Cognitive Psychology

UNIT I – Foundations of Cognitive Psychology

Cognitive psychology is the branch of psychology that studies mental processes such as perception, memory, attention, problem-solving, and decision-making. Emerging in the mid-20th century as a response to behaviorism, it emphasized the importance of internal mental states. The **cognitive revolution** of the 1950s and 1960s, influenced by developments in linguistics (Noam Chomsky), computer science, and neuroscience, established cognitive psychology as a dominant paradigm. Today, it integrates with neuroscience, artificial intelligence, and cultural psychology, reflecting its interdisciplinary nature.

Attention and Perception are central topics.

- **Selective Attention** refers to focusing on specific stimuli while ignoring others. Theories include Broadbent's filter model, Treisman's attenuation model, and Deutsch & Deutsch's late selection theory.

- **Sustained Attention** involves maintaining focus over time, influenced by motivation, fatigue, and task complexity.

- **Subliminal Perception** suggests that stimuli presented below conscious awareness can still influence behavior, though its effects remain debated.

Perceptual Organisation involves Gestalt principles such as proximity, similarity, closure, and continuity, which explain how humans perceive patterns as unified wholes.

Time Perception is often described as the "fourth dimension." Humans perceive time subjectively, influenced by attention, emotion, and biological rhythms.

Pattern Recognition is explained through two approaches:

- **Bottom-Up Processing**: Recognition driven by sensory input (e.g., feature analysis).

- **Top-Down Processing**: Recognition guided by prior knowledge, expectations, and context.

Perceptual Learning refers to long-term changes in perception due to experience. For example, musicians develop heightened auditory discrimination.

Depth Perception relies on monocular cues (size, perspective, texture gradient) and binocular cues (retinal disparity, convergence), allowing humans to perceive three-dimensional space.

UNIT II – Memory Processes

Memory is the process of encoding, storing, and retrieving information.

- **Sensory Memory** briefly retains sensory impressions (iconic and echoic memory).
- **Short-Term Memory (STM)** holds limited information for a short duration, often described by Miller's "magic number" 7±2.
- **Long-Term Memory (LTM)** stores information indefinitely. It includes declarative memory (episodic and semantic) and procedural memory (skills and habits).

Working Memory, proposed by Baddeley and Hitch, expands STM into a system with components: phonological loop, visuospatial sketchpad, central executive, and episodic buffer.

Forgetting can be incidental (due to interference or decay) or motivated (repression of unpleasant memories).

Applications of memory research include:

- **Everyday Memories**: Understanding how memory operates in daily life.
- **Autobiographical Memory**: Personal recollections that shape identity.
- **Flashbulb Memory**: Vivid recollections of emotionally significant events (e.g., natural disasters, political events).
- **Improving Memory**: Techniques such as mnemonics, rehearsal, elaboration, and retrieval practice enhance retention.

UNIT III – Thinking and Problem Solving

Thinking is the manipulation of mental representations to form concepts, solve problems, and make decisions.

- **Types of Thinking** include convergent thinking (logical, focused solutions) and divergent thinking (creative, multiple solutions).
- **Components of Thinking**:
  - **Images**: Mental representations of sensory experiences.
  - **Concepts**: Categories that organize information, enabling efficient reasoning.

Problem Solving involves identifying a problem, generating solutions, and evaluating outcomes. Classic strategies include trial and error, algorithms (systematic procedures), and heuristics (mental shortcuts).

UNIT IV – Decision Making and Artificial Intelligence

Decision Making is the process of choosing among alternatives.

- **Models and Theories**: Rational choice models assume logical evaluation of options, while bounded rationality (Herbert Simon) recognizes cognitive limitations.

- **Complex and Uncertain Decision Making**: Real-world decisions often involve incomplete information, risk, and uncertainty. Prospect theory (Kahneman & Tversky) explains how people evaluate gains and losses asymmetrically.

Human Problem Solving relies on strategies and heuristics. Common heuristics include availability (judging likelihood by ease of recall), representativeness (judging by similarity to prototypes), and anchoring (relying heavily on initial information).

Artificial Intelligence (AI) intersects with cognitive psychology by modeling human thought processes. AI systems simulate problem-solving, learning, and decision-making, offering insights into both machine intelligence and human cognition. Cognitive psychology informs AI development, while AI provides tools to test psychological theories.

Conclusion

Cognitive psychology provides a comprehensive framework for understanding the mental processes that underlie human behavior. From perception and attention to memory, thinking, and decision-making, it explores the mechanisms that allow individuals to interact with their environment. Its applications extend to education, health, technology, and artificial intelligence, making it a vital discipline in both theoretical and practical domains. By studying cognitive psychology, we gain deeper insight into the workings of the human mind and its potential to adapt, learn, and innovate.

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