Cognitive Theories of Learning

Dr. K. A. Korb

WATS

Learning Goals

- Describe the 6 elements of the information processing model
  ◦ Explain three theories of perception.
  ◦ Explain the limitations of working memory.
  ◦ Explain how information can be effectively stored in Long-Term Memory.
 ◦ Explain what Metacognition is.

Overview of Learning

Behavioral Perspective	Cognitive Perspective
- Cannot scientifically study mental processes - Humans behave in ways that are reinforced - Behaviors are learned	- Can scientifically study mental processes - Humans actively construct knowledge that results in behavior - Knowledge is learned

Cognitive Learning Theory

- Consists of various theories that share assumptions:
  ◦ Learners are active in their attempts to understand their experiences
  ◦ Learners develop understanding that depends on what they already know
  ◦ Learning is a change in a person's mental structures

Information Processing Model
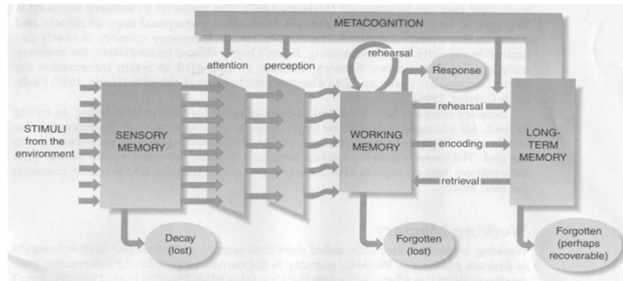
Sensory Memory

- **Sensory Memory:** Briefly holds stimuli from the environment until it can be processed
- **Attention:** Consciously focusing on a stimulus
  - **Automaticity**: Perform a task with little mental attention

Perception

- **Perception:** Attaching meaning to a stimulus
- There are three major theories of perception:
  - **Gestalt:** Organize stimuli to coherent pattern
  - **Bottom-Up :** Notice separate defining features and assemble them into a recognizable pattern
  - **Top-down:** Perceive based on the context and the patterns you expect to occur in the situation

Working Memory

- **Working Memory**: Store that holds information as a person processes it
- Properties
  - Short Span: 15 to 30 seconds
  - Limited Space: 7 ± 2

Working Memory

‣ Overcome the limitations of Working Memory
  ◦ **Automatize information**
  ◦ **Maintenance rehearsal**: Repeat information in your mind
  ◦ **Elaborative rehearsal**: Connect information with something already known
  ◦ **Off-load the burden** (i.e. make a to-do list)
  ◦ **Chunk**: Mentally combine separate items into larger, more meaningful units

Information Processing Model

‣ **Long term memory**: Permanent information store

Working vs. Long Term Memory

Working Memory	Long Term Memory
‣ Easy for information to enter	‣ Takes considerable effort for information to enter
‣ Limited capacity	‣ Almost unlimited capacity
‣ Information is easily forgotten	‣ Information remains relatively permanently

Long Term Memory

‣ Types of knowledge in Long Term Memory:
  ◦ **Declarative knowledge**: Knowledge of facts, definitions, procedures, and rules
  ◦ **Procedural knowledge**: Knowledge of how to perform tasks
  ◦ **Self-regulatory knowledge**: Knowledge of how to manage your knowledge; knowing when and how to apply declarative and procedural knowledge

What type of Knowledge?

1. The definition of positive reinforcement
2. Riding a bike
3. Nigeria's Independence Day
4. Resolving conflict between two students

Long Term Memory

‣ Helping information enter Long-Term Memory
  ◦ **Activity:** Students become active participants in the learning process (answer meaningful questions, solve problems, experimentation, find examples, etc.)
  ◦ **Organization:** Cluster information into patterns to illustrate connections. Use charts, tables, flowcharts
  ◦ **Elaboration:** Connect new information to previously known information
  ◦ **Mnemonics:** Strategies to aid encoding by forming artificial associations.
    • Mneumonics are not meaningful, so should only be used as a last resort.

Information Processing Model

‣ **Metacognition**: Awareness of and control over one's cognitive processesConsists of:
  ◦ Planning
  ◦ Monitoring
  ◦ Evaluation
‣ Metacognitive strategies consist of plans for accomplishing specific learning goals

Metacognition

‣ Types of Regulatory Behavior
  ◦ Knowing what is known and unknown
  ◦ Strategically planning ahead for study time
  ◦ Making efficient use of study time
  ◦ Monitoring progress while studying
‣ Self-evaluation is very important to learning

Metacognition

▸ The teacher's goal is not just to teach knowledge of a subject, but teach students how to think about how to think about the subject

KWL

Know	Want to Know	Learned

Application for Students

▸ **Attention**: You will not learn if you are not paying attention
▸ **Perception**: You create meaning based on linking new information to previous knowledge and experiences
▸ **Working Memory**
  ◦ Organize information into meaningful chunks to be learned
  ◦ Note-taking can help remind you of something later
  ◦ **Distributed practice:** Distribute learning over time
  ◦ **Part learning:** Break learning into smaller segments

Application for Students

▸ **Long-Term Memory**
  ◦ Make connections between new information and already learnt information
  ◦ Focus on meaning, not memorization, of new information
  ◦ Provide for repetition and review
▸ **Metacognition**: Always conduct self-evaluations of what you know and whether your behavior reflects what you know

Application to Education

- **Sensory Memory:** Romans 10:14-15
- **Attention**
  - People will not learn if they are not paying attention
    - To keep attention, make educational situations interesting and filled with variety
- **Perception:** People do not come as "blank slates." Instead, they put meaning to new information based on what they already know

Critique of Cognitive Theories

- Cognitive theories provide an excellent overview of how information is committed to memory
- However, the Christian life is not about committing facts to memory, but life obedient to truth
  - Operant conditioning focuses on changing outward behavior but **not** changing the inner mind
  - Cognitive theories focus on changing the inner mind but **not** change outward behavior