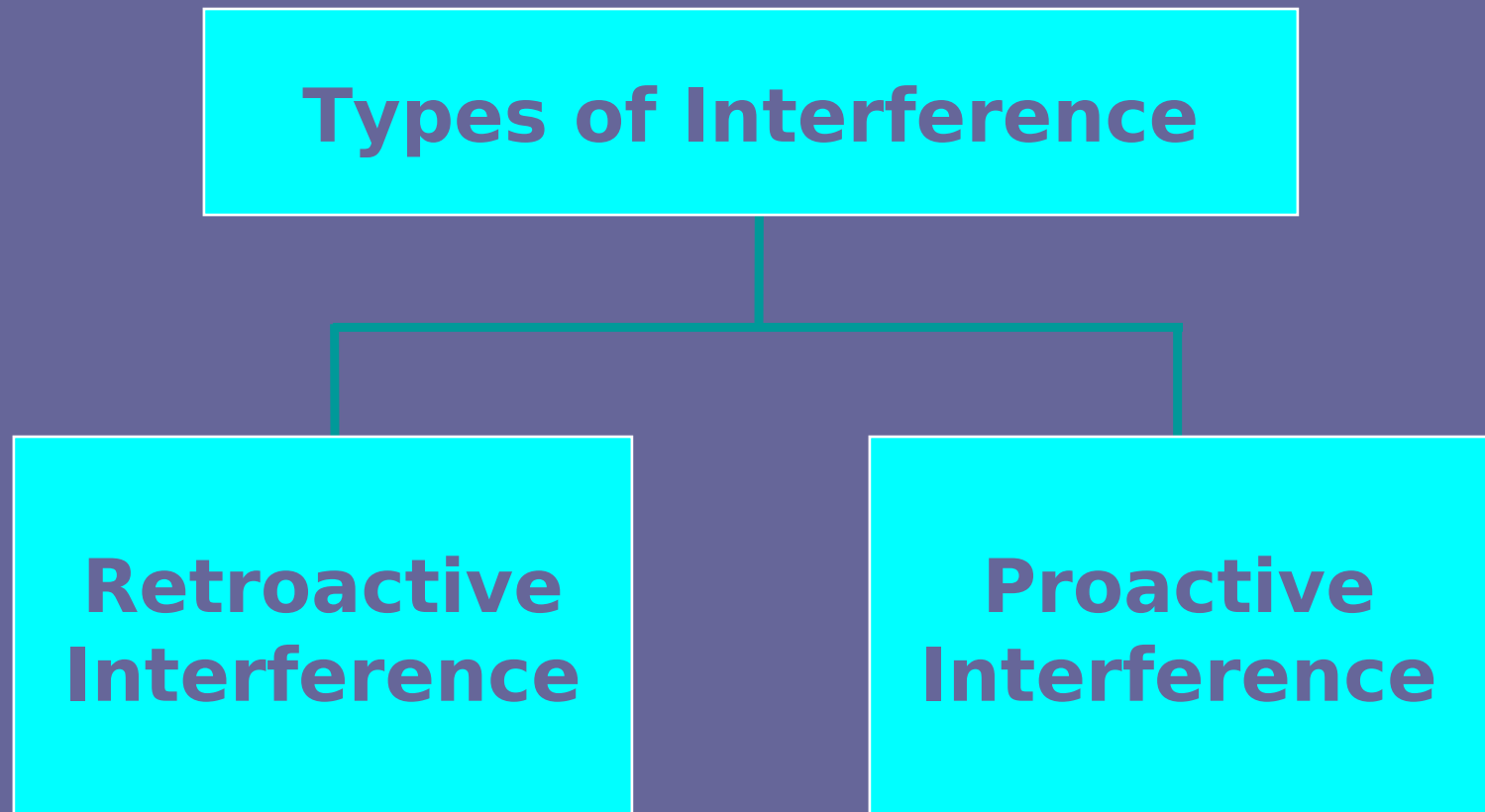
- Info never encoded into LTM



Interference Theories

- “Memories interfering with memories”
- Forgetting NOT caused by mere passage of time
- Caused by one memory competing with or replacing another memory
- Two types of interference

Two Types of Interference



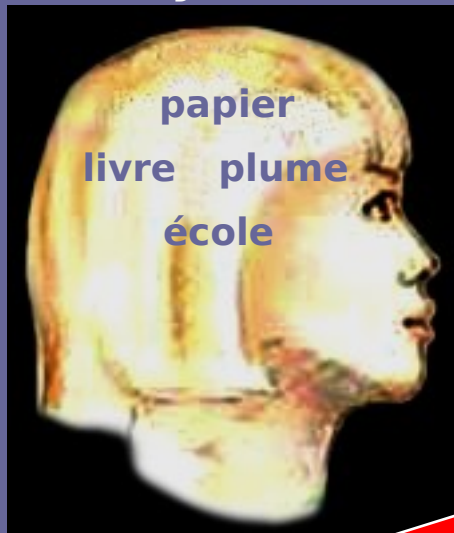
Retroactive Interference

- When a NEW memory interferes with remembering OLD information
- Example: When new phone number interferes with ability to remember old phone number

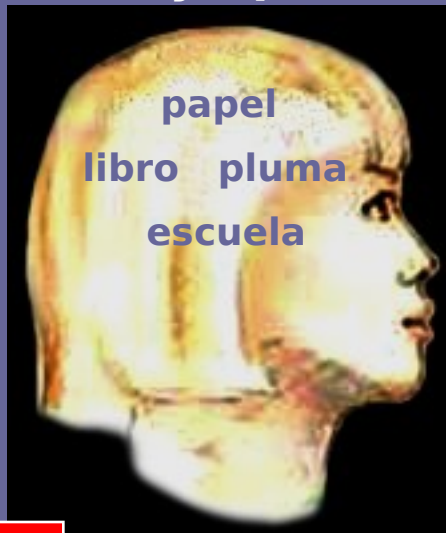
Retroactive Interference

- Example: Learning a new language interferes with ability to remember old language

Study French



Study Spanish



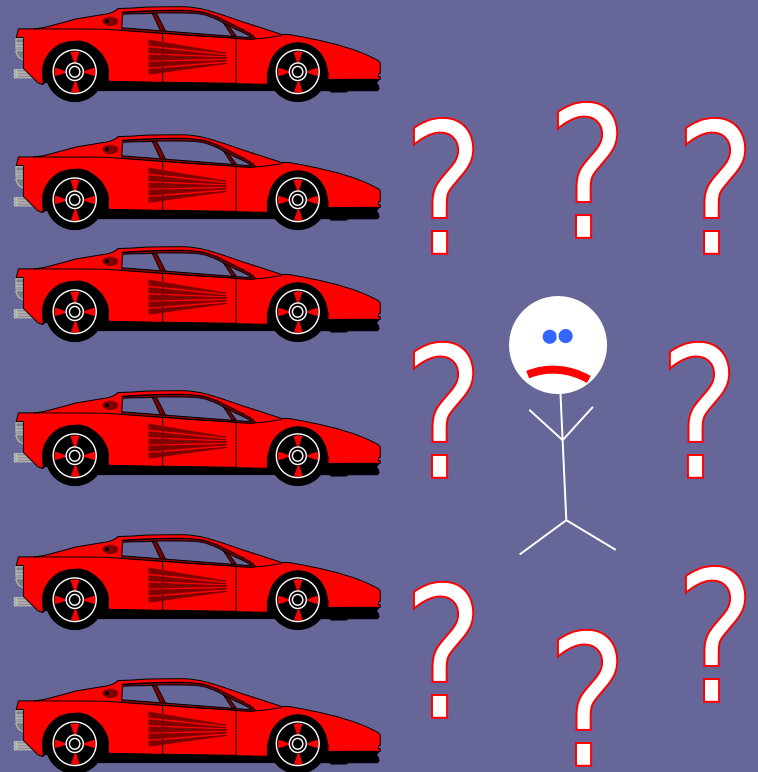
retroactive interference

**French 101
Mid-term
exam**



Proactive Interference

- Opposite of retroactive interference
- When an OLD memory interferes with remembering NEW information
- Example: Memories of where you parked your car on campus the past week interferes with ability find car today

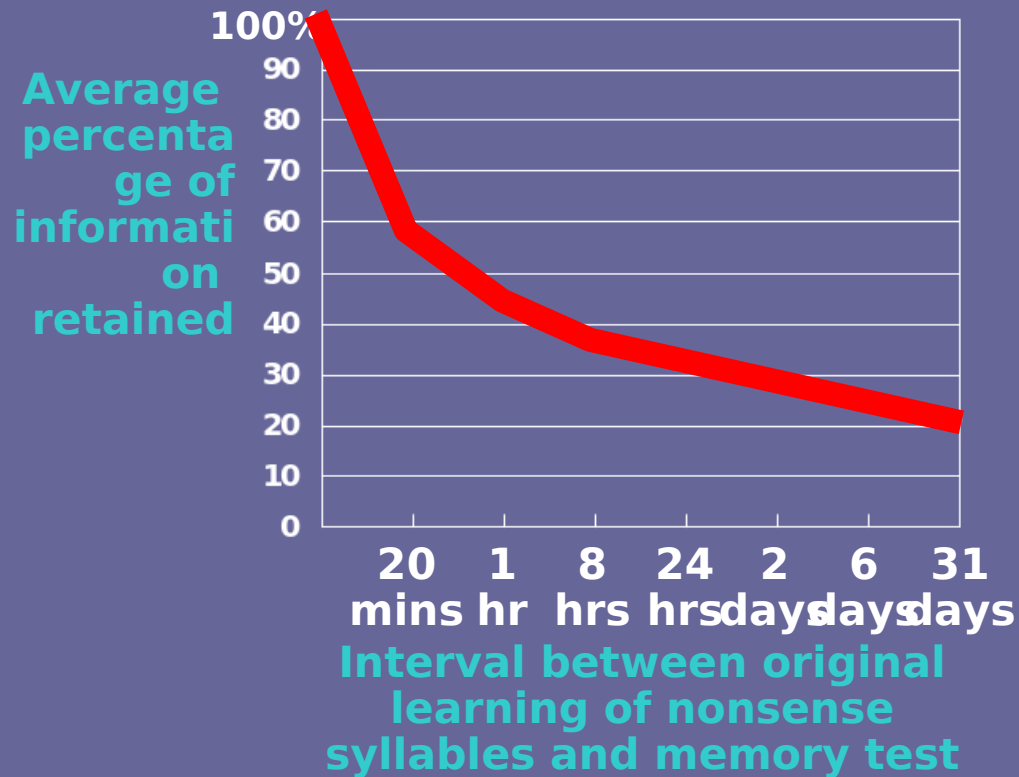


Motivated Forgetting

- Memories that would cause unhappiness or suffering if brought to mind are often forgotten.
- There may be cases in which we would like to forget so making, such as a trauma, painful insult, threats to our life, high way collision and other such experiences.
- Undesired memory is held back from awareness
 - Suppression—conscious forgetting
 - Repression—unconscious forgetting (Freudian)

Decay Theories

- Memories fade away or decay gradually if unused
- Time plays critical role
- Ability to retrieve info declines with time after original encoding



Decay Theories

- Biology-based theory
- When new memory formed, it creates a *memory trace*
 - a change in brain structure or chemistry
- If unused, normal brain metabolic processes erode memory trace
- Theory not widely favored today

Amnesia

- Amnesia—severe memory loss
- Retrograde amnesia—inability to remember past episodic information; common after head injury; need for *consolidation*
- Anterograde amnesia—inability to form new memories; related to hippocampus damage