

Introduction and Research Methods

i Instruction Tip

Have students fill out index cards the first day of class indicating their major, year in school, what grade they expect in the class, why they are taking the course and any other information you are interested in. These cards are useful for learning students' names, getting a general consensus of the class's expectations, and importantly can be used to call on students to start a discussion, or spur a slowing discussion. Systematically working through the cards instead of only calling on those few who raise their hands anyway is effective.

i Instruction Tip

Students are often confused about how to search for journal articles, and amazed at the wealth of information available to them once they know how. Conduct a PsychINFO tutorial during class, or arrange for a librarian to conduct a session for you.

**Discussion Topics**

What is the relationship between cognitive psychology and other areas of psychology and between cognitive science and other disciplines?

What are the different approaches to the study of cognition?

What are the different areas of study under cognitive psychology? How is it that cognitive psychology can lay claim to all of the various areas covered under the broad topic of cognitive psychology?

What is phrenology? How is it related to the study of cognitive psychology?

The authors present cognition from an information processing perspective. What types of limitations might this present in the broader sense of understanding cognition? Does this contradict what we know about parallel processing?

The text talks about the hold behaviorism had on psychology. How is it that behaviorism could hold back the emergence of cognitive psychology? What were the factors that led to the rise of cognitive psychology over behaviorism?

When we talk about the cognitive revolution we see people from diverse area who came together to discuss their research. How did this lead to the diversity of what was later to be known as cognitive psychology?

Why are such varied methodologies necessary to study cognition?



Internet Sites

NEUROSCIENCES ON THE INTERNET

<http://www.neuroguide.com>

Neurosciences on the Internet has a broad array of Neuroscience categories to choose from and an extensive listing of links.

THE UNIVERSITY OF ALBERTA'S COGNITIVE SCIENCE DICTIONARY

http://www.bcp.psych.ualberta.ca/%7emike/Pearl_Street/Dictionary/dictionary.html

This is a dictionary of cognitive science terms.

COGLAB: ONLINE LABORATORY

<http://coglab.wadsworth.com>

This site has many quality Java based cognitive experiments, and students can log in as guests. It provides background information and detailed instructions that must be read prior to beginning the experiment. Additionally, site provides references to relevant articles.

COGPRINTS: COGNITIVE SCIENCE PRINT ARCHIVE

<http://cogprints.ecs.soton.ac.uk/>

Cogprints is an electronic archive for papers in the areas of Psychology, Neuroscience, Linguistics, Computer Science, Artificial Intelligence, Philosophy, and Biology.

COGNITIVE SCIENCE SOCIETY

<http://www.cognitivesciencesociety.org>

The Cognitive Science Society promotes scientific interchange among researchers in disciplines comprising the field of Cognitive Science. This includes Artificial Intelligence, Linguistics, Anthropology, Psychology, Neuroscience, Philosophy, and Education. This site contains links to other Cognitive Graduate Programs, Cognitive Societies, Cognitive Journals, and available jobs in Cognitive Psychology.



Books

Bechtel, W. (1988). *Philosophy of Mind: An Overview for Cognitive Science*. Hillsdale, NJ: Lawrence Erlbaum and Associates.

“As one of the several contributing disciplines to cognitive science, philosophy offers two sorts of contributions. On the one hand, philosophy of science provides a metatheoretical perspective on the endeavors of any scientific enterprise, analyzing such things as the goals of scientific investigation and the strategies employed in reaching those goals...philosophy of mind offers substantive theses about the nature of mind and of mental activity.” (from the preface).

Gardner, H. (1987). *The Mind’s New Science: A History of the Cognitive Revolution*. Basic Books.

“...in lieu of an oral history or a journalistic account of current laboratory work...I decided to make a comprehensive investigation of cognitive science in which I could include the long view—the philosophical origins, the histories of each of the respective fields, the current work that appears most central, and my own assessment of the prospects for this ambitious field.” (from the preface).

Kandel, E. R. (2006). *In search of memory: The emergence of a new science of mind*. New York: W.W. Norton & Company, Inc.

“Charting the intellectual history of the emerging biology of mind, Eric R. Kandel illuminates how behavioral psychology, cognitive psychology, neuroscience, and molecular biology have converged into a powerful new science of mind. This science now provides nuanced insights into normal mental functioning and disease, and simultaneously opens pathways to more effective healing.”

Norman, D. A. (1990). *The Design of Everyday Things*. Doubleday.

“Anyone who designs anything to be used by humans--from physical objects to computer programs to conceptual tools--must read this book, and it is an equally tremendous read for anyone who has to use anything created by another human. It could forever change how you experience and interact with your physical surroundings, open your eyes to the perversity of bad design and the desirability of good design, and raise your expectations about how things *should* be designed.” (from the back cover)



Multiple Choice Test Questions

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.

- 1) Among the most important forces accounting for a cognitive neuroscience revolution during the years following the late 1950s was:
 - A) the increase in medical schools
 - B) the "failure" of systematic introspection
 - C) the rise of structuralism
 - D) the "failure" of behaviorism
 - E) the decrease in psychology graduate school applications

- 2) From the behaviorist point of view, internal states including mental processes were subsumed under the label of intervening variables which were defined as:
 - A) hypothetical constructs which were critical in determining stimulus-response connections
 - B) hypothetical constructs which played no part in behavior
 - C) hypothetical constructs presumed to represent processes that mediated the effects of stimuli on responses
 - D) concepts "relevant for philosophers, but not scientists"
 - E) none of the above

- 3) According to Neisser, cognition refers to:
 - A) "all processes within the human brain"
 - B) "all sensory processes"
 - C) "all processes by which the sensory input is transformed, reduced, elaborated, stored, recovered, and used..."
 - D) "every process that affects thought, and pain sensations in our bodies"
 - E) "all processes related to problem solving"

- 4) In E. C. Tolman's (1932) experiments with rats and maze learning, he found that what rats learn is:
 - A) how to better smell cheese
 - B) how to please the researcher
 - C) a series of S-R connections
 - D) similar to behaviors in the wild
 - E) an internal "cognitive map," which was, in effect, the way information about their environment was represented

- 5) Cognitive models are based on observations that describe:
 - A) the structure and processes of cognition
 - B) the terminology of cognition
 - C) the future of cognition
 - D) the faults of cognition
 - E) the history of cognition

- 6) Which of the following was not a force supporting the reemergence of cognitive psychology in the late fifties?
- A) the emergence of communication theory
 - B) the "failure" of behaviorism
 - C) modern linguistic theory
 - D) reemphasis on operant conditioning techniques
 - E) advances in computer technology
- 7) The specialty within computer science that aims at simulating human cognitive processes is called:
- A) artificial intelligence
 - B) cognitive development
 - C) behavior simulation
 - D) computer imagery
 - E) robotics
- 8) Which of the following contributed to the shaping of modern cognitive psychology?
- A) Eriksen's Behavioral Forces theory
 - B) The impact of modern physics, such as quantum theory
 - C) Animal intelligence studies
 - D) Neo-Freudian theory
 - E) Computer science and other technological advances
- 9) Which of the following is *not* a principle area cognitive psychology draws upon?
- A) Human intelligence
 - B) Developmental psychology
 - C) Psychoanalysis
 - D) Perception
 - E) Artificial intelligence
- 10) Cognitive psychology involves which psychological processes?
- A) Computer sciences, neural networks, and artificial intelligence
 - B) Perception, attention, learning, and memory
 - C) Cognitive formation, thinking, imaging, and language
 - D) All of the above
 - E) Emotions, developmental processes, and neuroscience
- 11) Parallel Distributed Processing (PDP) is based on:
- A) problem solving
 - B) chess
 - C) weather patterns
 - D) computer functioning
 - E) neural functioning
- 12) Plato considered the seat of knowledge to be located in:
- A) the liver
 - B) the soul
 - C) the brain
 - D) the pineal gland
 - E) the heart

- 13) Cognitive psychology can be characterized in:
- A) psychoanalytic terms
 - B) stimulus-response terms
 - C) language terms
 - D) information-processing terms
 - E) dream analysis terms
- 14) A central question about knowledge which was discussed by ancient Greek philosophers and is still a major question in modern cognitive psychology is:
- A) how knowledge is processed through working memory
 - B) how perception is related to knowledge
 - C) how perceptual processes influence intelligence
 - D) how knowledge influences problem solving
 - E) how knowledge is represented in the human mind
- 15) Two people who have formalized the Parallel Distributed Processing (PDP) theory are:
- A) Roediger and Vygotsky
 - B) Waugh and Norman
 - C) Mountcastle and Lashley
 - D) Rumelhart and McClelland
 - E) Shepard and Metzler
- 16) One of the appeals of PDP is that it is:
- A) based on neuroanatomical functioning
 - B) based on a medical model
 - C) based on a computer metaphor
 - D) a simpler model than the information processing model
 - E) based on a pedagogical model
- 17) The assumption that cognition can be analyzed into a series of hypothetical stages and that at each stage a unique function is carried out on incoming information is central to:
- A) a dichotomous model
 - B) the stage theory of cognition
 - C) an information processing model
 - D) a language processing model
 - E) a problem solving model
- 18) Why has computer science been so influential in the study of human cognition?
- A) It provided a means to evaluate artificial intelligence.
 - B) It greatly contributed to advances in experimentation.
 - C) It helped address key issues in language processing.
 - D) All of the above
 - E) It caused reexamination of basic postulates of human problem solving.
- 19) The late nineteenth century psychologist who emphasized both structure and processes in his view of memory and also established the first psychological laboratory in America was:
- A) Hermann Ebbinghaus
 - B) Wilhelm Wundt
 - C) F. C. Donders
 - D) J. M. Cattell
 - E) William James

- 20) The cognitive model introduced by William James:
- A) includes detection of stimuli and response production
 - B) is old fashioned
 - C) includes primary and secondary memory
 - D) includes both STM and LTM
 - E) is one of the first cognitive models embraced by the behaviorists
- 21) The one element most cognitive models share is:
- A) a focus on early childhood development
 - B) they are only concerned with memory
 - C) they are based on a sequence of events
 - D) a focus on performance
 - E) they are based on parallel processing
- 22) Two early inventors of a "thinking machine" were:
- A) Newell and Simon
 - B) Carnegie and Mellon
 - C) Rumelhart and McClelland
 - D) Goldberg and Wright
 - E) Waugh and Norman
- 23) The two main questions posed by the information-processing model are:
- A) "What are the stages of information processing" and "In what form is information represented?"
 - B) "What's the meaning of life" and "Where can I get some ice cream?"
 - C) "What are the stages of information processing" and "What is the importance of emotions for understanding behavior?"
 - D) "How is information represented" and "How can computers be made to simulate thought?"
 - E) "What are the neurological structures involved in memory" and "Who are the important psychologists in the field?"
- 24) A basic assumption of the PDP model is that "information processing takes place through the interaction of a large number of simple processing elements called _____."
- A) units
 - B) atoms
 - C) neurons
 - D) links
 - E) nodes
- 25) During the first half of this century, experimental psychology was dominated by research in the field of:
- A) imagery and internal representation of events
 - B) artificial intelligence
 - C) semantic organization and language processes
 - D) attention and consciousness
 - E) behaviorism
- 26) Why did some people consider behaviorism a "failure"?
- A) It overemphasized the importance of personality.
 - B) It ignored psychologically relevant topics like memory and attention.
 - C) It overemphasized the importance of emotion as governing behavior.
 - D) It ignored psychologically relevant topics like mob behavior.
 - E) It underemphasized the importance of genetics.
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- 27) Evolutionary cognitive psychology draws on:
- A) psychometrics and evolutionary psychology
 - B) social psychology and biological psychology
 - C) social psychology and statistics
 - D) evolutionary psychology and biological psychology
 - E) ethology and anthropology
- 28) George Miller (and others) fix 1956 as the date of the beginning of cognitive science and base it on _____.
- A) a book about information theory
 - B) a symposium on information theory
 - C) a symposium on memory
 - D) the book *Remembering*
 - E) the book *Awakenings*
- 29) One of the criticisms of psychology by evolutionary psychologists is:
- A) the exclusion of Darwin's theories
 - B) that psychologists study psychological phenomenon in isolation
 - C) the focus on animal behavior
 - D) the focus on human behavior
 - E) that psychologists are too laboratory-based
- 30) The field most likely to be interested evolutionary cognition would be:
- A) anthropology
 - B) cybernetics
 - C) behavioral analysis
 - D) clinical psychology
 - E) none of the above
- 31) Which of the following is NOT an assumption proposed by the information-processing model?
- A) All of the above are assumptions.
 - B) Most processes are performed identically and independently in the left and right cerebral hemispheres.
 - C) Each stage receives information from preceding stages.
 - D) At each stage, unique operations are performed on incoming information.
 - E) Cognition can be analyzed into a series of stages.
- 32) One reason cognitive psychologists and neuroscientists have formed a close alliance is because:
- A) cognitive psychologists need laboratory techniques to make their observations more scientific
 - B) cognitive psychology evolved primarily from neuroscience
 - C) cognitive psychologists are seeking neurological explanations for their findings and neuroscientists are seeking cognitive explanations for their findings
 - D) neuroscientists have made important discoveries that have little to do with reality
 - E) cognitive psychologists have developed exceptional laboratory techniques which need to be tested physiologically
- 33) Simply put, cognitive psychology is the study of:
- A) sharing
 - B) emotions
 - C) thinking
 - D) seeing
 - E) socializing

- 34) In simple terms, cognitive models can be divided into the following components:
- A) detection of stimuli, working memory, long-term storage
 - B) storage of information, production of responses, and a feed back loop
 - C) echoic memory, working memory, and thinking
 - D) stimuli detection, storage and transformation of stimuli, and response production
 - E) iconic storage, short-term memory, and long-term memory
- 35) Ancient Egyptians and early Greek philosophers (such as Aristotle) believed the seat of knowledge was in:
- A) the kidneys
 - B) the heart
 - C) the stomach
 - D) the soul
 - E) the pineal gland
- 36) Model building:
- A) is only for novice scientists
 - B) is only used in computer science
 - C) makes observations more comprehensible
 - D) is only for the most experienced of scientists
 - E) is not particularly useful in cognitive psychology
- 37) What perspective would you most likely use if you are a functionalist?
- A. Evolutionary
 - A) Neuroscience
 - B) Information processing
 - C) Computer science
- 38) Which phrase fits best with the evolutionary perspective
- A) Time ordered sequence of events
 - B) Underlying functions provide cognitive experience
 - C) Widely shared attributes of the mind are result of passed on psychological traits
 - D) None of the above
- 39) Which had the least effect on the declining of behaviorism in favor of cognitive psychology
- A) Developmental psychology
 - B) Psychological analysis
 - C) Computer science
 - D) Linguistics
- 40) Which of the following does cognitive psychology least rely on?
- A) Neuroscience
 - B) Philosophy
 - C) Anthropology
 - D) Symbolism

- 41) While observational studies help you DESCRIBE a phenomena, which of the following help you EXPLAIN a phenomena
- A) Post hoc
 - B) Correlation
 - C) Experiment
 - D) None of the above
- 42) What is a conceptual definition?
- A) General idea
 - B) Precise definition
 - C) Ranking
 - D) All of the above
- 43) What is an operational definition
- A) General idea
 - B) Second opinion
 - C) Precise definition
 - D) A second definition for the same term
- 44) Which of the following is a difference between cognitive psychology and social psychology?
- A) Type of people being studied
 - B) Size of the unit of analysis
 - C) Duration of a study
 - D) Region in which study is being conducted
- 45) In the text, the study of light perception uses:
- A. Behavior in altered states
 - B. Single cell study
 - C. Reaction time study
 - D. Psychophysics
- 46) Hubel and Weisel shared a noble prize in single cell research where they put a probe in the brain into which of the following animals?
- A) Cats
 - B) Humans
 - C) Monkeys
 - D) Pigeons
- 47) Which method demonstrates the length of time of cognitive activity?
- A) Eye tracking
 - B) Single cell
 - C) Reaction time
 - D) Case study
- 48) Which method involves the surgical cutting of the corpus callosum on people with severe epilepsy to reduce seizures?
- A) Lateralization
 - B) Reaction time
 - C) Single cell
 - D) Eye tracking

49) Which method is used to determine the effects of brain damage on a certain area of the brain in an individual?

- A) Case Study
- B) Lateralization
- C) Eye tracking
- D) Single cell

50) Imaging studies can show

- A) Structure
- B) Processes
- C) Neurological damage
- D) All of the above

51) Eye tracking is useful in understanding what disability?

- A) Mental Retardation
- B) Dyslexia
- C) Autism
- D) Conduct disorder

52) Which group mentioned in the text is concerned with the treatment of animals in experiments

- A) PETA
- B) APA
- C) Animals Rights
- D) CAZ



Essay Test Questions

ESSAY. Write your answer in the space provided or on a separate sheet of paper.

- 1) How might the study of cognitive processes be applied to real life situations? List and discuss three applications.
- 2) Describe and explain the functions of a cognitive model, theory and perspective.
- 3) Cognitive psychology draws freely from 12 principle areas within psychology. List five of them and briefly explain.
- 4) What are the roots of cognitive psychology?
- 5) Cognitive psychologists seem to favor model building. What is model building? Is model building beneficial to the discipline?
- 6) How can the field of evolutionary psychology further our understanding of the processes underlying cognition?

- 7) Outline some of the main topics in modern cognitive psychology and, where possible, their historical antecedents.
- 8) What were the main reasons for the reemergence of cognitive psychology in the 1950s?
- 9) What are some of the basic assumptions underlying an information-processing model of cognition? Explain some of the historical forces that led to its development and the cognitive neuroscience "revolution."



Multiple Choice Answers

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|-------|-------|
| 1) D | 28) B |
| 2) C | 29) B |
| 3) C | 30) A |
| 4) E | 31) B |
| 5) A | 32) C |
| 6) D | 33) C |
| 7) A | 34) D |
| 8) E | 35) B |
| 9) C | 36) C |
| 10) D | 37) A |
| 11) E | 38) C |
| 12) C | 39) B |
| 13) D | 40) D |
| 14) E | 41) C |
| 15) D | 42) A |
| 16) A | 43) C |
| 17) C | 44) B |
| 18) D | 45) D |
| 19) E | 46) A |
| 20) C | 47) C |
| 21) C | 48) A |
| 22) A | 49) A |
| 23) A | 50) D |
| 24) A | 51) B |
| 25) E | 52) A |
| 26) B | |
| 27) D | |



Essay Answers (Key Points)

- 1)
 - Understanding normal cognitive processes aids in understanding abnormal cognitive behavior and may lead to the development of drugs or therapy
 - Understanding cognitive processes can help us develop techniques or strategies to improve cognitive abilities such as memory and learning
 - Decision making and judgments--juries
- 2)
 - Abstract organizational ideas derived from inferences based on observations
 - Visual guide of how cognitive processes occur
 - Makes observations more comprehensible
 - Structure within which hypotheses can be tested
 - Allows for prediction
 - Main theoretical approaches that guide research questions and interpretation
- 3)
 - Cognitive neuroscience
 - Perception
 - Pattern recognition
 - Attention and consciousness
 - Memory
 - Imagery
 - Representation of knowledge
 - Language
 - Developmental psychology
 - Thinking and concept formation
 - Human intelligence
 - Artificial intelligence
- 4)
 - Greek Philosophers
 - Empiricists
 - Nativists
 - Renaissance Philosophers
 - Early psychologists
 - Gestalt theorists

- 5)
 - An abstract metaphor of how nature works
 - Makes observations more comprehensible
 - Provides structure within which hypotheses can be tested
 - Ability to predict events based on the model
 - Models guide visualizations of cognitive processes
 - Aid in predictions
 - Help integrate theories in cognitive psychology and related disciplines
- 6)
 - There exists universal human cognitive attributes
 - Cognition as a tool to aid in survival
- 7)
 - Detection of sensory signals and neuroscience
 - Attention
 - Knowledge
 - Pattern recognition
 - Mental imagery
 - Memory
- 8)
 - Failure of behaviorism
 - Emergence of communication theory
 - Modern linguistics
 - Memory research
 - Computer science
 - Technological advances
 - Cognitive development
- 9)
 - Sequential stages
 - Unique processes take place at each stage
 - Each stage receives information from the proceeding stage, then performs its unique function
 - Models of memory
 - Computer metaphor
 - Neuroscience