Hergenhahn's An Introduction to the History of Psychology
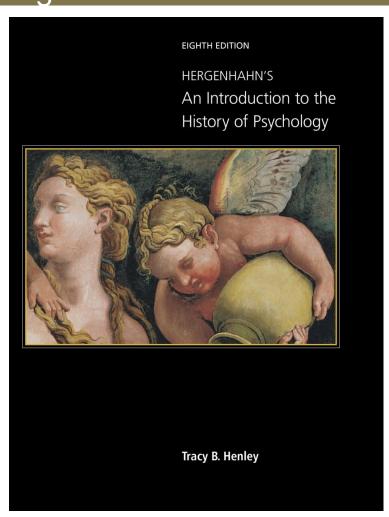## Eighth Edition

EIGHTH EDITION

HERGENHAHN'S
An Introduction to the
History of Psychology

Tracy B. Henley

Chapter 19
Cognitive Psychology

Learning Objectives (1 of 2)

After reading and discussing Chapter 19, students should:

- Be aware of the history of the development of cognitive psychology prior to 1950.

- Be familiar with the development of cognitive psychology during the 1950s.

- Be acquainted with the development of cognitive psychology after the 1950s.

- Be familiar with the work in artificial intelligence.

- Be acquainted with the many aspects of information-processing psychology.
- Be familiar with the emergence of and work in new connectionism.

Early Influences (1 of 3)

- History and Contributors
  - Throughout psychology's history, human cognitive abilities have been studied philosophically, and later experimentally
  - The contributions of J.S. Mill, Sir Frederic Charles Bartlett, Fechner, Ebbinghaus, James, and others have been discussed earlier

- Jean Piaget
  - His work demonstrated that the child's interactions with the environment become more complex and adaptive as its cognitive structure becomes more articulated through maturation and experience.
  - His work in cognitive development between the 1930s and 1940s contributed to the revived interest in cognitive issues in the 1950s.
- Cybernetics
  - Cybernetics is the study of the structure and function of information processing systems.

Early Influences (3 of 3)

- Shannon and Weaver
  - Began what is known as information theory, which notes the various transformations information undergoes as it enters a communication system as it operates within the system.

- Noam Chomsky
  – Argues that the human brain is genetically programmed to generate language.
  – Each child is born with brain structures that make it relatively easy to learn the rules of language.
- George Miller
  – Argues that a symposium on information theory sponsored by the Massachusetts Institute of Technology (MIT) marked the beginning of modern cognitive psychology.

Developments Around the 1950s (2 of 4)

- Continued to move the interest in cognitive psychology along with several contributions.
  - Miller and Bruner founded a center for cognitive studies through which Piaget's ideas were popularized in the United States.

- Physiological and Gestalt influences
  - Lashley and Hebb
    - Continued to discuss physiology and behavioral phenomena and cognitive processes.

– Leon Festinger

  ▪ Noted that ideas that one may have might be compatible with or incompatible with one another.

    ○ When ideas are incompatible, a state of cognitive dissonance exists that motivates a person to change beliefs or behavior.

    ○ His description made no reference to behavioristic ideas.

- Heider
  - Concept of attribution
    - Effort
    - Ability
    - Task
    - Luck
- Hovland
- Milgram
- Zimbardo

A Cognitive Revolution

- Bandura
  - Social cognitive theory began its early development and is still a popular theory in use today.

- Ulric Neisser
  - *Cognitive Psychology*

- Definition
    - "the capability of machines to manifest such processes as perception, cognition, and learning much as humans do"

- Alan Turing and the Turing Test
  - Raised the question about and developed a test of whether or not machines think
    - Other researchers have suggested the concepts of weak artificial intelligence and strong artificial intelligence.
      - Proponents of weak AI claim that, at best, a computer can only simulate human mental attributes.
      - Proponents of strong AI claim that the computer (when appropriately programmed) really is a mind capable of understanding and having mental states.

- Searle Argument Against Strong AI
  - Searle distinguishes between syntax (manipulation of symbols according to specified rules) and semantics (assignment of meaning to symbols).
  - He stated that computer programs have syntax, not semantics.
    - Human thought has intentionality, but computers do not.

- Are humans machines?
  - The question reintroduces important questions into modern times, such as what is the nature of human nature?
    - This type of question posed in relation to machines brings into play many issues such as the mind-body question and the lawfulness of human behavior and free will.

Cognitive Science (1 of 3)

- Approach
  - Uses the computer as a model for human information processing
  - It follows the rationalist tradition
  - Has a strong nativistic component
- Faculty Psychology
  - Information processing marks a return to faculty psychology, as does the recent discovery that the brain is organized into many "modules" (groups of cells) each associated with some specific function.

- Return of the Mind–Body Problem
  – Radical behaviorists denied the existence of a mind, but cognitive psychology assumes the existence of a mind.
  – In each case, bodily events and cognitive events are assumed
    ▪ Therefore the relationship between the two must be explained.

- Cognitive Science
  - In the 1970s, information-processing psychologists combined efforts with philosophers, anthropologists, linguists, neuroscientists, engineers, and computer scientists to create the area of cognitive science (1970s)

- "Hebb's rule"
  - The cornerstone of this model states if neurons are successively or simultaneously active, the strength of the connections among them increases.

- Neural networks
  - A model of a complex system of artificial neurons
  - As in the brain, associations among neurons in the network change as a function of experience

– In the networks, synaptic changes (which occur in the brain as associations are made) are simulated by modifiable mathematical weights, or loadings among units in the network.

– Strengths of the connections among units that are active together are increased by mathematically increasing their weights.

– Learning is explained in terms of changing patterns of excitation and inhibition (represented by mathematical weights) within the neural network.

- Back propagation systems
  - Connectionist system that requires a "teacher" to provide feedback concerning the program's performance.
    - NETtalk is an example of this type of system in which words are fed into the system and their influence travels through the hidden units until they are coded into phonemes.
  - Training consists of adjusting the weights within the network so that the discrepancy between the input and the desired output is systematically reduced.