Lecture Notes

# Chapter 1: Cognitive Psychology: History, Methods, and Paradigms

## Learning Objectives

* Identify examples of cognitive activity that occur in everyday life
* Describe the various schools of psychology as their history relates to cognitive psychology
* Summarize the major research designs used in cognitive psychology
* Differentiate among the four paradigms of cognitive psychology

## Outline

**I.** Setting the Stage

**A.** Cognitive psychology is the branch of psychology that is concerned with how people acquire, store, transform, use, and communicate information.

**1. Attention** involves mentally focusing on a stimulus.

**2. Perception** involves interpreting sensory information to yield meaning.

**3. Pattern recognition** involves classifying a stimulus into a category.

**4. Memory** involves storing and retrieving information.

**5.** Other cognitive processes include **reasoning, problem solving,** and **decision**-**making.**

**B.** A central problem of studying cognition is how to study it with sufficient experimental rigor to draw firm conclusions.

**C.** Yet, a key challenge is to make sure that laboratory tasks preserve the essential workings of the process under study in the “real world.”

**II.** Influences on the Study of Cognition

**A.** Ideas about mental abilities date back to at least the Greek philosophers Aristotle and Plato.

**1. Empiricism** comes from Aristotle’s position that knowledge comes from an individual’s own experience.

**a)** Learning takes place through the **mental association** of two ideas.

**b)** Philosophers such as Locke argued that two ideas could be associated simply through occurring at the same time, thus giving the environment a powerful role in determining a person’s abilities.

**2. Nativism** comes from Plato’s position emphasizing the role of native (biologically endowed) capacities and tendencies.

**B. Structuralism** was the first formal approach to psychology and emphasized the attempt to determine the underlying structure of our consciousness.

**1.** Wilhelm Wundt developed the first psychology laboratory in 1897 to identify the “mental elements,” much like a chemistry periodic table.

**2.** Wundt used the technique of **introspection** to describe conscious experiences in terms of their raw, sensory materials: mode, quality, intensity, and duration.

**C.** In America, William James founded the approach known as functionalism, which focused more on the purposes of mental operations.

**1.** Among other topics, James wrote on the establishment of habits, both good and bad.

**2.** Functionalism draws on evolutionary theory and the idea of adaptation to one’s environment.

**3.** Functionalists also believed that mental phenomena should be studied in real-world settings rather than in the laboratory.

**D. Behaviorism** took root in the 1930s and attempted to explain all psychological phenomena in terms of observable stimuli and responses.

**1.** Watson banished all “mental language” from use in Psychology.

**2.** B. F. Skinner argued that mental events such as images and thoughts were proper objects of study, but that they needed to be treated as any other behavior that is caused by external stimuli.

**3.** Other behaviorists, such as Tolman, were willing to hypothesize the existence of **mental representation** such as cognitive maps that could be demonstrated through observation of an animal’s behavior.

**E. Gestalt Psychology** assumed that psychological phenomena could not be reduced to simple elements, but must be studied as complete wholes.

**1.** Gestalt psychologists rejected structuralism, functionalism, and behaviorism as offering incomplete accounts of cognitive experience.

**2.** Gestalt psychologists chose to study subjective experiences of stimuli rather than the “objective” events favored by the behaviorists.

The work of Francis Galton led to psychology’s emphasis on individual differences.

Galton noted that eminence seemed to run in families, leading him to question the role of genetics in human ability.

Galton developed tests of intelligence and also invented statistical analyses to help him test his hypotheses.

In the years following World War II, the cognitive revolution challenged the idea that concepts such as “mental representations” were unnecessary to explain behavior.

The field of **human factors engineering** led to the development of the concept of the **person-machine system**, noting that machines needed to be designed to interact with the operator’s cognitive capacities.

Human beings were seen as limited-capacity processors who can do only so many things at once.

At the same time, Noam Chomsky’s work in **linguistics** showed that behaviorism cannot adequately explain how the grammar of language is acquired.

Early developments in **neuroscience** helped to answer questions about the **localization of function** to particular regions of the brain.

Finally, work in **artificial intelligence** examined how to program computers to solve the sorts of problems that people solve, strengthening the **computer metaphor** for human cognitive activity.

During the 1970s, researchers in different fields noticed that they were investigating common questions about the nature of the mind, and the interdisciplinary study of cognitive science was born.

**III.** Research Methods in Cognitive Psychology

**A.** The most frequently adopted approach to cognitive research is the experiment.

**1.** In a true **experiment**, the experimenter manipulated one or more independent variables and observed how the dependent variables change as a result.

**2.** In a **between-subjects design**, different participants are assigned to different experimental conditions, whereas in a **within-subjects design**, each participant experiences more than one condition.

**3.** When an independent variable cannot be directly manipulated by an experimenter, designs called **quasi-experiments** can be used to approximate the control of a true experiment.

**4.** Scientists value experiments and quasi-experiments because they allow us to isolate causal variables, but experiments may fail to fully capture real-world phenomena.

**B. Naturalistic observation** consists of an observer watching people in familiar, everyday contexts.

**1.** Ideally, the observer should be as unobtrusive as possible, so as not to change the behavior of the people being observed.

**2.** The biggest advantage to naturalistic observation is its high **ecological** **validity**; it studies things that actually occur in the real world.

**3.** The disadvantage of naturalistic observation is its lack of **experimental** **control**; there is no way to isolate the cause of behavior in a natural setting.

**C. Controlled observations** give researchers some degree of influence over the setting in which observations are conducted.

**D. Clinical interviews** give investigators even more control over the research process, asking participants open-ended questions that are followed up by more specific lines of questioning.

**E.** Modern introspection requires participants to think aloud as they solve problems or reach decisions.

**F.** Since the 1970s, various techniques of **brain imaging** have been developed to investigate the neural underpinnings of cognition.

**IV.** Paradigms of Cognitive Psychology

**A.** A **paradigm** is a body of knowledge structured according to what its proponents consider important and what they do not.

**B.** There are four major paradigms in cognitive psychology.

**1.** The **information-processing approach** draws an anology between human cognition and computerized processing of information.

**a)** Researchers taking an information-processing approach assume that information is processed in a series of stages and that information is stored in specific places while being processed.

**b)** Information processing theorists assume that people are general-purpose symbol manipulators, like computers.

**2. Connectionism** depicts cognition as a network of connections among simple processing units.

**a)** Unlike the information-processing approach, connectionism assumes that we can process several things in parallel (at the same time).

**b)** The connectionist approach is more consistent with the way that the brain functions, with many neurons connected to one another in complex ways.

**3.** The human mind is a biological system that has evolved over generations, according to the **evolutionary approach**.

**a)** Some of the most significant issues our ancestors faced involved social issues, such as creating and enforcing social contracts.

**b)** Thus, people’s reasoning abilities will be enhanced when they are reasoning about cheating, a topic that involves important social costs and benefits.

**4.** Related to the evolutionary approach, the **ecological approach** assumes that cognition does not occur in isolation from larger cultural contexts.

**a)** For example, we solve real problems (such as how much food to buy at the grocery store) differently than we solve school arithmetic problems.

**b)** The viewpoint of **embodied cognition** is a version of the ecological paradigm that focuses on how cognition is linked to the fact that our minds are encased in bodies that influence how we perceive and behave.