




# Memory and Cognition

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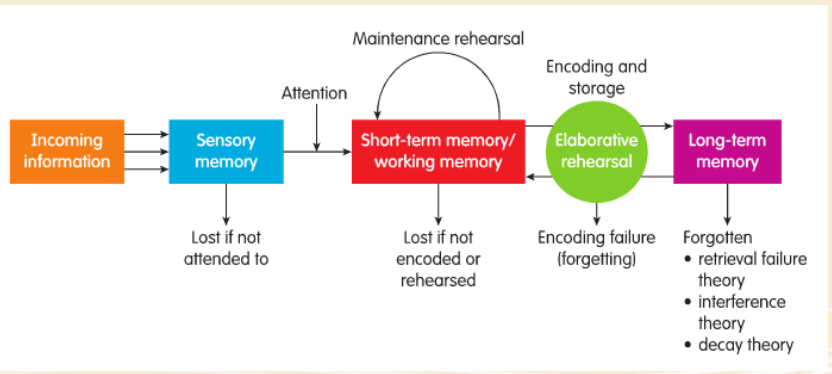
## Memory

Processes that allow us to record, store, and later retrieve experiences and information

It adds richness and context to our lives, but even more fundamentally, it allows us to learn from experience and thus adapt to changing environments.

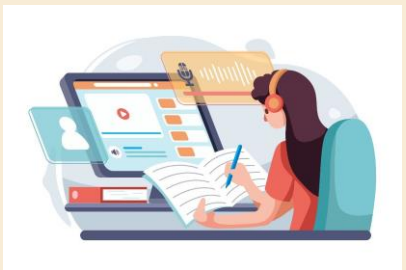
## The three- stage model of memory

by Atkinson and Shiffrin (1968)



## Sensory memory

- briefly holds incoming sensory information
- through selective attention some information enters short-term memory
- Information must be represented by some type of code if it is to be retained in short-term memory



## Memory codes

Mental representations of some type of information or stimulus such as:

- Visual codes (mental images)
- Phonological codes (code something by sound)
- Semantic codes (focus on the meaning of the stimulus)
- Motor codes (patterns of movement)



## Short-term memory: Capacity and Duration

### Chunking

HCUMOSUOYKNAHT

- Read the letters then write down as many letters as you can remember after 15 seconds.

THANKYOU SO MUCH

- Now this time, with the reversed order and a few spaces added, try to remember all the letters.

### Rehearsal

- Without rehearsal, information in short-term memory generally has a shelf life of up to 20 seconds. But by rehearsing information – you can extend its duration in short term memory.

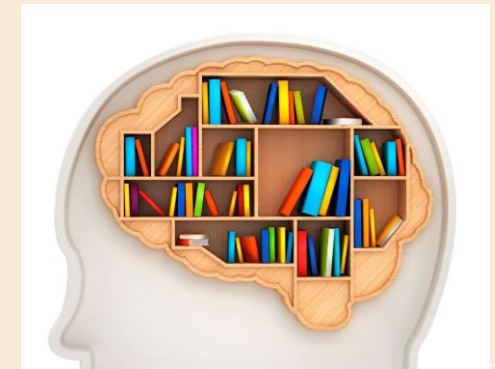
## Short-term memory / Working memory

- A limited-capacity system that temporarily stores and process information.
- It is a mental workspace that stores information, actively manipulates it, and supports other cognitive functions such as problem solving and planning.



## Long term memory

It is our our vast library of more durable stored memories. Its capacity is unlimited, and once formed, a long-term memory can endure for up to a lifetime.



## Encoding

The holdings of your long-term memory, like those of a library must be organized if they are to be available when you want to retrieve them.

The more effectively we encode material into long term memory, the greater likelihood of retrieving it.

- **Effortful processing** – encoding that is initiated intentionally and requires conscious attention
- **Automatic processing** – encoding that occurs without attention. Information about the frequency, spatial location, and sequence of events is often encoded automatically.

## Exposure and Rehearsal

### Maintenance Rehearsal

- Involves simple, rote repetition
- It keeps information active in working memory
- However, rote memorization usually is not an optimal method to transfer information into long-term memory.



## Exposure and Rehearsal



### Elaborative Rehearsal

- Involves focusing on the meaning of information or expanding (i.e. elaborating) on it in some way
- It involves deeper processing than maintenance rehearsal, and experiments show that it is more effective in transferring information into long-term memory.

## Exposure and Rehearsal

### Elaborative Rehearsal

- Mnemonic devices (memory aid)
- Hierarchy
- Visual Imagery
- Meaning of information
- Links to your life and existing knowledge

### Schema

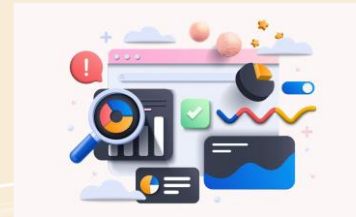
A mental framework that shape how we encode information. As we become experts in any given field. We developed schemas that allow us to encode information into memory more efficiently.

## Storage: Retaining Information



- **Associative Networks** view long term memory as a network of associated node, with each node representing a concept or unit of information
- **Neural network** models propose that each piece of information in memory is represented not by a single node but by multiple node throughout the brain. Each memory is represented by a unique pattern of simultaneously activated nodes.

## Storage: Retaining Information



- **Declarative long-term memories** involved factual knowledge and include episodic memories (knowledge concerning personal experiences) and semantic memories (facts about the world and language). In contrast, **procedural memory** is reflected in skills and actions
- **Explicit memory** conscious or intentional memory retrieval, whereas **implicit memory** influences our behavior without conscious awareness

## Retrieval: Accessing Information



Flashbulb memory

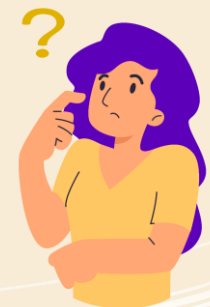
**Retrieval cues** activate information stored in long-term memory.

It is more likely to occur when we have multiple cues, self generated cues and distinctive cues.

Distinctive and emotionally arousing events are recalled most easily or vividly over time. But just because a memory seems vivid doesn't guarantee its accuracy.

## Forgetting: Why do we forget?

- **Encoding failure** – failing to encode the information into long-term memory
- **Decay of memory trace** – physical memory traces in long-term memory deteriorate with misuse over time
- **Interference** – we forget information because other items in long-term memory impair our ability to retrieve it.
- **Motivated forgetting** – people are consciously or unconsciously motivated to forget.
  - *Repression* is a motivational process that protects us by blocking the conscious recall of anxiety-arousing memories.



## Forgetting: Why do we forget?

- Retrograde amnesia – memory loss for events that occurred before the onset of amnesia
- Anterograde amnesia – memory loss for events that occur after the initial onset of amnesia
- Alzheimer’s disease – produces both types of amnesia and is the leading cause of dementia among elderly adults
- Infantile amnesia- inability to remember experiences from the first few years of our lives

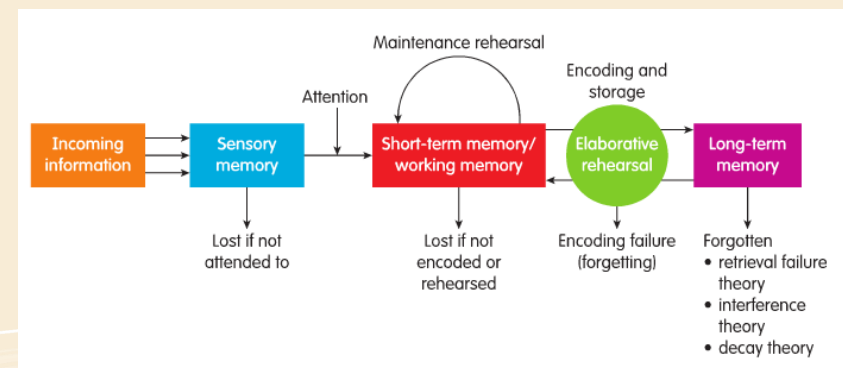
## Factors related to forgetting and memory distortion

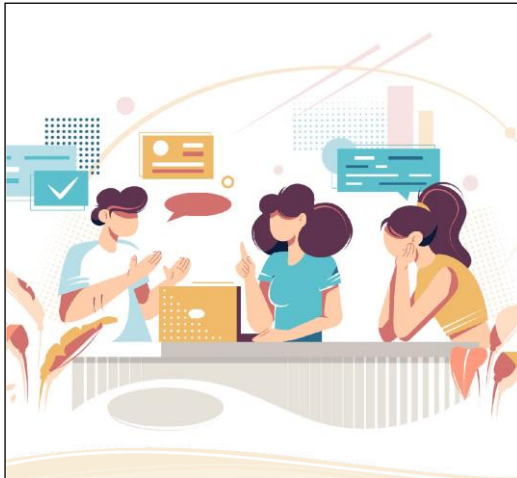
- **Biological**
  - Evolutionary adaptiveness of forgetting
  - Inadequate brain chemical activity
  - Memory not consolidated in hippocampus
  - Brain damage that [produces amnesia
- **Psychological**
  - Failure to encode information
  - Weak retrieval cues and interference
  - Mental schemas distort information
  - Motivated forgetting of anxiety-arousing information
- **Environmental**
  - Stimulus overload
  - Information lacks distinctiveness, meaning, or organization
  - Mismatch between learning and recall environments
  - Misinformation effects: post event stimuli distort information



## What is the value of forgetting?

## The three- stage model of memory by Atkinson and Shiffrin (1968)





## Language and Thinking

Humans have a remarkable ability to create **mental representations** of the world and to manipulate them in the forms of language, thinking, reasoning, and problem solving. It includes images, ideas, concepts, and principles.

## Language

- It has been called the 'jewel in the crown of cognition' and the 'human essence' since much of our thinking, reasoning, and problem solving involves the use of language.
- It consists of a system of symbols and rules for combining these symbols in ways that can generate an infinite number of possible messages and meanings.
- **Psycholinguistics** is the scientific study of the psychological aspect of language, such as how people understand, produce, and acquire language.

## Adaptive Functions of Language

- Some evolutionary theorists believed that the use of language evolved as people gathered to form larger social units.
- The development of language made it easier for humans to adapt to these environmental demands.
- Humans have evolved into highly social creatures who need to communicate with one another and have the physical that allow them to do so in the most flexible way through language.



## Properties of Language

- ✓ Language is symbolic and structured.
- ✓ Language Conveys Meaning
- ✓ Language is Generative and Permits Displacement



## The Hierarchical Structure of Language



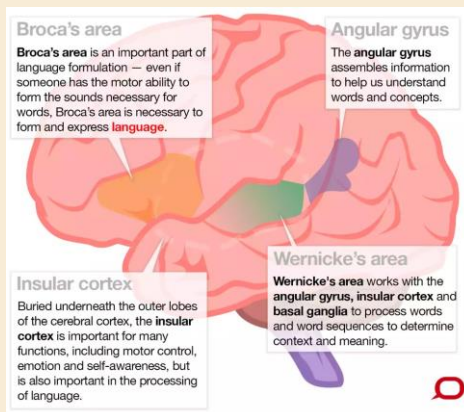
## Pragmatics: The Social Context of Language

- Pragmatics – a knowledge of the practical aspects of using language.
- Language occurs in a social context, and pragmatic knowledge not only helps you understand what other people are really saying, it helps you make sure that other people get the point of what you're communicating.



## What brain regions control our language?

People with damage in one or both areas (Broca's area or Wernicke's area) typically suffer from **aphasia**, an impairment in speech comprehension and/or production that can be permanent or temporary.



In infancy, babies can perceive all the phonemes that exist in all the languages of the world. Between 6-12 months of age, their speech discrimination narrows to include only the sounds specific to their native tongue. By ages 4-5, most children have learned the basic grammatical rules for combining words into meaningful sentences.



Language development seems to depend heavily on innate mechanisms that permit the learning and production of language, provided that the child is exposed to an appropriate linguistic environment during a **sensitive period** that extends from early childhood to puberty.



## Thinking

From a biological perspective, thought exists as **patterns of neural activity**. At the psychological level, thinking may seem to be the **internal language of the mind** – somewhat like “inner speech”- that actually uses several mental activities.

## Modes of Thought

- **Propositional thought** – verbal sentences that we say or hear in our minds; it expresses propositions or statement such as “I’m hungry”
- **Imaginal thought** – images that we can see, hear or feel in our mind
- **Motoric thought** – mental representations of motor movements such as throwing of objects

## Reasoning

### Deductive Reasoning

- Reasoning from the top down, that is, from general principles to a conclusion about a specific case
- Using this, people begin with a set of premises (propositions assumed to be true) and determine what the premises imply about a specific situation.

### Inductive Reasoning

- Reasoning from the bottom-up, starting with specific facts and trying to develop a general principle.
- Scientists use induction when they discover general principles, or laws, as a result of observing a number of specific instances of a phenomenon



## Stumbling blocks in Reasoning

- **Distraction by Irrelevant information**
  - When people don't focus on relevant information and take into account irrelevant information that lead them astray
- **Belief bias**
  - Tendency to abandon logical rules in favor of own beliefs
- **Emotions and framing**
  - Relying on emotions – “trusting one's gut”
  - Affected by the way the information is presented to us, or “framed”
  - Framing refers to the idea that the same information, problem or options can be structured and presented in different ways

## Steps in Problem Solving

1. Understanding, or Framing, the Problem
2. Generating Potential Solutions
3. Testing the Solutions
4. Evaluating the Results



## Confirmation Bias and Overconfidence

### Confirmation Bias

Tending to look for evidence that will confirm what they currently believe rather than looking for evidence that could disconfirm their beliefs

Being very selective in the kind of information they expose themselves to

### Overconfidence

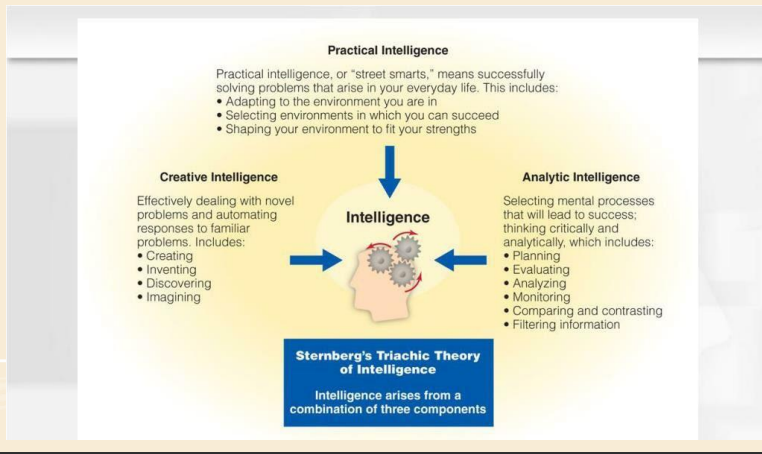
- The tendency to overestimate one's correctness in factual knowledge, beliefs, and decisions
- It stems from people's need to see themselves as knowledgeable and competent.

## Intelligence

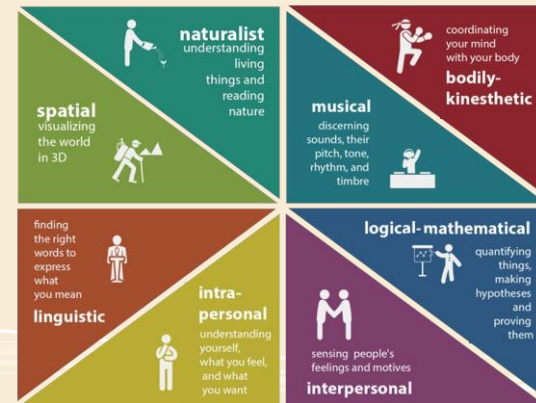
- The ability to acquire knowledge to think and reason effectively, and to deal adaptively with the environment.
- Because cultural environments differ in skills most important for adaptation, cultural conceptions of intelligence may differ markedly



# Sternberg's Triarchic Theory of Intelligence

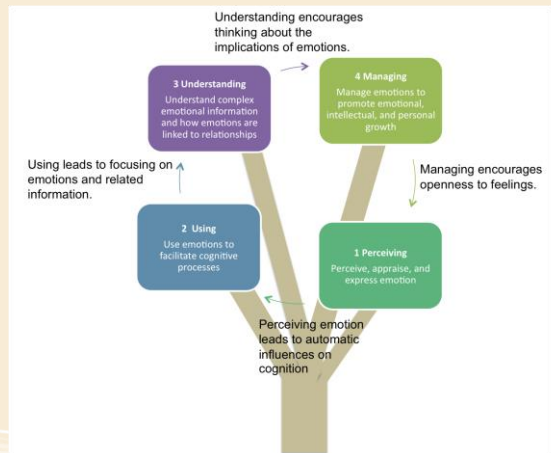


# HOWARD GARDNER'S THEORY OF MULTIPLE INTELLIGENCES



# Emotional Intelligence

According to John Mayer and Peter Salovey, it involved abilities to read others' emotions accurately, to respond to them appropriately, to motivate oneself, to be aware of one's own emotions, and to regulate and control one's own emotional responses.



# THANK YOU!