

# Memory



**NATURE OF MEMORY:**

**THE RETENTION OF INFORMATION OR  
EXPERIENCE OVER TIME**



Except for frustrating moments when our memory fails, or when someone experiences memory loss, we do not think about how everything we do or say depends in the smooth operation of memory.

Schacter '96 and Schacter/Addis '07

Memory occurs in three phases: ***Encoding, Storage, Retrieval***

# Encoding



- The way in which information is processed to then be stored.
- Encoding has much in common with hearing.
- Some information gets into memory almost automatically.
  - Example: this is related to each person's genetic makeup. Before birth we develop neural pathways so we can gather information and experience, therefore learn, without knowing or having an awareness of learning.

# Encoding



- Attention: To begin encoding we have to pay attention to information. (Posner/ Rothbart '07)
- We cannot pay attention to everything, so we are limited and therefore selectively pay attention to some things and ignore others. (Knudsen '07)
- Divided attention can negatively affect encoding

# Levels of Processing



- Shallow processing: Physical features are analyzed.
- Example: The outward appearance of an object.



# Levels of processing



- Intermediate processing: Stimulus is recognized and labeled.
- Examples:
- Flower
- Leaves
- Colors
- Stems
- Name the flower

# Levels of processing



- Deep processing: Meaningful or symbolic characteristics are used by you which makes the image (information) more personal/ useful.
- These particular flowers as a gift which was important to you.
- These particular flowers from a place and time, event that was important to you.



- Your strongest memories occur when you use deep processing.

# Levels of processing



- Elaboration: Extensiveness of processing at any given level of memory. Hence, more elaboration leads to deeper processing.
- *Thinking of concepts is more in tune with deeper processing. Therefore, you will generally increase your understanding.*
- **Elaboration adds to the distinctiveness of memory, by creating a unique representation in memory.**

# Levels of processing



- Imagery: to make memories distinctive by use of a mental image.
  - Mnemonic ability relates to enhancing or improving you memory by grouping information together into a meaningful alliance.
- Paivio's Dual-code hypothesis ('71, '86, '07) claims there are two ways information gets stored in memory.
  - Verbal code (word / label)
  - Image code (numbers / pictures)

# Levels of processing



- Paivio's research showed that image code is better than verbal code because it has more detail and is more distinctive. When coding by image you are generally using both the numeric and picture pathways, therefore requires deeper processing.
- In verbal coding you generally use either a word or a label to describe something, but typically not both, therefore shallower processing.

# Storage



- Storage: includes how information is retained over time and how it is represented in memory.
- Atkinson-Shiffren theory('68) : memory storage involves three separate systems.
  - Sensory memory: time frames for a fraction of a second up to several (3) seconds.
  - This is lost quickly if you don't transfer it to Short-term Memory (STM) or Long-Term Memory (LTM).
    - ✦ Two parts of Sensory memory are (Echoic- auditory/sound); (Iconic- image)

# Storage



- Sperling's research ('60) On Iconic memory involved giving subjects numbers or letters to remember while adjusting a second stimuli, and measuring the outcome to see if memory improved, or did not.

# Storage



- *Short-Term Memory (STM)* A limited capacity memory system in which information is retained for only 30 seconds unless you make an effort to retain it longer, or work with it longer.
- It is generally agreed by most professionals that STM has a capacity for 7 items (+ or - 2) Miller ('56)
- **Some** longer lists can be worked with **IF** the information is related to your strongest neural pathway.

# Storage



- **Chunking and Rehearsal:** Chunking means to pack information that is larger than the  $7+2$  capacity of STM into units that can be remembered as single units.
- **Example:** OAC HTW PYR DOS ENH WYO UHV  
NEL YAE NRU AON
- **Try a different order:** see the board!!

# Storage



- Rehearsal: The conscious repetition of information. Without rehearsal information is lost in STM within 30-40 seconds. However, when rehearsal is not interrupted information can be retained indefinitely.
- The reason simple rehearsal does not work well when studying for a test in a week or even an hour from now is because you just mechanically repeat information without attaching any meaning to it.

# Storage



- Working Memory: A three part system that temporarily holds information as people perform tasks. It is like a workbench or desktop where information is manipulated, worked with, and assembled into a finished product or completed task.
  - Some professionals believe that A-S theory is too simple and that the relationship between STM and LTM is more dynamic and always ongoing. (in both directions)

# Storage



- Baddley proposed this 3 part system (working memory) temporarily holds information while you work with it to complete a task.
  - Baddley three parts are:
    - ✦ The Central Executive
    - ✦ The phonological loop
    - ✦ Visiospatial working memory

# Storage



- Long Term Memory
  - Explicit Memory (Declarative Memory)
    - ✦ Conscious recollection of data
    - ✦
      - Episodic: where, when, what
      - Semantic: knowledge about the world

# Storage



- Long Term Memory
  - Implicit Memory: Memory which affects behavior because of prior experience. (life's experiences)
    - ✦ Procedural Memory: skills memory
    - ✦ Priming: activation of information already in memory. (Helps recall)
    - ✦ Classical Conditioning: Learning by association

# Organization of Memory



- Exercise: Name the months of the year.
- Different organizational methods will give you different results on how long it takes to recall all of the months.
- Organization is a key to unlocking memory.

# Organization of Memory



- Hierarchies: a system of organizing information from general areas, or types of information; to specific areas or types of knowledge.
- Semantic networks: p 39. model of LTM within a semantic network of interrelated ideas, facts, data, examples, experiences, models all held within explicit memory.
- Schemas: a preexisting mental concept that helps organize / interpret information. (Parallel distributed processing)

# Memory Retrieval



- *Serial position Effect*: We tend to focus on the beginnings and endings of lists to remember, not so effectively in the middle.
- *Encoding Specificity Principle*: information present at the time something is encoded (learned); Then it will serve as an effective cue for remembering.

# Memory Retrieval



- Information is easier to recall when you are in the same, or similar context, or situation (initial learning state) at the time you stored it.
- ***\*Context-Dependent, or State Dependent Memory***
- Priming can activate particular connections or associations in memory to lead you to the accurate serial position of the information you need.

# Memory Retrieval



- 5 Special cases of retrieval:
  - Autobiographical
    - ✦ Lifetime period
    - ✦ General events
    - ✦ Event specific knowledge
  - Emotional
  - Memory for trauma
  - Repressed memory
  - Eyewitness testimony

# Forgetting in memory



- **Encoding failure:** You make errors about the information or data when you attempt to save it.
- **Retrieval failure:**
  - Interference
    - ✦ Proactive
    - ✦ Retroactive
  - Decay
  - Motivated forgetting
  - Amnesia
    - ✦ Antergrade
    - ✦ Retrograde

# Effective Memory Strategies



- Good time management
- Pay attention
- Minimize distractions
- Understanding over rote memorization
- Question yourself
- Effective note taking
- Relate information to different aspects of your life

# Effective Memory Strategies



- **Mnemonic Strategies:**

- Acronyms: HOMES – Huron, Ontario, Michigan, Erie, Superior (Great Lakes)
- Keyword: You attach a vivid image to important words
- Method of Loci: You develop an image of items to remember and stored them within an image of a place, like rooms in a house. (picture oriented memory) As you remember the items you think of moving around the house and picking them up where you put them.