

1. Artificial intelligence researchers have created a program that matches human intelligence.
A) True
B) False

2. Only in the last 150 years has human cognition been a subject of scientific inquiry.
A) True
B) False

3. Gestalt psychologists believe that the activity of the mind is more than the sum of its parts.
A) True
B) False

4. Cognitive science is the study of how cognition is realized in the brain.
A) True
B) False

5. Information-processing analysis breaks a cognitive task down into a set of steps.
A) True
B) False

6. When one refers to the nervous system, one is only referring to the brain.
A) True
B) False

7. From an information-processing point of view, the MOST important components of the nervous system are the neurons.
A) True
B) False

8. All neurons look alike and behave in the same manner.
A) True
B) False

9. An axon can vary in length from a few millimeters to a meter.
A) True
B) False
10. The terminal buttons of one neuron touch the dendrite of another.
A) True
B) False
11. There is a great deal of growth of new neurons and new synapses in the adult brain.
A) True
B) False
12. The cerebral cortex is the MOST recently evolved portion of the brain.
A) True
B) False

Answer Key

1. B
2. A
3. A
4. B
5. A
6. B
7. A
8. B
9. A
10. B
11. B
12. A

1. The ancient Greek philosopher Aristotle believed that the mind was contained in the:
 - A) brain.
 - B) heart.
 - C) lungs.
 - D) stomach.

2. According to _____, all knowledge comes from experience.
 - A) empiricism
 - B) nativism
 - C) relativism
 - D) verticality

3. According to _____, children come into the world with a great deal of innate knowledge.
 - A) empiricism
 - B) horizontality
 - C) nativism
 - D) relativism

4. Why wasn't cognitive psychology studied before the 19th century?
 - A) Before the 19th century, most sciences remained largely undeveloped.
 - B) It was believed that the human mind could not be scientifically studied.
 - C) Questions about the human mind were not asked before the 19th century.
 - D) The equipment needed to conduct research had not yet been invented.

5. Who established the first psychology laboratory?
 - A) James
 - B) Thorndike
 - C) Watson
 - D) Wundt

6. _____ refers to reporting the contents of one's own consciousness under controlled conditions.
 - A) Behaviorism
 - B) Gestalt psychology
 - C) Introspection
 - D) Relativism

7. According to _____, psychologists should NOT try to analyze the working of the mind.
- A) behaviorism
 - B) empiricism
 - C) Gestalt psychology
 - D) nativism
8. Developments in which field did NOT influence the emergence of cognitive psychology?
- A) artificial intelligence
 - B) Internet technology
 - C) information theory
 - D) linguistics
9. Cognitive science does NOT integrate research efforts from which field?
- A) physics
 - B) linguistics
 - C) neuroscience
 - D) philosophy
10. Components of the neuron include the:
- A) axon, dendrite, and ganglia.
 - B) axon, dendrite, and soma.
 - C) axon, ganglia, and soma.
 - D) dendrite, ganglia, and soma.
11. The main body of the neuron is called the:
- A) axon.
 - B) dendrite.
 - C) soma.
 - D) synapse.
12. A synapse is the:
- A) point at which an axon from one neuron touches the dendrite of another.
 - B) point at which a dendrite from one neuron touches the dendrite of another.
 - C) space shared by an axon from one neuron and a dendrite from another.
 - D) space shared by a dendrite from one neuron and a dendrite from another.

13. Neurons communicate by releasing chemicals called:
- A) dendrites.
 - B) hormones.
 - C) neurotransmitters.
 - D) syno-transmitters.
14. _____ form the fixed pathways by which neurons transmit action potentials.
- A) Axons
 - B) Dendrites
 - C) Somas
 - D) Muscles
15. Excitatory synapses:
- A) decrease the potential difference between the inside and the outside of a neuron.
 - B) increase the potential difference between the inside and the outside of a neuron.
 - C) do not change the potential difference between the inside and the outside of a neuron.
 - D) can either increase or decrease the potential difference between the inside and the outside of a neuron.
16. Inhibitory synapses:
- A) decrease the potential difference between the inside and the outside of a neuron.
 - B) increase the potential difference between the inside and the outside of a neuron.
 - C) do not change the potential difference between the inside and the outside of a neuron.
 - D) can increase or decrease the potential difference between the inside and the outside of a neuron.
17. An axon's _____ of firing determine(s) how it will affect nearby cells to which it synapses.
- A) intensity
 - B) pattern
 - C) rate
 - D) intensity, pattern, and rate
18. A bulge in the cortex is called a(n):
- A) aphasia.
 - B) gyrus.
 - C) sulcus.
 - D) synapse.

19. Which of these lobes is NOT cortical?
- A) anterior
 - B) frontal
 - C) parietal
 - D) temporal
20. The primary visual areas are contained in the _____ lobe.
- A) frontal
 - B) occipital
 - C) parietal
 - D) temporal
21. Spatial processing occurs in the _____ lobe.
- A) frontal
 - B) occipital
 - C) parietal
 - D) temporal
22. The _____ lobe is involved in object recognition.
- A) frontal
 - B) occipital
 - C) parietal
 - D) temporal
23. Planning is performed by the _____ lobe.
- A) frontal
 - B) occipital
 - C) parietal
 - D) temporal
24. The _____ portion of the brain is disproportionately larger in primates than in most mammals.
- A) frontal
 - B) occipital
 - C) parietal
 - D) temporal

25. The _____ appears to be critical for human memory.
- A) frontal lobe
 - B) hippocampus
 - C) hypothalamus
 - D) prefrontal cortex
26. Damage to the _____ results in amnesia.
- A) amygdala
 - B) hippocampus
 - C) hypothalamus
 - D) thalamus
27. Which structure or structures is/are involved in motor functioning?
- I. the basal ganglia
 - II. the cerebellum
 - III. the frontal lobe
- A) II
 - B) I and II
 - C) II and III
 - D) I, II, and III
28. The left hemisphere is associated with _____ processing.
- I. analytic
 - II. linguistic
 - III. perceptual
 - IV. spatial
- A) II
 - B) IV
 - C) I and II
 - D) II and IV
29. The right hemisphere is associated with _____ processing.
- I. analytic
 - II. linguistic
 - III. perceptual
 - IV. spatial
- A) I
 - B) IV
 - C) I and III
 - D) III and IV

30. The left hemisphere and the right hemisphere are connected by the:
- A) amygdala.
 - B) basal ganglia.
 - C) corpus callosum.
 - D) medulla oblongata.
31. Jesse is a researcher working with split-brain patients. He presents a complex command to one patient in the right ear (the right-ear patient) and presents the same complex command to another patient in the left ear (the left-ear patient). Jesse finds that:
- A) the left-ear patient displays full comprehension, while the right-ear patient does not.
 - B) the right-ear patient displays full comprehension, while the left-ear patient does not.
 - C) both patients display full comprehension.
 - D) neither patient displays full comprehension.
32. Billy and Mac were in a car accident. Oddly, Billy suffered damaged to Broca's area, while Mac suffered damage to Wernicke's area. As a result:
- A) Billy suffered from language deficits, while Mac suffered from visual deficits.
 - B) Billy suffered from visual deficits, while Mac suffered from language deficits.
 - C) both suffered from language deficits.
 - D) both suffered from visual deficits.
33. Nick speaks in short, ungrammatical sentences. He might have _____ aphasia.
- A) Basal's
 - B) Broca's
 - C) Sternberg's
 - D) Wernicke's
34. Sharon speaks in fairly grammatical sentences that are almost devoid of meaning. She might have _____ aphasia.
- A) Basal's
 - B) Broca's
 - C) Sternberg's
 - D) Wernicke's

35. _____ records the electrical potentials that are present on the scalp.
- A) EEG
 - B) fMRI
 - C) MRI
 - D) PET
36. Victor is a neuroscientist. The imaging technique that he is using has very good temporal resolution but isn't very useful at identifying the location in the brain that is producing neural activity. This technique is called:
- A) ERP.
 - B) fMRI.
 - C) MRI.
 - D) PET.
37. _____ is BEST at detecting activity in the sulci of the cortex and is less sensitive to activity in the gyri or activity deep in the brain.
- A) EEG
 - B) fMRI
 - C) MEG
 - D) PET
38. In _____, a radioactive tracer is injected into the bloodstream.
- A) EEG
 - B) fMRI
 - C) MEG
 - D) PET
39. _____ relies on the fact that there is more oxygenated hemoglobin in regions of greater neural activity.
- A) EEG
 - B) fMRI
 - C) MEG
 - D) PET
40. The body sends more blood to more active areas of the brain. This is referred to as the:
- A) hemodynamic response.
 - B) hemoglobin response.
 - C) MRI effect.
 - D) PET effect.

41. Transcranial magnetic stimulation is used to:
- A) generate the magnetic fields read by MRIs.
 - B) permanently incapacitate an overactive brain region.
 - C) temporarily incapacitate a normal-functioning brain region.
 - D) reactivate a brain region that has suffered mild damage.

Answer Key

1. B
2. A
3. C
4. B
5. D
6. C
7. A
8. B
9. A
10. B
11. C
12. C
13. C
14. A
15. A
16. B
17. C
18. B
19. A
20. B
21. C
22. D
23. A
24. A
25. B
26. B
27. D
28. C
29. D
30. C
31. B
32. C
33. B
34. D
35. A
36. A
37. C
38. D
39. B
40. A
41. C

1. Why has social science developed without grounding in cognitive psychology?
2. Differentiate between empiricism and nativism.
3. How did American introspection differ from German introspection?
4. Describe the conflict among introspectionists, behaviorists, and Gestalt psychologists.
5. Describe Thorndike's view on introspection.
6. Differentiate between cognitive psychology and cognitive science.
7. What is the function of the spinal cord?
8. Describe the functions of the four lobes of the brain.
9. Describe the specializations of each hemisphere of the brain.
10. Differentiate between Broca's aphasia and Wernicke's aphasia.

Answer Key

1. Two main reasons are given in the text. The first reason is that the field of cognitive psychology is not that advanced yet. The second reason is that researchers in other areas of social science have found other explanations for phenomena they study (apart from the potential explanatory contributions of cognitive psychology).
2. Empiricism and nativism are both philosophical positions that have potential implications for the study of human cognition. Empiricism is the view that all knowledge comes from experience. Nativism is the view that children are born into the world with a great deal of innate knowledge.
3. German introspection involved an intense analysis of the contents of the human mind. This analysis was conducted by highly trained observers reporting the contents of their own consciousness under carefully controlled conditions. American introspection differed, however, in that it was not implemented as intensely. It involved a relatively more casual and reflective process of observing one's thoughts and consciousness. As a result, various laboratories in America were reporting different results from introspection, with results tending to reflect the theory of that particular laboratory.
4. Introspectionists, behaviorists, and Gestalt psychologists had conflicts regarding how human behavior and/or cognition should be studied. Introspectionists used a method of inquiry, called "introspection," that involved highly trained observers reporting the contents of their own consciousness under carefully controlled conditions. An underlying assumption of this method was that the workings of the human mind should be open to self-observation. Behaviorists strongly disagreed with this view, as they rejected introspection as a worthwhile method. To the contrary, they believed that psychology should only study external, observable behavior, rather than the inner workings of the mind. Gestalt psychologists claimed that the activity of the brain and the mind was more than the sum of its parts. Thus, they were criticized by behaviorists for studying thought and consciousness at all. They also differed from introspectionists in that they sought to study the brain and mind holistically, rather than analyzing the parts of conscious thought.
5. Thorndike ignored introspection, as he believed that conscious experience "was just excess baggage that could be largely ignored."
6. The fields of cognitive psychology and cognitive science overlap, though they also have their differences. Cognitive psychology relies heavily on experimental techniques for studying behavior that grew out of the behaviorist era. Cognitive science makes greater use of such methods as logical analysis and the computer simulation of cognitive processes.
7. The main function of the spinal cord is to carry neural messages from the brain to the muscles and sensory messages from the body to the brain.
8. The occipital lobe contains the primary visual areas, and its main function is vision. The parietal lobe's functions include some perceptual functions (including spatial processing and representations of the body) and control of attention. The temporal lobe receives input from the occipital lobe, and it is involved in object recognition as well as language processing. The frontal lobe has two major functions: motor functions and higher-level processes, such as planning (these higher-level processes are localized specifically in the prefrontal cortex).

9. In general, the left hemisphere is associated with linguistic and analytic processing, while the right hemisphere is associated with perceptual and spatial processing.
10. People suffering from Broca's aphasia typically have damage to Broca's area (in the left cortex of the brain). They have a form of aphasia that results in their speaking in short, ungrammatical sentences. People with Wernicke's aphasia typically have damage to Wernicke's area (also in the left cortex of the brain). They have a form of aphasia that results in their speaking in fairly grammatical sentences that are almost devoid of meaning. They usually have difficulty with vocabulary and generate “empty” speech.

1. Herbert Simon, who has won the Nobel Prize for his work in economics, has spent the last 40 years studying this phenomenon in cognitive psychology.
 - A) complex problem solving
 - B) attentional mechanisms
 - C) decision making
 - D) memory encoding

2. Kahneman, a cognitive psychologist with expertise in decision making, received the Nobel Prize in 2002 for his contributions to which of the following topics?
 - A) behavioral economics
 - B) athletic performance
 - C) high-risk behavior
 - D) frontal lobe function

3. A centuries-old debate has raged among those who believe that all knowledge comes from experience and those who hold that we are born with innate knowledge. The former position is known as _____, while the latter position is referred to as _____.
 - A) rationalism; positivism
 - B) empiricism; nativism
 - C) dualism; interactionism
 - D) behaviorism; epiphenomenalism

4. From the perspective of cognitive psychology, the MOST lasting contribution of behaviorism is:
 - A) the initiation of the use of the animal model in psychology.
 - B) the development of clinical applications of both Pavlov and Skinner's work.
 - C) a set of sophisticated and rigorous techniques and principles for experimental study in all fields of psychology.
 - D) the adherence to the notion that internal processes are not measurable and thus should not be studied.

5. Which of the following is NOT true of Sternberg's information-processing account of his digit-probe paradigm?
 - A) The processing of information has a highly symbolic character.
 - B) The critical dependent variable is participants' reaction time.
 - C) The computer metaphor is important to properly understand human information processing.
 - D) Information processing should be conceptualized with reference to brain location and processes.

6. In the nervous system, synapses that cause depolarization, causing the potential differences between the internal and external portions of the membrane to become smaller, are referred to as _____, while synapses that cause hyperpolarization, causing the potential differences to become larger, are referred to as _____.
- A) excitatory; inhibitory
 - B) g-protein synapses; salutatory synapses
 - C) dendritic; axonal
 - D) glial; reuptake
7. Which individual identified 52 separate regions of the cerebral cortex according to differences in cell types found in each region?
- A) Hubel
 - B) Brodmann
 - C) Olds
 - D) Sherrington
8. The _____ area of the cerebral cortex is thought to control higher-level processes such as planning.
- A) Broca's
 - B) fusiform face
 - C) primary auditory
 - D) prefrontal
9. Which of the following brain structures is NOT part of the basal ganglia?
- A) the putamen
 - B) the caudate nucleus
 - C) the thalamus
 - D) the globus pallidus
10. Areas of the brain responsible for receiving sensory information are organized in such a way that more sensitive areas (that is, the fovea in the retina, the hands or mouth in the body) are represented to a much greater extent than less sensitive areas and thus occupy more space in these cortical sensory areas. This type of organization is known as _____ organization.
- A) spatially sensitive
 - B) geometric
 - C) topographic
 - D) nonspecific

11. The cortical minicolumns found in the primary visual area of the brain demonstrate particularly well which principle of neural organization?
- A) the presence of dominance columns
 - B) the comparative lack of glia in the cortex
 - C) the highly specialized function of some adjacent neurons
 - D) the existence of structures without specific purpose
12. The results from Posner, Peterson, Fox, and Raichle's (1988) PET study of reading revealed which finding?
- A) Reading is a right-hemisphere phenomenon.
 - B) There are different neural pathways for the transmission of auditory and visual language.
 - C) Dyslexia is actually a collection of different reading disorders.
 - D) Different brain regions are involved in passive reading tasks versus word-generation tasks.
13. This technique employed in cognitive neuroscience involves the use of a small magnetic field applied briefly to a part of an individual's head in order to disrupt functioning in a particular part of the brain.
- A) fMRI
 - B) TMS
 - C) PET
 - D) EEG
14. Measurements of the blood oxygen level dependent (BOLD) response are critical to which neuroscience technique?
- A) fMRI
 - B) single-cell recording
 - C) PET
 - D) event-related potentials

Answer Key

1. A
2. A
3. B
4. C
5. D
6. A
7. B
8. D
9. C
10. C
11. C
12. D
13. B
14. A

1. Why should scientists in other fields study cognitive psychology?
2. What are the practical applications of cognitive psychology? Give specific examples.
3. Why was cognitive psychology ignored as a subject of scientific inquiry for so many years?
4. Why did introspection fall out of favor among psychologists?
5. What influences account for the modern development of cognitive psychology?
6. How does Sternberg's theory exemplify a classical abstract information-processing account?
7. What are split-brain patients, and what have we learned from research on them?
8. Describe the methods used in cognitive neuroscience. In other words, how does one explore the neural basis of cognition?
9. Select and describe two brain-imaging techniques. What are the benefits of each? What are the limitations of each?

Answer Key

1. Reasons given in the textbook:
 - The basic mechanisms of human thought are important in understanding the types of behavior studied by other social sciences.
 - Cognitive psychology is analogous to physics, in the sense that it is foundational to the other social sciences (in the same way that physics is foundational to the physical sciences).Examples given in the textbook—Cognitive psychology is important in understanding:
 - Psychopathology and its treatment (clinical psychology)
 - How people behave (social psychology)
 - How persuasion works (political science)
 - How people make economic decisions (economics)
 - How groups can be organized (sociology)
 - The features of language (linguistics)
2. One general point from the textbook:
 - We could greatly improve humans' intellectual training and performance by better understanding intelligence and the acquisition of intellectual skills.Other specific examples given in the textbook:
 - Research regarding eyewitness testimony reliability, which led to the formation of guidelines for law enforcement personnel
 - The design of computer-based devices, such as modern flight management systems on modern aircraft
 - Advances in reading instruction and computerized mathematics instruction (education)Given these examples, many more practical examples are possible in the future.
3. • Main reason: People did not believe that the human mind could be subjected to scientific analysis.
 - In the time of the ancient Greeks, philosophical debates would sometimes touch upon aspects of human cognition, but during this time other sciences developed, while cognitive psychology did not.
 - It was not until the end of the 19th century that the scientific method was utilized to study human cognition.
 - There were no technological or conceptual barriers to studying the mind scientifically prior to the end of the 19th century, but people were confused regarding how the human mind could possibly study itself.
4. • The German version was an intense process that involved having highly trained observers report the contents of their own consciousness under tightly controlled conditions, which led to controversy regarding whether or not conscious thought could be studied, since observers sometimes had a difficult time articulating their conscious experiences.
 - The American version was implemented in a relatively more casual and reflective manner—not an intense analytic process—so different laboratories would report different results of introspection. Results were highly reflective of the laboratory members' own theory, suggesting that the introspective process was somehow subjective or tainted.

- The American intellectual climate was also focused on the need for an “action oriented” psychology that would have practical applications, particularly for education. It did not lend itself well to American receptivity toward intense studies of consciousness.
5. Cognitive psychology developed primarily between 1950 and 1970, and the main influences identified in the textbook as contributing to its development are:
 - Research on human performance, which was a result of World War II
 - Governments' practical war-time issues—such as helping soldiers use complicated equipment and training them to attend and perform under stress
 - Broadbent and other psychologists of his time integrating research on human performance with new ideas from an area of study called information theory, which led to new developments in understanding perception and attention but also led to other analyses pervading all aspects of cognitive psychology
 6. According to the textbook, there are four main ways in which Sternberg's theory exemplifies the information-processing approach:
 1. Information processing is discussed without reference to the brain and its structures.
 2. The processing of the information has a highly symbolic character.
 3. The processing of information can be compared with the way in which computers process information.
 4. The information processing is conceived as occurring in discrete stages (represented by a flowchart), with certain stages taking a certain amount of time.
 7. Split-brain patients have undergone surgery to sever their corpus callosum (the part of the brain connecting the right and left hemispheres). This surgery is sometimes done to prevent severe epileptic seizures, for example. Research on split-brain patients has taught us a lot about the functional differences between the right and left hemispheres:
 - If a word was flashed on the left side of a screen that a split-brain patient was viewing, it would be received by the right, nonlanguage hemisphere. The patient would be able to pick up an object that the word described but would not be able to say the word
 - The right hemisphere can only process simple linguistic commands, while the left hemisphere demonstrates full linguistic comprehension
 - The right hemisphere can much more adeptly perform basic manual tasks (with the left hand) compared with the left hemisphere (with the right hand).
 8. Historically:
 - Animal studies involving surgical removal of part of an animal's brain to observe the resulting functional deficits or measurement of neural activity in particular regions (limited generalizability to humans)
 - Patient populations (e.g., patients with localized brain damage, split-brain patients, etc.)

More recently, new methods have developed in the study of cognitive neuroscience, primarily involving noninvasive brain-imaging techniques:

 - Electroencephalography (EEG—recording electrical potentials on the scalp)
 - Magnetoencephalography (MEG—recording magnetic fields produced by the brain's electrical activity)
 - Positron emission tomography (PET—measuring metabolic rate or blood flow in

brain regions)

- Functional magnetic resonance imaging (fMRI—also measuring metabolic rate or blood flow in brain regions)
- Transcranial magnetic stimulation (TMS—briefly incapacitating a region of the brain to study its function)

9. The brain-imaging techniques described in the text include:

- Electroencephalography (EEG—recording electrical potentials on the scalp)
- Magnetoencephalography (MEG—recording magnetic fields produced by the brain's electrical activity)
- Positron emission tomography (PET—measuring metabolic rate or blood flow in brain regions)
- Functional magnetic resonance imaging (fMRI—also measuring metabolic rate or blood flow in brain regions)
- Transcranial magnetic stimulation (TMS—briefly incapacitating a region of the brain to study its function).

Each technique also has benefits and limitations:

- EEG yields good temporal resolution with event-related potentials, but it is difficult to determine the location(s) of the brain structures involved in scalp activity.
- MEG provides better spatial resolution than EEG and is good at detecting activity in the sulci (creases) of the cortex, but it is less sensitive to activity in the gyri (bumps) or deep-brain activity.
- PET and fMRI both provide good information about the location of neural activity but poor information about the timing of that activity.
- fMRI offers better spatial resolution than PET and is less intrusive.
- TMS is relatively safe and has no lasting effect, and it can help determine causal relationships between brain structures and functions.