

CHAPTER 1: COGNITIVE PSYCHOLOGY: A BRIEF HISTORY AND INTRODUCTION

CHAPTER OUTLINE

- I. What Is Cognition?
 - A. The Omnipresence of Cognitive Processes
 - 1. Perception
 - 2. Attention
 - 3. Immediate Memory
 - 4. Identifying and Classifying Objects
 - 5. Long-Term Memory
 - 6. Autobiographical Memory
 - 7. Memory Distortion
 - 8. Language
 - 9. Decision Making
 - 10. Problem Solving
 - B. An Interdisciplinary Perspective
 - C. Stop and Review!
- II. Psychology B.C. (*Before Cognitive Psychology*)
 - A. Psychophysics
 - B. Structuralism: The Contents of Mental Experience
 - C. Functionalism: The Functions of Mental Experience
 - D. Behaviorism: The Rejection of Mental Experience
 - E. Laying the Foundation for Cognitive Psychology
 - 1. Ebbinghaus: Pioneering Experiments on Memory
 - 2. Bartlett's Memory Research
 - 3. Gestalt Psychology
 - F. Stop and Review!
- III. The Emergence of Cognitive Psychology
 - A. S-R Explanations: Seriously wRong?
 - 1. Failure to Account for the Data
 - a. Learning Without Responding
 - b. Learning Without Reinforcement
 - c. Cognitive Maps
 - 2. Lashley Lashes Out
 - B. Technological Influences
 - 1. Communications Engineering
 - 2. Computer Science
 - C. Stop and Review!
- IV. Psychology A.D. (*After the Decline of Behaviorism*)
 - A. Behaviorism Reconsidered
 - B. Information Processing: A Computer Metaphor for Cognition
 - C. Connectionism: A Brain Metaphor for Cognition
 - D. The Brain: More than a Metaphor?
 - 1. The Neuron
 - 2. The Brain
 - a. A Terminology Tour
 - b. The Cerebral Cortex
 - c. Hemispheric Asymmetries
 - d. Subcortical Structures
 - 3. The Tools of Cognitive Neuroscience
 - a. Brain Trauma and Lesions
 - E. Current TrendsStop and Review!

STOP AND THINK ELABORATIONS

Thinking about Thought Processes (p. 4)

This is a straightforward exercise designed to get students thinking about the everyday and applied nature of thought processes (so obvious that it almost seems silly to point out). One interesting variation might be to have students reflect on how their thought processes occasionally misfire, and to reflect on which types of errors (i.e., attention, memory, etc.) seem to be most common.

Comparing Cognitive Psychology to its Forerunners (p. 5)

This exercise will give you a chance to tie some of the fundamental questions of cognition to those posed by philosophy, and will give students a chance to see yet another connection between psychology and its foundational discipline. Points that can be raised include the fact that the basic questions that underlie cognitive psychology are largely philosophical ones, while the method used by cognitive psychologists are more in the spirit of physiology.

Cognitive Processes - Conscious or Unconscious? (p. 6)

This exercise will give students an opportunity to reflect closely on cognitive processes and will no doubt lead them to the realization that some of these processes occur rapidly and completely outside of conscious awareness. You might discuss the difficulties associated with investigating processes that occur quickly and unconsciously, and the methods that are necessitated by these problems (e.g., RT studies).

Two Approaches to the Study of Cognition (p. 10)

This exercise is a good one for getting students to compare the applied problems and situations to which cognitive research could be applied. Thinking of how cognitive processes might be investigated would be good practice in thinking up operational definitions.

Considering Cognition's Historical Influences (p. 19)

This one is simply a conversation starter that requires students to think closely about the various historical influences that led to the development of a science of cognition. Reasons for the choices will provide for some interesting class discussion.

DISCUSSION STARTERS

Everyday Cognition: One useful way to introduce the field of cognitive psychology on the first day of class is to simply ask students about the cognitive processes in which they engage every day. Which processes are especially salient? Which processes are especially proficient? What processes seem to be particularly difficult and prone to error? How do the contexts of thinking (internal and external) impact thinking?

Introspecting: Having students engage in the task of introspection always serves as an entertaining and informative diversion. Bring something edible to class (e.g., a cookie, gum, candy, etc.) and ask for a volunteer, whose task it will be to introspect upon the experience of eating it.

Research Sampler: Students enter their cognition class with little or no idea about the kind of research done in the field. To give them some idea, bring in the table of contents from a leading journal (e.g., *Journal of Experimental Psychology*, *Memory & Cognition*) and highlight the range of topics investigated.

Can Computers Think? In conjunction with a discussion of the information-processing approach, and the influence of the computer as a model for cognition, start a conversation with students about whether computers might be considered “conscious” or “thinking”. There are some obvious ways in which they could be (i.e., processing information) and some obvious ways in which they aren't (i.e., expressing emotions). Most students will claim that computers can do nothing that they aren't programmed or “told” to do. Counter this by arguing that the same could be said of humans.

Research Sampler Redux: This extension of the research sampler (see above) involves providing students with a contrast between laboratory and ecological approaches to cognition. To do this, you might provide students with

some sample titles and/or abstracts from the journals listed above, along with titles from more applied journals such as *Applied Cognitive Psychology*.

Brain Investigation Techniques: One way to give students a glimpse of the different brain investigation techniques would be to have them search via PsycINFO or an internet search engine for the various techniques mentioned in the chapter, and to take note of what they're used to investigate. They might also note what techniques are used in combination. They could also look for associations between the issues investigated and the relative advantages and disadvantages of each technique, as summarized in Table 1.1 (p. 36).

INTERNET RESOURCES

History Websites

History of Psych Website
<http://elvers.us/hop/>

Today in the History of Psychology
<http://www.cwu.edu/%7Ewarren/today.html>

Barnard College History of Psychology Collection
http://www.barnard.columbia.edu/psych/museum/b_museum.html

Cognitive Science Websites

Gallery of Cognitive Scientists (pictures of cognitive scientists)
http://www.bcp.psych.ualberta.ca/~mike/Pearl_Street/Gallery/

Cognitive Science Society
<http://cognitivesciencesociety.org/index.html>

Prehistory of cognitive science
<http://www.rc.umd.edu/cstahmer/cogsci/>

The Millennium Project - The top 100 works in cognitive science
http://www.cogsci.umn.edu/OLD/calendar/past_events/millennium/home.html

On-Line Laboratory Experiments and Demonstrations

PsychExps (Psychology Experiments on the Internet)
<http://www.psych.uni.edu/psychexps/>

Basic Information on Neuroscience

Tutorial on Basic Neural processes (By John H. Krantz, Ph.D., Hanover College)
<http://psych.hanover.edu/Krantz/neurotut.html>

Neuroscience Tutorial
<http://thalamus.wustl.edu/course/>

UCLA brain-mapping center
<http://www.brainmapping.org/#>

Neuroscience for Kids
<http://faculty.washington.edu/chudler/neurok.html>

Institutes and Organizations

Cognitive Neuroscience Society
<http://www.cogneurosociety.org/>

Society for Neuroscience
<http://www.sfn.org/>

Center for the Neural Basis of Cognition
<http://www.cnbc.cmu.edu>

Center for Brain and Cognition (V.S. Ramachandran, Director)
<http://cbc.ucsd.edu/CBC2.html>

Miscellaneous Informational and Historical Sites

Mind and Body: From Descartes to James (Robert Wozniak, Bryn Mawr College)
<http://serendip.brynmawr.edu/Mind/>

Museum of the Study of RT
<http://www.chss.montclair.edu/psychology/museum/mrt.html>

Museum of the Study of psychology Instrumentation
<http://www.chss.montclair.edu/psychology/museum/museum.htm>

Encyclopedia of Psychology - Publications in Cognitive Psych (Listing of Cognitive Journals)
<http://www.psychology.org/links/Publications/Cognitive/index.html>

Directory of Neuroscience Departments and Programs
<http://www.andp.org/>

COG BLOGS

New Cognitive Robotics Lab Tests Theories of Human Thought
<http://www.sciencedaily.com/releases/2010/12/101230114808.htm>

New Psychology Theory Enables Computers to Mimic Human Creativity
<http://www.sciencedaily.com/releases/2010/12/101201124345.htm>

Myth About Popular Optical Illusion Debunked
<http://www.sciencedaily.com/releases/2010/12/101221163836.htm>

Portraits of Mind at the New York Academy of Science
<http://danapress.typepad.com/weblog/2010/12/portraits-of-mind-at-the-new-york-academy-of-science.html>

Fighter Pilots' Brains Are More Sensitive
<http://www.sciencedaily.com/releases/2010/12/101214181930.htm>

Stunning Details of Brain Connections Revealed
<http://www.sciencedaily.com/releases/2010/11/101117121803.htm>

Adapted MRI Scan Improves Picture of Changes to the Brain
<http://www.sciencedaily.com/releases/2010/11/101113165257.htm>

A Technique That Shows Colorful Connections in the Brain
<http://www.sciencedaily.com/releases/2010/10/101020193036.htm>

The Reality of the Brain-Computer Interface
<http://brainblogger.com/2009/08/14/the-reality-of-the-brain-computer-interface/>

The Prefrontal Cortex is Holistic
<http://neuroskeptic.blogspot.com/2010/09/prefrontal-cortex-is-holistic.html>

A Brain Made of Memristers
<http://brainblogger.com/2010/12/18/a-brain-made-of-memristors/>

The Brain is Ready for Its Close-Up
<http://discovermagazine.com/photos/17-the-brain-is-ready-for-its-close-up>

Neuroradiology as Art
<http://neurocritic.blogspot.com/2010/12/neuroradiology-as-art.html>

I Can Smell Burnt Toast
<http://mindhacks.com/2010/12/08/i-can-smell-burnt-toast/>

Lights, Camera, Action Potential
<http://mindhacks.com/2010/10/27/lights-camera-action-potential/>

TEST ITEMS

MULTIPLE CHOICE

- 1) The subdiscipline of cognitive science that is interested in the association between mental processing and brain activity is:
- a) developmental.
 - b) clinical.
 - c) neuropsychology.
 - d) social.

Answer: c

Page Ref: 4

- 2) Which of the following is not generally studied by cognitive psychologists?
- A) memory distortion
 - B) social interaction
 - C) decision making
 - D) problem solving

Answer: b

Page Ref: 2-4

- 3) The issue of how we manage (or fail to manage) driving and talking on a cell phone would be of most interest to someone who studies:
- a) problem solving.
 - b) attention.
 - c) memory.
 - d) decision making.

Answer: b

Page Ref: 2

- 4) Which subdiscipline of cognitive science focuses on (as its primary goal) using computers to simulate and model human thought?
- a) neuroscience
 - b) linguistics
 - c) cognitive psychology
 - d) artificial intelligence

Answer: d

Page Ref: 6

- 5) The interdisciplinary field of cognitive science is comprised of fields that include philosophy, psychology, neuroscience, _____, and _____.
- a) anthropology; sociology
 - b) sociology; artificial intelligence
 - c) anthropology; artificial intelligence
 - d) physics; chemistry

Answer: d

Page Ref: 4

- 6) The two disciplines typically characterized as the forerunners to psychology (and cognitive psychology) are:
- a) philosophy and physiology.
 - b) sociology and history.
 - c) history and philosophy.
 - d) chemistry and theology.

Answer: a

Page Ref: 5

- 7) In which of these would a psychophysicist be most interested?
- a) the ways in which the perceptual system translates an incoming stimulus
 - b) the basic relationship between brain activity and conscious experience
 - c) identifying the basic sensations, images and feelings that comprise experience
 - d) the behavior of someone in response to some stimulus
- Answer: a*
Page Ref: 6
- 8) Generally, as a stimulus becomes more intense, the minimal change in intensity needed in order for a person to notice the change:
- a) increases.
 - b) decreases.
 - c) stays the same.
 - d) has no relationship whatsoever to original intensity.
- Answer: a*
Page Ref: 6
- 9) Which psychophysicist came up with the notion of an unconscious inference?
- a) Donders
 - b) Fechner
 - c) Helmholtz
 - d) Wundt
- Answer: c*
Page Ref: 6
- 10) Which psychophysicist's major contribution was to demonstrate that the relationship between incoming stimuli and corresponding perceptions was not one-to-one?
- a) Fechner
 - b) Helmholtz
 - c) Wundt
 - d) Titchener
- Answer: a*
Page Ref: 7-
- 11) Helmholtz was a _____ whose work included the insight that _____.
- a) structuralist; perception involves unconscious inferences about incoming stimuli
 - b) structuralist; consciousness is complex, but composed of simple elements that can be analyzed through introspection
 - c) psychophysicist; perception involves unconscious inferences about incoming stimuli
 - d) psychophysicist; consciousness is complex, but composed of simple elements that can be analyzed through introspection
- Answer: c*
Page Ref: 8
- 12) Psychophysics is to cognitive psychology as _____ is to _____.
- a) early processes; late processes
 - b) late processes; early processes
 - c) late processes; all processes
 - d) early processes; all processes
- Answer: d*
Page Ref: 7

- 13) Who established the first psychological laboratory in Leipzig, Germany?
- a) Titchener
 - b) Fechner
 - c) Watson
 - d) Wundt
- Answer: d*
Page Ref: 7
- 14) The atomistic approach employed by the structuralists — breaking consciousness down into its elemental components — has been likened to the approach of which other scientific discipline?
- a) physics
 - b) chemistry
 - c) biology
 - d) archaeology
- Answer: b*
Page Ref: 7
- 15) According to structuralists, consciousness encompasses three basic categories of experience, including sensations, feelings, and:
- a) behaviors.
 - b) motives.
 - c) drives.
 - d) images.
- Answer: b*
Page Ref: 7
- 16) The name “structuralism” was coined by:
- a) Titchener.
 - b) Wundt.
 - c) James.
 - d) Ebbinghaus.
- Answer: a*
Page Ref: 7
- 17) _____ refers to a procedure that requires a rigorous, and systematic self-report of the basic elements of an experience, and was the primary method used by _____.
- a) Schema analysis; Gestalt psychologists
 - b) Savings; behaviorists
 - c) Functional reporting; functionalists
 - d) Introspection; structuralists
- Answer: d*
Page Ref: 7
- 19) Who wrote *Principles of Psychology*, a book that reads like a “what’s what” of the study of cognition?
- a) James
 - b) Titchener
 - c) Wundt
 - d) Watson
- Answer: a*
Page Ref: 8
- 20) William James was a prominent _____ who characterized consciousness as a _____.
- a) functionalist; stream
 - b) functionalist; complex combination of simple elements
 - c) structuralist; stream
 - d) structuralist; complex combination of simple elements

Answer: a

Page Ref: 8

- 21) When considering the emotion of anger; which of these questions would be of most interest to a functionalist?
- a) What is the purpose of anger?
 - b) What is the conscious experience of anger like?
 - c) What are the behaviors of an angry person?
 - d) What happens in the brain during fits of anger?

Answer: a

Page Ref: 8

- 22) The scientific perspective known as behaviorism was established by:
- a) John Watson.
 - b) William James.
 - c) Edwin C. Tolman.
 - d) B.F. Skinner.

Answer: a

Page Ref: 8

- 23) Mind and behavior can be conceptualized as an “S”, an “R”, and a black box in between. The behaviorists were interested in:
- a) the S's only
 - b) the R's only
 - c) S's and R's
 - d) the black box

Answer: c

Page Ref: 8

- 24) In his investigations of memory, Ebbinghaus studied long lists of:
- a) lines from poems.
 - b) book titles.
 - c) nonsense syllables.
 - d) single syllable words.

Answer: c

Page Ref: 9

- 25) The forgetting curve, as mapped out by Ebbinghaus, demonstrates that material is forgotten:
- a) very slowly at first, then at a very rapid rate.
 - b) rapidly at first, then at a very slow steady rate.
 - c) at a fairly constant rate over time.
 - d) only if there is interference.

Answer: b

Page Ref: 9

- 26) If you're a psychology major, you've probably been exposed to basic information about the history of psychology in several courses. Each time you're exposed to this information, you probably pick up on it and retain it a little better. This is an example of _____, a key concept from the work of memory psychologist _____.

- a) savings; Bartlett
- b) savings; Ebbinghaus
- c) schemata; Bartlett
- d) schemata; Ebbinghaus

Answer: b

Page Ref: 9

- 27) Bartlett's studies of memory were different than Ebbinghaus's in that:
- a. Bartlett found little evidence of forgetting
 - b. Bartlett's studies featured a higher degree of realism
 - c. Bartlett's ideas were consistent with the behaviorist approach of the day.
 - d. it has had relatively little influence on current day research

Answer: b

Page Ref: 10

- 28) What was the term Bartlett used for generalized knowledge structures about events and situations based on past experience?
- a) savings
 - b) introspections
 - c) configurations
 - d) schemata

Answer: d

Page Ref: 10

- 29) Gestalt psychologists are known for their work on _____, and profoundly influenced the present-day study of _____.
- a) isolating the basic elements of conscious experience; perception and problem-solving
 - b) isolating the basic elements of conscious experience; decision-making and language
 - c) the basic tendency of the mind to organize experience; perception and problem-solving
 - d) the basic tendency of the mind to organize experience; decision-making and language

Answer: c

Page Ref: 11

- 30) Which school of psychology is best captured by its credo, "The whole is different than the sum of its parts"?
- a) Structuralism
 - b) Functionalism
 - c) Gestalt
 - d) Behaviorism

Answer: c

Page Ref: 11

- 31) In explaining how a rat learns to navigate a maze to get food, behaviorists would be extremely unlikely to include which of these phrases in their accounts?
- a. "the rat knows"
 - b. "the rat runs"
 - c. "reinforcement strengthens"
 - d. "stimulus-response connection"

Answer: c

Page Ref: 13

- 32) Recall the study by McNamara, Long, & Wike (1956) in which rats were exposed to a T-maze in one of two ways: the rats in one group ran the maze themselves, while the rats in the other group were pushed through the maze in carts. Which group(s) learned to make the correct choice at the end of the "T"?
- a) The rats who ran themselves learned to make the correct choice, but the rats in carts failed to learn it.
 - b) The rats in carts learned to make the correct choice, but the rats who ran themselves failed to learn it.
 - c) Neither group of rats learned to make the correct choice.
 - d) Both groups of rats learned to make the correct choice.

Answer: d

Page Ref: 13

- 33) What happened to the group of rats that wasn't reinforced until the 11th day of the Tolman and Honzik study?
- a) After the 11th day, they showed slow but steady improvement in their maze-running.
 - b) They showed no improvement and no decline in their maze-running.
 - c) They showed sudden improvement in their maze-running after day 11, running as quickly as the rats who had always been reinforced.
 - d) They showed sudden improvement in their maze-running, but never ran as quickly as the rats who had always been reinforced.

Answer: c

Page Ref: 13-14

- 34) What was the term Tolman coined to refer to learning that occurs in the absence of any reinforcement?
- a) latent learning
 - b) learning by savings
 - c) Gestalt learning
 - d) associative learning

Answer: a

Page Ref: 14

- 35) In a classic study reported by Tolman (1948), rats were exposed to a complex maze that had three different paths to food: Path 1 was shortest, Path 2 was a bit longer, and Path 3 was the longest. After experiencing all of the paths, rats showed a strong preference for Path 1 (the shortest path). Then, the researchers blocked Path 1 — which also, as it turns out, blocked Path 2. What did rats do when they were placed in this situation?
- a) After being blocked at Path 1, they tried Path 2, then finally chose Path 3.
 - b) After being blocked on Path 1, they kept trying Path 1 over and over again.
 - c) After being blocked at Path 1, they tried Path 2, and then kept trying Path 2 over and over again.
 - d) After being blocked at Path 1, they immediately switched to Path 3 (not even bothering with Path 2).

Answer: d

Page Ref: 15

- 33) The behaviorists claimed that in order for learning to take place, you need to have _____ and _____. It turns out _____ is (are) absolutely necessary.
- a) mental representations; motivation; neither
 - b) mental representations; motivation; only mental representations
 - c) response and reinforcement; neither
 - d) response and reinforcement; only reinforcement

Answer: d

Page Ref: 13-16

- 34) Lashley _____ the S-R approach to performance, pointing out that _____.
- a) attacked; complex performance plays out too quickly to be a simple chain of S-R associations
 - b) defended; even complex responses can be explained through a simple appeal to responses and reinforcements
 - c) attacked; humans in no way are guided by associations
 - d) defended; complex responses can only be explained via an S-R analysis.

Answer: a

Page Ref: 16

- 35) Noam Chomsky:
- a) proposed that language can be accounted for solely based on S-R principles.
 - b) sharply criticized Skinner's view of language learning.
 - c) proposed that language learning is dependent on automatic self-reinforcement.
 - d) saw no need for the concept of mental representations in explaining language.

Answer: b

Page Ref: 16

- 36) Chomsky's views on _____ proved to be one of the stiffest challenges to the behaviorist view.
- a) problem solving
 - b) computers
 - c) attention
 - d) language
- Answer: d*
Page Ref: 16
- 37) Which theorist wrote what one psychologist termed “perhaps the single most influential psychological paper published since Watson's behaviorist manifesto of 1913”?
- a) Skinner
 - b) Miller
 - c) Chomsky
 - d) Lashley
- Answer: c*
Page Ref: 16
- 38) Little Baruti sees a four-legged creature that makes the noise, “Woof! Woof!”. He points and says, “Dog!” His mother says, “Good, Baruti, good!” Skinner would propose that Baruti saying, “Dog!” is a _____ that comes under control of the stimulus, which is _____.
- a. response; his mother saying “Good!”
 - b. response; the dog
 - c. reinforcement; his mother saying “Good!”
 - d. reinforcement; the dog
- Answer: b*
Page Ref: 17
- 39) Communications engineering and computer science were both important to the emergence of cognitive psychology because both:
- a) showed that learning could occur without reinforcement or response.
 - b) showed that machines could perform intelligent human functions.
 - c) provided a model/metaphor for how the mind might work.
 - d) provided technological advances to better investigate mental processing.
- Answer: c*
Page Ref: 18-19
- 40) In the end, what happened to behaviorism?
- a) It was replaced by a renewed interest in structuralism.
 - b) It completely died out.
 - c) It continues to hold some sway to this day.
 - d) It was replaced by a renewed interest in functionalism.
- Answer: c*
Page Ref: 20-21
- 40) The information processing approach to cognition likens thought to:
- a) the operation of a computer.
 - b) the storage system of a library.
 - c) the assembly-line production of a factory.
 - d) the trial-and-error learning of the rat in a maze.
- Answer: a*
Page Ref: 21

- 41) Which of the following is a similarity between computers and humans?
- a) Both humans and computers translate incoming information into a different form.
 - b) Both humans and computers have the capacity for executing a logical decision chain.
 - c) Both humans and computers have the capacity to store programs and instructions, as well as the data with which these programs work.
 - d) All of the above are similarities between computers and humans.

Answer: d

Page Ref: 21

- 42) According to the information processing approach, the brain can be viewed as _____, while mental processing can be viewed as _____:
- a) the “hardware” of a computer; the computer’s “software”
 - b) a complex network of nodes; activation among these nodes
 - c) neuronal activity; a computer program
 - d) a computer program; central processing unit

Answer: a

Page Ref: 21

- 43) The information processing approach is to the connectionist approach as _____ is to _____.
- a) recent; antique
 - b) serial; parallel
 - c) automatic; controlled
 - d) brain; computer

Answer: b

Page Ref: 21-22

- 44) Which model of cognition uses a brain-based metaphor to describe cognitive processes in terms of complex and interconnected networks of individual processing units that operate in parallel?
- a) Computerism
 - b) Structuralism
 - c) Parallelism
 - d) Connectionism

Answer: d

Page Ref: 21-22

- 45) Another name for connectionism is:
- a) Parallel Distributed Processing.
 - b) Computerism.
 - c) Associative Network Modeling.
 - d) Cognitive Mapping.

Answer: a

Page Ref: 22

- 46) In explaining cognition, the connectionist approach emphasizes:
- a) interactions between individual processing units in the brain.
 - b) the serial nature of cognitive processing.
 - c) that cognitive processes are localized within certain regions of the brain.
 - d) simple perceptual processing, rather than higher-level cognitive processing.

Answer: a

Page Ref: 22

- 47) Cognitive neuroscience emerged in the:
- a) 1950s.
 - b) 1960s.
 - c) 1970s.
 - d) 1980s.

Answer: c

Page Ref: 23

48) The higher cognitive processes, such as remembering, planning, and deciding are located in:

- a) the cerebral cortex.
- b) the midbrain.
- c) the hindbrain.
- d) none of the above.

Answer: a

Page Ref: 24

49) Communication between neurons can be described as:

- a) electrical only.
- b) chemical only.
- c) both electrical and chemical.
- d) neither electrical nor chemical.

Answer: c

Page Ref: 25

50) The assumption that the association between two neurons becomes stronger if these two neurons are active at the same time forms a partial basis for which approach to cognition?

- a) descriptive approach
- b) connectionist approach
- c) information processing approach
- d) ecological approach

Answer: b

Page Ref: 25

51) You're visiting the neuroscience lab of Dr. Wu, and he asks you to look at his plastic model of the brain, particularly the rostral area. Where should you look on his model?

- a) the front
- b) the back
- c) the top
- d) the bottom

Answer: a

Page Ref: 26

52) The _____ comprises most of the brain and consists mainly of the _____,

- a) hindbrain; amygdala, and thalamus
- b) forebrain; amygdala and thalamus
- c) hindbrain; cerebral cortex
- d) forebrain; cerebral cortex

Answer: d

Page Ref: 26

53) The _____ is the seat of what are typically labeled "higher cognitive functions."

- a) hindbrain
- b) midbrain
- c) caudal area
- d) cerebral cortex

Answer: d

Page Ref: 26

54) The areas of the brain that aren't strictly devoted to sensory or motor functions are termed:

- a) prefrontal areas.
- b) association areas.
- c) occipital areas.
- d) Broca's areas.

Answer: b

Page Ref: 27

55) Which of these is a correct sequencing of cortical areas, from those most anterior to those most posterior?

- a) occipital lobe, parietal lobe, motor cortex, prefrontal cortex
- b) prefrontal cortex, motor cortex, parietal lobe, occipital lobe
- c) parietal lobe, motor cortex, occipital lobe, prefrontal cortex
- d) motor cortex, prefrontal cortex, parietal lobe, occipital lobe

Answer: b

Page Ref: 27

56) Research on split-brain patients reveals that:

- a) the left hemisphere typically specializes in verbal processing, while the right hemisphere specializes in spatial tasks
- b) the left hemisphere typically specializes in spatial tasks, while the right hemisphere specializes in verbal processing
- c) people who have had their corpus callosum severed have a great deal of difficulty functioning in everyday life
- d) for normal people, there is no difference between the functioning of the left and right hemispheres

Answer: a

Page Ref: 28

57) Which subcortical structure seems particularly involved in regulating emotion and forming emotional memories?

- a) hippocampus
- b) hindbrain
- c) hypothalamus
- d) amygdala

Answer: d

Page Ref: 28

58) Wernicke's insights about language use were based on this neuroscientific technique:

- a) brain trauma and lesion
- b) EEG
- c) ERP
- d) CTscan

Answer: a

Page Ref: 29

59) Suppose damage to a particular brain area leaves someone unable to recognize faces, but does not affect the ability to recognize objects. This is an example of _____, and provides some evidence that _____.

- a) a single dissociation; recognition of faces and recognition of objects depend on different brain mechanisms
- b) a single dissociation; recognition of faces and recognition of objects depend on the same brain mechanisms
- c) a double dissociation; recognition of faces and recognition of objects depend on different brain mechanisms
- d) a double dissociation; recognition of faces and recognition of objects depend on the same brain mechanisms

Answer: a

Page Ref: 30

- 60) Suppose damage to brain area “A” leaves someone unable to recognize faces, but does not affect the ability to recognize everyday objects. In addition, suppose that damage to brain area “B” leaves someone unable to recognize everyday objects, but does not affect the ability to recognize faces. This is an example of a _____, and provides some evidence that _____.
- a) a single dissociation; recognition of faces and recognition of objects depend on different brain mechanisms
 - b) a single dissociation; recognition of faces and recognition of objects depend on the same brain mechanisms
 - c) a double dissociation; recognition of faces and recognition of objects depend on different brain mechanisms
 - d) a double dissociation; recognition of faces and recognition of objects depend on the same brain mechanisms

Answer: c

Page Ref: 30

- 61) Which brain investigation technique provides a global recording of the action potentials occurring in the brain?
- a) CATscan
 - b) PETscan
 - c) fMRI
 - d) electroencephalograph (EEG)

Answer: d

Page Ref: 31

- 62) Event-related potentials is a technique used in conjunction with _____ that allows researchers to _____.
- a) PET scan; plot out the time course of brain activity in response to some discrete event
 - b) PET scan; derive a “map” of active and inactive brain areas
 - c) electroencephalography; plot out the time course of brain activity in response to some discrete event
 - d) electroencephalography; derive a “map” of active and inactive brain areas

Answer: c

Page Ref: 32

- 63) A semantic anomaly (i.e., “Jake put the cookies into the *birdbath*.”) produces an ERP signal termed an N400. What does the “400” refer to?
- a) distance in the brain's cortex
 - b) approximate number of neurons responding
 - c) time between stimulus presentation and brain response
 - d) the time it takes for the person to say they notices an anomaly in the sentence

Answer: c

Page Ref: 32

- 64) Which neuroscientific investigation technique uses a SQUID?
- a) ERP
 - b) MEG
 - c) PTscan
 - d) fMRI

Answer: b

Page Ref: 32-33

- 65) How does magnetoencephalography (MEG) compare to EEG in terms of spatial and temporal resolution?
- a) MEG is better than EEG for spatial resolution; the reverse is true for temporal resolution
 - b) MEG is better than EEG for temporal resolution; the reverse is true for spatial resolution
 - c) EEG is better than MEG for both spatial and temporal resolution
 - d) MEG is better then EEG for both spatial and temporal resolution

Answer: d

Page Ref: 33

- 66) How does TMS (trans-cranial magnetic stimulation) differ from the other techniques?
- a) TMS involves direct stimulation of the brain; the other techniques do not.
 - b) TMS involves getting an “image” or picture of the brain; the other techniques do not.
 - c) TMS provides poorer temporal and spatial resolution than all of the other techniques.
 - d) TMS is much more costly than any other of the techniques.

Answer: a

Page Ref: 33

67) Which neuroscience investigation technique uses detectors that are sensitive to hemoglobin levels in the blood?

- a) PETscan
- b) TMS
- c) fMRI
- d) MEG

Answer: c

Page Ref: 34

68) The most commonly used neuroscience tool seems to be:

- a) imaging techniques like fMRI and PETscan.
- b) stimulation techniques like TMS.
- c) recording techniques like EEG/ERP.
- d) brain trauma and lesion.

Answer: a

Page Ref: 35

69) Which technique for brain investigation is has been termed “the new phrenology”?

- a) brain trauma and lesion
- b) imaging techniques like fMRI and PETscan
- c) stimulation techniques like TMS
- d) recording techniques like EEG/ERP

Answer: b

Page Ref: 35

70) How much of our brain do we use?

- a) more of the right than the left
- b) more of the left than the right
- c) about 10%
- d) 100%

Answer: d

Page Ref: 37

71) As external (or ecological) validity increases, what happens to internal validity?

- a) Internal validity tends to increase also.
- b) Internal validity tends to decrease.
- c) Internal validity remains constant.
- d) It completely depends on the particular research design.

Answer: b

Page Ref: 39

72) In referring to “the problem of meaning”, renowned psychologist Jerome Bruner was offering what critique of cognitive research?

- a) too much emphasis on internal validity at the expense of external validity
- b) too much emphasis on external validity at the expense of internal validity
- c) not enough emphasis on how cognition relates to brain activity
- d) research in cognition should be “disembodied”

Answer: a

Page Ref: 40

73) What is the term proposed by Descartes that refers to the belief that mind and body are separable entities?

- a) Empiricism
- b) Materialism
- c) Dualism
- d) Embodied Cognition

Answer: c

Page Ref: 41

74) Which term refers to a constellation of ideas emphasizing the belief that thinking is dynamic and occurs in conjunction with action and within a broader context that guides and shapes it?

- a) Materialism
- b) Embodied cognition
- c) Dualism
- d) Empiricism

Answer: b

Page Ref: 41

75) Metacognition refers to:

- a) the role that emotion plays in cognition.
- b) the fact that we have evolved particular cognitive tendencies and abilities.
- c) the role that the body plays in thinking.
- d) the knowledge we have about our own cognitive processes.

Answer: d

Page Ref: 42

ESSAY

- 1) What is cognitive science, and of what disciplines is it comprised?
Page Ref: 5-6
- 2) Define psychophysics, and briefly explain its role in the history of cognitive psychology.
Page Ref: 7-9
- 3) What are the three important principles that are highlighted by Helmholtz's concept of unconscious inference?
Page Ref: 8
- 4) Describe the basic approaches of structuralism and functionalism, and state which had more of an impact on the development of a scientific psychology (and why).
Page Ref: 9-10
- 5) Discuss the work of Ebbinghaus and how he investigated memory. Why were his contributions important?
Page Ref: 12-13
- 6) Explain the S-R analysis for how an organism learns to perform a behavior. (Hint: use the terms stimulus, response, and reinforcement). Explain why (a) learning without reinforcement and (b) learning without responding are problematic for this analysis.
Page Ref: 15-20
- 7) Describe the objections to the behaviorist analysis of complex behavior and language offered by Lashley and Chomsky. How did their proposals help form a basis for the study of cognition?
Page Ref: 20-21
- 8) Describe how the development of technology (i.e., computers and communications engineering) helped provide a basis and a metaphor for the study of cognition.
Page Ref: 22
- 9) Describe the major assumptions underlying the information processing approach, and discuss some of the similarities between humans and computers.
Page Ref: 24-26
- 10) Outline the basic assumptions of the connectionist approach to cognition, and describe the differences between the connectionist approach and the information-processing approach.:
Page Ref: 26-29
- 11) Discuss the ecological approach to the study of cognition, and compare it to the traditional approach.
Page Ref: 30
- 12) Summarize the major subsections, areas, and structures of the brain, and their function.
- 13) Describe the general method used in EEG and ERP? What type of information do they yield about brain function?
- 14) Describe the general method used by imaging methods? What type of information do they yield about brain function?
- 15) What are the relative advantages and disadvantages of each of the neuroscience techniques?